battery 104. For example, the internal battery 150 may be rated from about 3,000 mah to 20,000 mah, or higher. A compact battery charger 102 having a 12,000 mah internal battery 150, for instance, may output 200 cranking amps / 400 peak amps during the jump start function, which is sufficient to start a vehicle, but higher power internal batteries are contemplated for larger vehicles and trucks. In certain embodiments, the internal battery 150 may comprise a plurality of electrically coupled batteries (*e.g.*, connected in parallel, or when multiple lower voltage batteries are to be summed, in series). For example, lithium ion batteries containing LiFePO, $LiFePO_4$, $LiFeMgPO_4$, and $LiFeYPO_4$ have a nominal cell voltage of about 3.2V to 3.3V each. Thus, internal battery 150 need not be limited to a single battery or single battery cell. Accordingly, four lithium ion cells may be connected in series to achieve a nominal voltage of 12.8V to 13.2V. To the extent that a higher nominal voltage is desired, additional lithium ion cells may be connected in series to achieve higher voltages.

[0040] The compact battery charger 102 may receive external power via a direct current (DC) input terminal 154 coupled to a DC power supply 156 and/or an alternating current (AC) input terminal 134 coupled to an AC power supply 148. AC power supply 148 may be wall current (*e.g.*, 110VAC), while the DC power supply 156 may be, for example, an automotive cigarette lighter (*e.g.*, 12VDC) or a USB port (*i.e.,* 5VDC). The compact battery charger 102 may provide a plurality of DC outputs 136 to facilitate charging energy (*e.g.*, to external battery 104 or one or more portable electronic devices 152) or boosting energy (*e.g.*, to a vehicle/external battery 104). In certain aspects, such as when a USB Port or 12V port is used, a DC connector may be used for both DC input terminal 154 and DC output terminal 136. That is, the compact battery charger 102 may draw power from a device coupled to the DC connector (functioning as a DC input terminal 154), or supply power to the device coupled to the DC connector (functioning as a DC output terminal 136). To convert the AC power supply 148, an AC to DC transformer may be provided, which may be integral with, or external to, the compact battery charger 102. An AC to DC transformer may removably coupled to wall current and removably coupled to the compact battery charger 102. In certain aspects, a power inverter and AC output terminal may be provided to output an AC voltage (*e.g.*, a 110VAC output). In such an embodiment, power from the DC power supply 156 or the internal battery 150 may be processed (*e.g.*, using a DC to AC inverter) and used to supply the AC voltage to the AC output terminal.

[0041] In operation, when the AC power supply 148 or DC power supply 156 is unavailable (*e.g.*, disconnected, out of service, when a circuit breaker is blown, the compact battery charger 102 is

DELTRAN EX1002
IPR2024-01219

otherwise disconnected, etc.), the compact battery charger 102 may draw the power needed to operate the compact battery charger 102's components from the external battery 104 and/or internal battery 150, thereby enabling the user to determine the status of the compact battery charger 102 (and state of charge, or other parameters, of the external battery 104) when the AC power supply 148 and the DC power supply 156. To that end, the compact battery charger 102 may report a power supply failure (*e.g.*, as an alert) to one or more portable electronic devices 152 (*e.g.*, phones, tablet computers, portable computers, or other handheld terminals) within a battery monitoring system via a communication network. A suitable example battery monitoring system is disclosed by commonly owned U.S. Patent Serial No. 14/826,805 by Brian F. Butler et al, filed August 14, 2015 and titled "Battery Charger Status Control System And Method."

[0042] The battery charging method or technique can be any of a variety of charging techniques including conventional, fast charging, and the like. The compact battery charger 102 may be further configured to determine, automatically, different battery chemistry (*e.g.*, AGM, gel, lithium ion, etc.) and the battery's nominal voltage. The charging characteristics of a battery charger may be configured to match the battery chemistry of the battery to be charged. For example, lead acid batteries may be charged with constant power, constant current, constant voltage, or combination thereof. Such batteries are known to be charged with both linear as well as switched-mode battery chargers. U.S. Patent No. 7,808,211, assigned to the same assignee as the assignee of the present invention, discloses an example of a switched-mode battery charger for automotive and marine battery applications. Further, commonly owned U.S. Patent No. 8,947,054 discloses a battery charger and method utilizing alternating DC charging current, while commonly owned U.S. Patent No. 8,575,899 discloses a battery charger with automatic voltage detection.

[0043] The identified battery chemistry and voltage may be displayed on display device 114. The compact battery charger 102 may indicate to the user (*e.g.*, via display device 114) the number of ampere hours put into battery, and/or an indication of the state of health of the external battery 104. For example, if customer inputs a battery size/model number, the compact battery charger 102 can use the battery capacity to provide the state of health. The compact battery charger 102 may indicate to the user the state of charge or health of the internal battery 150 (*e.g.*, the number of coulombs) via display device 114.

[0044] The compact battery charger 102 may further include an input/output interface 126 that interfaces the processor 128 with one or more peripheral and/or communicative devices, such as

DELTRAN EX1002
IPR2024-01219

a user interface 138, a Global Positioning System (GPS) transmitter 140, a wired link 142, a wireless device 144, a microphone 158, and a speaker 124, which may be used to signal an alert (*e.g.*, charge complete, error, etc.) or other status information.

[0045] As illustrated, the processor 128 may be operatively coupled to a display device 114 via a display driver 116. The display device 114 may comprise, or otherwise employ, one or more light emitting diodes (LEDs) and/or a liquid crystal display (LCD) screen. The LCD screen may be an alphanumeric segmented LCD display, or a matrix LCD display, such as those used on portable electronic devices. In certain embodiments, the LCD screen may further provide touch screen functionality to facilitate user input device via a thin layer of sensing circuitry present either beneath the visible portion of display device 114's surface, or as part of a thin, clear membrane overlying the display device 114 that is sensitive to the position of a pen or finger on its surface. In operation, the display driver 116 may receive display data from the processor 128 via input/output interface 126 and display that display data via the display device 114. For example, interactive display device 114 may be provided on the housing to provide the user with status information and/or input capability (*e.g.*, via a touch screen or voice commands using, for example, wave files). Reminders, or other information (*e.g.*, status information), may be displayed to the user, via the display device 114, as a scrolling message or menu structure (*e.g.*, a graphical user interface (GUI)).

[0046] With regard to the internal data storage device 122, example flash memory devices include, for example, memory cards, such as RS-MMC, miniSD, microSD, etc. The internal data storage device 122 can function as an external hard drive or flash drive, thereby enabling the user to store digital files to the compact battery charger 102. In instances where the internal data storage device 122 is removable, as is the case with memory cards, the user can interchange, upgrade, or remove the memory card (*e.g.*, if the compact battery charger 102 becomes defective) to avoid data loss. The display device 114 may be used to display, for example, the contents of the internal data storage device 122, the remaining storage capacity (*e.g.*, as a percentage or in terms of available bytes), and, in certain aspects, the digital files themselves (*e.g.*, photos may be displayed, files accessed, etc.). In certain aspects, in addition to (or in lieu of) charging a portable electronic device (*e.g.*, a smart phone), the compact battery charger 102 may back up digital content stored to the portable electronic device 152 when the portable electronic device 152 is coupled to the compact battery charger 102 via, for example, the USB port.

DELTRAN EX1002
IPR2024-01219

[0047] When an external battery 104 is connected to DC output terminal 136 (*e.g.*, via clamps), the display device 114 may display the external battery 104's voltage. The display device 114 may also indicate the state of charge in terms of percent of charge of the jump starter's internal battery 150. During user inactivity, such as when charging the external battery 104 or the internal battery 150, the display device 114 may enter a sleep mode and will not display any messages until activity is detected (*e.g.*, when devices are connected/disconnected from the compact battery charger 102 or the user interface 138 is actuated). As discussed below, if the external battery 104's voltage is too low to detect, the display device 114 may remain blank and the voltage will not display, but a manual start procedure may be selected to enable the jump start function. The jump start function may be used to start a vehicle having an external battery 104 (*e.g.*, a depleted automotive battery). The jump start function causes the compact battery charger 102 to output about 400-600 peak amperes (270-405 cranking amperes) via clamps coupled to the DC output terminal 136. One of skill in the art, however, would recognize that the internal battery 150 may be replaced with a higher capacity battery to facilitate higher output currents.

[0048] In one example, once an AC power supply 148 is connected, a first LED may be illuminated to indicate that the compact battery charger 102's internal battery 150 is charging. When the compact battery charger 102 is fully charged, a second LED on the unit may be illuminated. Finally, when the DC output terminal 136 is successfully coupled (*e.g.*, clamped or otherwise electrically coupled) to external battery 104, a third LED may be illuminated. Rather than employing separate LEDs, an LCD display or a single multi-color LED may be employed that changes color depending on the status of the compact battery charger 102. The compact battery charger 102 may be further equipped with a light, which functions as a map light, flash light, emergency light, etc. The light may be activated and deactivated via user interface 138. The light may be an LED that outputs, for example, about 1 Watt/90 Lm.

[0049] When an LCD display is employed, the display device 114 may be configured to display, in addition to, or in lieu of, the LEDs, a number of messages to indicate the current status, or operation of the compact battery charger 102 to the user. In selecting the message(s) to display, the compact battery charger 102 measures one or more parameters of the internal battery 150, external battery 104, or of the compact battery charger 102. Parameters include, for example, voltage, power capacity, temperature, connection status, etc. Example messages include those illustrated in Table A, where "[XX]" represents a measured or calculated value.

DELTRAN EX1002
IPR2024-01219

Message	Status/Condition
Charging [XX]%	Coupled to AC power supply 148 or DC power supply 156 and internal battery 150 is charging.
Fully Charged	Coupled to AC power supply 148 and internal battery 150 is fully charged.
Battery Too Hot To Charge	Disconnect from AC power supply 148 or DC power supply 156 and allow internal battery 150 to cool down before charging.
Battery Too Cold To Charge	The temperature of the internal battery 150 is too low.
Charging - USB On	The USB port is in use while the internal battery 150 is charging.
Charging – 12V On	The 12V port is in use while the internal battery 150 is charging.
Fully Charged - USB On	The internal battery 150 is fully charged and the USB port is in use.
Fully Charged - 12V On	The internal battery 150 is fully charged and the 12V port is in use.
Unplug Charger	Attempting to use the jump starter function while the internal battery 150 is charging.
Charge Aborted	Charging cannot be completed normally.
Battery [XX]% - USB On	The USB port is in use. The percentage shows the internal battery 150's charge.
Battery [XX]% - 12V On	The 12V port is in use.
12V/USB Overload	The 12V/USB port is overloaded.
Battery Low - Recharge	While using the 12V/USB port, the internal battery 150's voltage has dropped. The 12V/USB power will shut off after

DELTRAN EX1002
IPR2024-01219

	10 minutes.
Battery [XX]% - Clamps Disconnected	The compact battery charger 102 is turned on, but does not detect external battery 104.
Warning - Reverse Polarity	The DC output terminal 136 is connected backwards to an external battery 104 (*i.e.*, reverse polarity).
Battery Low-Recharge	The jump start function button has been selected, but the internal battery 150 has discharged below a predetermined level.
Turn Off 12V/USB	The jump start function button has been selected, but 12V/USB function is activated.
Off	The jump start button has been pressed twice.
Battery Too Hot	The internal temperature of the internal battery 150 is too warm. Allow internal battery 150 to cool down before attempting another jump start.
Jump Start Ready - Battery Cold : Reduced Performance	The temperature of the internal battery 150 is too low, which reduces cranking performance.
Jump Start Ready	The jump start button has been pressed, compact battery charger 102 is correctly connected to a vehicle battery, and the compact battery charger 102 is ready for jump start function.
Battery Cool Down - [XX] Seconds Remaining	Shows waiting time needed before attempting another engine start.

Table A

[0050] The user interface 138 may be used to enable the user to switch the output charge amperage (*e.g.*, 1A, 10A, 50A, 100A, etc.) or another setting (*e.g.*, charge, boost, other). Example user interface 138 devices may include, for example, physical buttons, physical switches, a digitizer (whether a touch pad, or transparent layer overlaying the display device 114), voice command (*e.g.* via the microphone 158 and speaker 124), and other input devices. For instance, using the digitizer, a

DELTRAN EX1002
IPR2024-01219

user may control or interact with the compact battery charger 102 by writing or tapping on the display device 114 using, a pen, stylus, or finger.

[0051] The GPS transmitter 140 may be used to track and/or monitor the location of the compact battery charger 102 and to relay the location information in the form of positional data (*e.g.*, geographic coordinate system data or Internet Protocol (IP) address) to a booster management server or another device in battery charging system or via a communication network. For example, a computer may be configured to track the activities, location, and/or charge history of a particular compact battery charger 102 in a battery charging system. The positional data may also be locally stored to the compact battery charger 102 (*e.g.*, to internal data storage device 122).

[0052] The wireless device 144 may be configured to manage communication and/or transmission of signals or data between the processor 128 and another device (*e.g.*, a remote interface device via a communication network or directly with a remote interface device) by way of a wireless transceiver. The wireless device 144 may be a wireless transceiver configured to communicate via one or more wireless standards such as Bluetooth (*e.g.*, short-wavelength, Ultra-High Frequency (UHF) radio waves in the Industrial, Scientific, and Medical (ISM) band from 2.4 to 2.485 GHz), near-field communication (NFC), Wi-Fi (*e.g.*, Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards), etc. For example, wireless connectivity (*e.g.*, RF 900MHz or Wi-Fi) may be integrated with the compact battery charger 102 to provide remote monitoring and control of the compact battery charger 102 via one or more portable electronic devices 152. Using a wireless device 144, a user may be able to start and/or stop the compact battery charger 102's charge cycle or otherwise change the settings.

[0053] That is, via a communication network and a booster management server, a user may monitor live charging status updates, charging conditions, historic data, remotely update software and firmware, and stay connected with the compact battery charger 102 manufacturer's news and updates. In certain aspects, an internal cellular modem may be implemented that utilizes standards-based wireless technologies, such as 2G, 3G, 4G, Code Division Multiple Access (CDMA), and Global System for Mobile Communications (GSM), to provide wireless data communication over worldwide cellular networks. An advantage of an internal cellular modem is that there is no reliance on a user's local network (*e.g.*, wireless router, modem, etc.), thereby enabling communication between the compact battery charger 102 and communication network, even in the event of a total power failure in a user's location.

DELTRAN EX1002
IPR2024-01219

[0054] In certain aspects, a wired link 142 may be provided to manage communication and/or transmission of signals or data between the processor 128 and another device via, for example, a data port 146 (*e.g.*, RS-232, USB, and/or Ethernet ports) capable of being wiredly coupled with another data port 146 positioned outside the compact battery charger 102 housing. As noted above, a USB port or 12V supply may be provided as DC output terminals 136 on the charger to facilitate the charging of accessories, such as portable electronic devices 152. Thus, the compact battery charger's 102 internal battery 150 may also be used as a power source for one or more DC accessories. Charging while operating the accessories can extend run time of the compact battery charger 102, but will also extend recharge time. If the load exceeds the charging input amperage (*e.g.*, 1A), however, the accessory being charged may discharge the internal battery 150.

[0055] The USB port may provide, for example, up to 3.0A at 5VDC. To activate the USB port, a USB power button (or other user selectable element) may be provided via user interface 138. The USB port may be activated by pressing the USB power button, and disabled by, for example, pressing the USB power button a second time, two or more times in quick succession, or held for a predetermined period of time. The 12VDC power output may provide, for example, up to 6.0A a 12VDC.

[0056] The compact battery charger 102 may further comprise a plurality of sensors to provide measurement data descriptive of the surrounding environment. In certain aspects, the USB output may automatically shut off when no load is detected (*e.g.*, after 5-10 minutes of a no load state). The 12VDC power supply, however, may remain active until the compact battery charger 102 reaches a low battery state (*e.g.*, the internal battery 150's charge level is less than a predetermined threshold, *e.g.*, number of coulombs). The 12VDC power supply may be used to supply power to an integrated or remotely situated air compressor (*e.g.*, for tire inflation) and may further function as a memory saver. The 12VDC power supply may be limited to 6.0A with over current protection. In certain aspects, a user may wish to check the internal battery 150's charge level. To do so, a button (or other user selectable element) may be provided via user interface 138 that causes the charge level to be displayed on the display device 114. To ensure accuracy of the measurement, the user may be instructed (*e.g.*, via display device 114) to turn off the compact battery charger 102 before actuating the button (or displaying the charge level). In one aspect, the display device 114 can show the internal battery 150's percent of charge, or a battery icon indicating the same. For example, the display device 114 may display "100%" (or a solid battery icon) when the internal battery 150 is fully charged.

DELTRAN EX1002
IPR2024-01219

[0057] The compact battery charger 102 may include a temperature or humidity sensor, or configured to monitor other appliances or devices, either directly (*e.g.*, using a sensor) or wirelessly (*e.g.*, using Wi-Fi). For example, the compact battery charger 102 may be configured to charge and monitor, in addition to automotive batteries, one or more portable electronic devices 152 being charged by said compact battery charger 102. Another temperature sensor may be provided to measure the temperature of a battery being charged (*e.g.*, a lithium-ion battery). If the measured temperature deviates from an operating range (*i.e.*, a range in which the measured value is acceptable), the charging or boosting operating may be prohibited.

[0058] A power management circuit 132 may be used to manage power needed to operate the compact battery charger 102 (and components thereof), start an engine, and to charge the external battery 104 or other device. That is, AC power may be drawn from an AC power supply 148, converted to DC power, and used to charge external battery 104 and/or internal battery 150. For instance, the compact battery charger 102 may be removably coupled with an AC power supply 148 located outside the housing (*e.g.*, a wall outlet) via an AC input terminal 134 and an AC to DC converter. In such an example, an AC wall charger may receive 120VAC from an electrical wall outlet and output, via an inverter, 12VDC to the compact battery charger 102's input socket. When charging, an LED (*e.g.*, a green LED) may light, and/or the display device 114 may display a message such as "Charging - [XX]%." When the charging has completed, the LED may pulse, and/or the display device 114 may display a message such as "Fully Charged."

[0059] In certain aspects, a Single-Ended Primary-Inductor Converter (SEPIC) circuit 302, in conjunction with an AC to DC converter 314, may be used to charge the internal battery 150. Generally speaking, a SEPIC circuit 302 is a type of DC to DC converter that allows the electrical potential (voltage) at its output to be greater than, less than, or equal to that at its input. The output of a SEPIC circuit 302 is controlled by the duty cycle of the control transistor. A SEPIC circuit 302 exchanges energy between capacitors and inductors in order to convert a variable input voltage to a predetermined output voltage. The amount of energy exchanged is controlled by a switch, which may be a transistor such as a Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET). As a result, a SEPIC circuit 302 enables a wide variation in input voltage both substantially higher and lower than nominal battery voltage. For example, to charge a 12 volt battery (nominal voltage) to 14.4V, the variable input voltage can be a voltage from a predetermined range, such as between 5VDC to 20VDC, thereby enabling internal battery 150 recharging functionality via a USB port, which is

DELTRAN EX1002
IPR2024-01219

5VDC. That is, the input voltage may not be always known, but the predetermined range may be known. In certain aspects, the SEPIC circuit 302 may be shut off (*e.g.*, bypassed) to facilitate a higher efficiency charge. For example, if a 20V power supply is used, the compact battery charger 102 may bypass the SEPIC circuit 302, whereas, if 12VDC power supply (*e.g.*, a vehicle charger accessory) is used, the SEPIC circuit 302 may be employed.

[0060] Accordingly, as illustrated in Figure 3, a supercapacitor 308, or another storage capacitor, may be used in conjunction with the SEPIC circuit 302 to supply a large amount of power that is sufficient time to jump start a vehicle. Supercapacitors 308 are useful in that, unlike batteries, they do not necessarily suffer from ageing and temperature problems. Because the amount of energy in the capacitor is finite, however, supercapacitors 308 are primarily used for engine starting. Yet, when a supercapacitor is simply coupled to a depleted battery, the finite energy reserve is drained into the battery, often lowering the supercapacitor's 308 voltage to a level that cannot start an engine. A jump starter battery, on the otherhand, can start an engine as it has sufficient current to override the discharging effects of a depleted vehicle battery. In cold weather, however, the peak current that a battery can supply may be limited due to the temperature effecting the chemical reaction inside the jump starter battery. This limit in peak current may be such that the engine may not turn over. Thus, an improved system for starting the vehicle may be jump starter having both an internal battery 150 and a supercapacitor 308, where the battery can supplies sufficient current to overcome the effects of the depleted external battery 104, while the supercapacitor 308 may supply the peak current.

[0061] In general, a supercapacitor 308 can hold a very high charge that can be released relatively quickly, thereby making it suitable for jump starting a vehicle, since the vehicle cranking operation lasts for a very short period of time during which high cranking power is required. Moreover, supercapacitors 308 are relatively small in size and can be employed in the compact battery charger 102 to provide sufficient cranking power to jump-start a vehicle. In operation, the SEPIC circuit 302 would draw current from the depleted external battery 104, which would be used to charge the supercapacitor 308. A small lithium battery may be used in combination with the supercapacitor to prevent the supercapacitor 308 from discharging the current back to the depleted external battery 104 until the compact battery charger 102 determines that the user trying to start the vehicle. Existing supercapacitor jump starter systems are deficient because they would require the removal of one of the external battery 104 connections to prevent the capacitor from discharging back into the dead battery. The disclose arrangement, however, obviates the need to disconnect one of the

DELTRAN EX1002
IPR2024-01219

external battery's 104 terminals. Thus, in one aspect of the present invention, a compact battery charger 102 is provided that employs a SEPIC circuit 302 in conjunction with a supercapacitor 308.

[0062] An example schematic diagram 300 of a charger having a SEPIC circuit 302 in conjunction with a supercapacitor 308 is illustrated in Figure 3. As illustrated, DC input power is received from a DC power supply 156 via DC input terminal 154, or either AC power supply 148 via an AC to DC converter 314. The DC input power is received by SEPIC circuit 302 and output to the internal battery 150 and the supercapacitor 308, in parallel, via an internal battery controller circuit 304 and a supercapacitor controller circuit 306, respectively. The internal battery controller circuit 304 and a supercapacitor controller circuit 306 may be used to monitor the parameters of the internal battery 150 and the supercapacitor 308, such as the charge level. Further, internal battery controller circuit 304 may monitor the temperature of the internal battery 150. The parameters may be communicated to the processor 128, which controlled, *inter alia*, the battery control relay 310, and supercapacitor controller 312.

[0063] The supercapacitor 308 and internal battery 150 may receive charging current from the DC input power. When DC input power is unavailable, for instance, the supercapacitor 308 may receive charging current from external battery 104 via the supercapacitor controller 312. For example, if an external battery 104 having a nominal voltage of 12VDC has depleted to 6VDC, the external battery 104 may be unable to start a vehicle, but the remaining power may be drawn from the depleted external battery 104 to the supercapacitor 308, which could then be used to boost the vehicle. As noted above, existing supercapacitor-only battery boosters were required to disconnect one of the external battery's 104 terminals so as to avoid premature discharge of the supercapacitor into the depleted battery. The lithium ion battery, however, may be used to output a current to the external battery 104, which may be monitored by the processor 128. If a drop in current is detected at the DC output terminal 136, the processor 128 may determines that the user is attempting to start the vehicle and the supercapacitor controller 312 may be instructed to electrically couple the supercapacitor 308 to the external battery 104 (via DC output terminal 136), thereby causing the supercapacitor 308 to quickly discharge into the external battery 104, thereby enabling the vehicle to start. The processor 128 may be similarly configured to control the battery control relay 310, which enables the internal battery 150 to discharge into the external battery 104.

[0064] Thus, the internal battery 150 and a supercapacitor 308 can each be recharged by a SEPIC circuit 302, which may any input voltage between, for example, 5VDC to 20VDC. The

DELTRAN EX1002
IPR2024-01219

internal battery controller circuit 304 recharges the battery inside the compact battery charger 102 properly, while a separate supercapacitor controller circuit 306 charges the supercapacitor 308. The supercapacitor 308 may also be recharged from the internal battery 150, thereby providing multiple peak current starts. The jump starting function is controlled by one or more processors 108 (e.g., a microprocessor(s)) once the jump starter cables are attached to an external battery 104 and the jump start function is engaged (either manually or automatically) the internal jump starter battery is connected by a circuit or relay to the vehicle's battery. The internal battery 150 transfers energy into the external battery 104 and when the vehicle ignition is actuated (e.g., the key is turned, or the start button is pressed), current drawn from the starter motor will cause a voltage drop across the jump starter connection leads. This voltage drop will be detected by the one or more processors 108, at which point the one or more processors 108 will electrically couple the supercapacitor in parallel with its internal battery 150 to supply the peak current required to start the engine. If the engine starts, the jump starter function is done and the compact battery charger 102 can recharge itself (*e.g.,* the internal battery 150 and/or the supercapacitor 308) from an electrical connection to the vehicle's electrical system, which may continue until the internal battery 150 and/or the supercapacitor 308 are fully charged. Afterwhich the compact battery charger 102 may shut off its charging function, or the clamps are removed. If the vehicle does not start, once the starter is disengaged the voltage on the external battery 104 will stabilize and the supercapacitor 308 will recharge from the internal battery 150 (or any available power from the external battery 104), and prepare for the next attempt to start the engine, whereby the process is repeated.

[0065] There are a number of ways in which the internal battery 150 may be charged. The user may also charge the internal battery 150 while driving via the DC input terminal 154 using a 12VDC car charger that couples to the cigarette lighter. Accordingly, a 12VDC input socket may be used to recharge the compact battery charger 102 to a point where the compact battery charger 102 is charged. The compact battery charger 102 may then be used to jump start a vehicle having an external battery 104. In certain aspects, the compact battery charger 102 may be charged through the clamps, which may be retractable and/or configured to be housed in a recess of the compact battery charger 102's housing. For example, charging may be accomplished by leaving the relay closed, thereby allowing the alternator in the vehicle, which can provide up to 70A, to rapidly charge the internal battery 150. Thus, the compact battery charger 102 may be configured to sense the current in a bidirectional manner through the clamps (*e.g.*, (1) to measure current going from the compact battery

DELTRAN EX1002
IPR2024-01219

charger 102 into the external battery 104, and (2) from the external battery 104 into the compact battery charger 102). To prevent overheating when current is passing into the compact battery charger 102, a temperature sensor may be coupled to the compact battery charger 102, whereby the relay is shut off if the compact battery charger 102, or the internal battery 150, reaches a predetermined shut-off temperature threshold. Indeed, a benefit of maximizing the amount of current going back into the compact battery charger 102 is that it yields a faster charge.

[0066] In lieu of clamps, the compact battery charger 102's charger cables may be fixedly coupled to the external battery 104 (*e.g.*, via a bolt and ring terminals) and configured to quick connect to compact battery charger 102 (*e.g.*, using quick connects/disconnect connectors). In certain instances, the quick connect connectors may not be compatible with different devices. For example, a battery maintainer (a/k/a trickle charger) may use a first type of connector, while a compact battery charger 102 may use a second type of connector. Such issues are common between different manufacturers. Due to the inconvenience of disconnecting and reconnecting the fixedly coupled connections, it may be advantageous to use a charger cable that fixedly couples to the external battery 104 at one end, but provides a plurality of different connectors at the second end. For example, the first end may be fixedly coupled to a battery terminal through the ring terminals, while the second end may be provided with two connecters, namely (1) an EC5 (male) connector configured to couple with an EC5 (female) connector of the compact battery charger 102 and (2) a second (male) connector configured to couple with a second (female) connector of a battery charger/maintainer. One or more end caps may be further provided to protect the unused connector from dirt and debris. Such a charger cable would be of particular use for vehicles that are not often used and typically require jump starting. While two connectors are described, such a charger cable need not be limited to two connectors, nor should it be limited to the example connector types described.

[0067] In another alterative, the entire compact battery charger 102 may be permanently coupled to an external battery 104 or a vehicle's electrical system (*e.g.*, installed under the hood or inside the vehicle). For example, the compact battery charger 102 may be fixedly coupled to the vehicle and remotely actuated using a physical button or controller (*e.g.*, one positioned under the hood, on the dashboard, in the glove box, etc.), or wirelessly. When integrated with the vehicle, the compact battery charger's 102 housing may be fabricated to mitigate damage from engine temperature or engine fluids. Wireless control may be accomplished using, for example, a portable electronic device 152 that is communicatively coupled to the compact battery charger 102 via a

DELTRAN EX1002
IPR2024-01219

communication network. For instance, a smart phone may wirelessly send a signal to the compact battery charger 102, either directly or through the vehicle's control system, which causes the compact battery charger 102 to output boosting energy or charging energy to the external battery 104 of the vehicle. The wireless communication may employ one or more wireless standards such as Bluetooth (*e.g.*, short-wavelength, UHF radio waves in the ISM band from 2.4 to 2.485 GHz), NFC, Wi-Fi (*e.g.*, IEEE 802.11 standards), etc. When permanently coupled to the external battery 104 or vehicle's electrical system, the compact battery charger 102 may charge the internal battery 150 when the vehicle is running via the vehicle's electrical system (*e.g.*, 12VDC supply).

[0068] In certain aspects, the supercapacitor 308 may be integrated with the vehicle's electrical system and configured to receive any residual power from the vehicle's accessories for use in jump starting the vehicles. For example, vehicles often have sufficient power to power the vehicle's entertainment system, but insufficient power to turn over the engine. In this example, the power may be diverted from the entertainment system (or other accessory or auxiliary system) at the press of a button and used to charge an integrated supercapacitor, which may be used to jump start the vehicle.

[0069] In certain aspects, the compact battery charger 102 may employ inductive charging to facilitate wireless charging of the internal battery 150. For example, the compact battery charger 102 may be placed on a corresponding charging inductor pad to charge the compact battery charger 102's internal battery 150. In one aspect, the charging inductor pad may comprise an induction coil that creates an alternating electromagnetic field from within a charging inductor pad and a second induction coil in the compact battery charger 102 that receives power from the electromagnetic field and converts the received power into electric current to charge the internal battery 150. The two induction coils in proximity combine to form an electrical transformer. Greater distances between transmitter and receiver coils can be achieved when the inductive charging system uses resonant inductive coupling. The coils may be fabricated using a number of materials, such as silver plated copper (or aluminum) to minimize weight and decrease resistance resulting from the skin effect. The charging inductor pad and the compact battery charger 102 may operate in compliance with one or more wireless power transfer standards, such as the Power Matters Alliance (PMA) under the IEEE Standards Association (IEEE-SA) Industry Connections, Rezence, and Qi. The PMA interface standard describes analog power transfer (inductive and resonant), digital transceiver communication, cloud based power management, and environmental sustainability.

DELTRAN EX1002
IPR2024-01219

[0070] Rezence is an interface standard developed by the Alliance for Wireless Power (A4WP) for wireless electrical power transfer based on the principles of magnetic resonance. The Rezence system comprises a single power transmitter unit (PTU) and one or more power receiver units (PRUs). The interface standard supports power transfer up to 50 Watts, at distances up to 5 centimeters. The power transmission frequency is about 6.78 MHz, and a plurality of devices can be powered from a single PTU depending on transmitter and receiver geometry and power levels. To use the Rezence system, the compact battery charger 102 (*i.e.*, PRU) is placed on top of the charging inductor pad (*i.e.*, PTU), which charges the compact battery charger 102's internal battery 150 via resonant inductive coupling. In addition to power transfer, the Rezence system may be used to transfer data from the compact battery charger 102 (*e.g.*, from the internal data storage device 122) to another device via the charging inductor pad. There exists, however, overlap between the PMA and Rezence specifications. For instance, PMA adopted the Rezence specification as the PMA magnetic resonance charging specification for both transmitters and receivers in both single and multi-mode configurations, while Rezence adopted the PMA inductive specification as a supported option for multi-mode inductive, magnetic resonance implementations. Akin to Rezence, Qi is an interface standard developed by the Wireless Power Consortium for inductive electrical power transfer over distances of up to 4 centimeters. The Qi system comprises a PTU and a PRU. To use the Qi system, the compact battery charger 102 (*i.e.*, PRU) is placed on top of the charging inductor pad (*i.e.*, PTU), which charges the compact battery charger 102's internal battery 150 via resonant inductive coupling.

[0071] Inductive charging offers advantages to the compact battery charger 102, beyond convenience of use. First, the connections on both the compact battery charger 102 and charging inductor pad are enclosed; therefore corrosion is avoided (or mitigated) because any electronic components are protected from water and oxygen in the atmosphere. Moreover, to mitigate water damage, the compact battery charger 102's housing may be waterproof and buoyant to facilitate, for example, marine applications. Second, inductive charging also lends durability to the compact battery charger 102 because the need to plug and unplug the device is obviated, resulting in significantly less wear and tear on the socket of the device and the attaching cable.

[0072] In certain aspects, the compact battery charger 102 may employ solar cells to facilitate a charging of the internal battery 150 and/or supercapacitor 308. The solar cell may be provided as a separate solar cell panel, or integrated with the compact battery charger 102. For example, solar cells may be positioned on an exterior surface of the compact battery charger's 102 housing or, when

DELTRAN EX1002
IPR2024-01219

integrated with a vehicle, the solar cell may be positioned on the vehicle, such as the roof, hood, trunk, windows, etc.

[0073] The compact battery charger 102's housing may further comprise a metal (*e.g.*, aluminum) plate on a back side to facilitate exterior warming of the interior battery 150 via the user's hand. Conversely, a button may be provided on the user interface 138 that causes power to be diverted from the interior battery 150 to a heating apparatus, such as a flexible heater. Flexible heaters can conform to a surface, such as a the compact battery charger 102. Example flexible heaters include silicone rubber heaters, polyimide film heaters, heating tapes, etc. Suitable flexible heaters include, for example, polyimide film insulated flexible heaters, such as those available from OMEGA Engineering Inc, and Kapton heaters (a form of ultra-thin, ultra-flexible, semitransparent, lightweight heaters), such as those available from Bucan Electric Heating Devices Inc.

[0074] The DC power may be output to the external battery 104 or other devices by way of a DC output terminal 136 (*e.g.*, battery terminal cables/clamps). Thus, power management circuit 132 and processor 128 may control the charging operation of the external battery 104 to provide charging, maintaining, and, in certain embodiments, the jump start function. Further, power management circuit 132 and processor 128 may facilitate reverse hook-up protection, as well as automatic nominal battery voltage detection. While the power management circuit 132 and processor 128 are illustrated as separate components, one of skill in the art would appreciate that power management functionality (*e.g.*, battery charging, battery maintaining, etc.) may be provided as a single component that combines the functionality of the power management circuit 132 and processor 128.

[0075] The output power may be controlled by software (*e.g.*, via a relay, MOSFET, and/or a silicon-controlled rectifier). The output power may be controlled using one or more parameters, such as maximum current over time, maximum temperature of battery, maximum time alone and/or minimum voltage (with or without time). Thus, when a parameter value is exceeded (or a requirement isn't met), the output voltage may be shut off. The compact battery charger 102 may include the ability to sense, or otherwise detect, that a battery (or other load/power supply) is coupled to the clamps. When a battery is not detected, the power may be shut off; however, the user may be provided with a manual override option (*e.g.*, by holding a button for a predetermined amount of time, such as 2 to 10 seconds, or about 5 seconds). In certain aspects, the compact battery charger 102 may not charge an external battery 104 when the external battery 104 is too hot or cold, thereby avoiding potential hazards and maintaining efficiency.

DELTRAN EX1002
IPR2024-01219

[0076] The compact battery charger 102 may further include the ability to sense the occurrence of a manual override, and, if voltage is still 0 after engine start, the user may be instructed to check and replace the vehicle battery. Further, an automatic shut-off function may be provided if a battery/load/power supply is not attached to the clamps within a predetermined amount of time (*e.g.*, about 1 to 60 minutes, more preferably about 5 to 30 minutes, most preferably about 15 minutes). The compact battery charger 102 may further preheat a cold battery by, for example, running amperes though the battery, or an internal heater. The compact battery charger 102 may further employ alternate power sources, such as a solar panel to enable battery maintaining and charging, as well as data monitoring through solar panels (*e.g.*, one or more 12-14 Watt panels). For example, solar cells may be used to charge or maintain fleet vehicles, such as vehicle dealership fleets, rental vehicles fleets, etc.

[0077] To use the jump start function, the DC output terminal 136 may be coupled to the external battery 104 (*i.e.*, the battery to be charged/jumped, whether directly or indirectly) and the user interface 138 may be used to activate the boost feature. If the compact battery charger 102 is being charged when the jump start function is selected, the display device 114 may indicate that the jump start function cannot be performed while the compact battery charger 102 is charging. If the clamps are improperly connected (*e.g.*, reverse polarity or disconnected), an aural alarm may sound, and the display device 114 may display a warning message, such as "Warning – Reverse Polarity" or "Warning - Battery Disconnected." Conversely, if the clamps are properly connected and the compact battery charger 102 is ready for use, the display device 114 may display a standby message, such as "Jump Start Ready."

[0078] If the compact battery charger 102's jump start function is attempted twice within a predetermined time period (*e.g.*, a minute), the jump start function may be prohibited until the compact battery charger 102 has cooled down. During the cool down period, the display device 114 may display a cool down message, which may also indicate the remaining time for the cool down period.

[0079] If the external battery 104's voltage is too low for the compact battery charger 102 to detect that the clamps are connected, a manual start procedure (*e.g.*, the manual override) may be selected to enable the jump start function. To use the manual start procedure, the DC output terminal 136 may be coupled to the external battery 104 and the user interface 138 may be used to activate the boost feature. For example, the same button may be used to trigger the jump start function, but

DELTRAN EX1002
IPR2024-01219

instead of a momentary press, the button may be pressed and held for a predetermined period of time (*e.g.*, about 2 to 10 seconds, more preferably about 5 seconds) until the display device 114 displays the standby message. In certain aspects, the manual start procedure may override safety features to ensure that power is delivered regardless of connection status. Accordingly, the compact battery charger 102 may energize the clamps and cause sparking if they are touched together (*i.e.*, shorted).

[0080] Figure 2 illustrates a flow diagram 200 of an example method for providing the jump start function using a compact battery charger 102. The process starts at step 202, which may be initiated by the user actuating a jump start function button on the user interface 138. At step 204, the compact battery charger 102's processor 128 determines, using one or more sensors, whether the temperature of the internal battery 150 is within an operating range. For example, if the temperature of the internal battery 150 exceeds a first predetermined shut-off temperature threshold, a warning is provided at step 220 indicating that the internal battery 150 is too hot. Similarly, if the temperature of the internal battery 150 does not meet a first predetermined shut-off temperature threshold, a warning is provided at step 220 indicating that the internal battery 150 is too cold. Otherwise, the process proceeds to the next step.

[0081] At step 206, the compact battery charger 102's processor 128 determines whether the state of charge for the internal battery 150 is within an operating range. For example, if the internal battery 150's state of charge does not meet a predetermined charge level threshold, a warning is provided at step 220 indicating that the internal battery 150 is not adequately charged. Otherwise, the process proceeds to the next step.

[0082] At step 208, the compact battery charger 102's processor 128 determines whether the internal battery 150 is being charged. If the internal battery 150's is being charged, a warning is provided at step 220 indicating that the internal battery 150 is being charged and cannot be used to provide the jump start function. Otherwise, the process proceeds to the next step.

[0083] At step 210, the compact battery charger 102's processor 128 determines whether an external battery 104 is coupled to the compact battery charger 102 (*e.g.*, via clamps coupled to the DC output terminal 136). If no external battery 104 is detected (*e.g.*, by measuring a voltage or resistance across the battery terminals), a warning is provided at step 220 indicating that the external battery 104 is not detected. Otherwise, the process proceeds to the next step.

[0084] At step 212, the compact battery charger 102's processor 128 determines whether an accessory is currently coupled to, or otherwise using, the compact battery charger 102 (*e.g.*, via DC

DELTRAN EX1002
IPR2024-01219

output terminal 136 or an AC output terminal). If an accessory is detected (*e.g.*, by detecting a load or other current draw at an output terminal), a warning is provided at step 220 indicating that the internal battery 150 is in use and cannot be used to provide the jump start function. Otherwise, the process proceeds to the next step.

[0085] At step 214, the compact battery charger 102's processor 128 determines whether an external battery 104 is properly coupled to the compact battery charger 102. If a reverse polarity condition is detected for the external battery 104, a warning is provided at step 220 indicating that the external battery 104 is improperly connected. Otherwise, the process proceeds to the next step.

[0086] At step 216, the compact battery charger 102's processor 128 determines whether the compact battery charger 102 is in a cool down period. For example, as noted above, if the compact battery charger 102's jump start function is attempted twice within a predetermined time period (*e.g.*, a minute), the jump start function may be prohibited until the compact battery charger 102 has cooled down (*i.e.*, the predetermine time period has elapsed). Accordingly, if the jump start function has been performed within a predetermined period of time, a warning is provided at step 220 indicating a cool down message, which may also indicate the remaining time for the cool down period. After the predetermined time period has elapsed at step 222 (*e.g.*, using a timer), the process may proceed to the next step.

[0087] At step 218, the compact battery charger 102 is ready to perform the jump start function, whereby boosting energy may be output to the external battery 104 upon actuating the jump start function button on the user interface 138, or automatically. The boosting energy may be provided for a predetermined period of time, before shutting off. For example, the boosting energy may be provided for 1 to 60 seconds, more preferably 5 to 30 seconds.

[0088] A warning may be provided at step 220 via one or more of a display device 114, a speaker 124, or to another device (*e.g.*, a portable electronic device 152) via a communication network. The message may indicate to the user one or more statuses/conditions of the internal battery 150, external battery 104, and/or of the compact battery charger 102, such as those illustrated in Table A.

[0089] At step 224, the process may be reset such that the process is repeated. The reset feature may be manually triggered (*e.g.*, via a button) or automatically once a predetermined condition is met. For example, if the temperature of the internal battery 150 is outside of the operating

DELTRAN EX1002
IPR2024-01219

range, the system may be automatically reset once the temperature of the internal battery 150 returns to the operating range. If a reset is not selected at step 224, the processed exits at step 226.

[0090] In certain aspects, a manual override option may be selected (*e.g.*, at any time) that causes the compact battery charger 102 to proceed to step 218, the compact battery charger 102 is ready to perform the jump start function, regardless of the status of the internal battery 150, external battery 104, or of the compact battery charger 102. Further, the compact battery charger 102's processor 128 determines whether the voltage of the internal battery 150 or the external battery 104 exceeds a predetermined threshold, in which case charging and/or boosting is prohibited to prevent overcharging.

[0091] The above-cited patents and patent publications are hereby incorporated by reference in their entirety. Although various embodiments have been described with reference to a particular arrangement of parts, features, and the like, these are not intended to exhaust all possible arrangements or features, and indeed many other embodiments, modifications, and variations will be ascertainable to those of skill in the art. Thus, it is to be understood that the invention may therefore be practiced otherwise than as specifically described above.

DELTRAN EX1002
IPR2024-01219

What is claimed is:

Claim 1. A compact battery booster comprising:

a processor;

a display device operatively coupled to the processor, wherein the display device displays a status of the compact battery booster;

a storage capacitor and an internal lithium ion battery, each of said storage capacitor and said internal lithium ion battery configured to provide a boosting energy to a vehicle coupled to an external battery;

a direct current (DC) output terminal configured to electrically couple with the external battery;

a single-ended primary-inductor converter configured to receive a variable input voltage between 5 volts DC and 20 volts DC and to output a predetermined output voltage to said storage capacitor and said internal lithium ion battery; and

a power management circuit operatively coupled to the processor, the power management circuit configured to electrically couple the DC output terminal with said storage capacitor or said internal lithium ion battery, thereby providing the boosting energy from said storage capacitor or said internal lithium ion battery to said vehicle.

Claim 2. The compact battery charger of claim 1, wherein the storage capacitor is a supercapacitor.

Claim 3. The compact battery charger of claim 1, wherein the storage capacitor draws a charging current from the external battery.

Claim 4. A compact battery charger comprising:

a processor;

DELTRAN EX1002
IPR2024-01219

a display device operatively coupled to the processor, wherein the display device displays a status of the compact battery charger;

an internal lithium ion battery, said internal lithium ion battery configured to provide a predetermined output energy;

a direct current (DC) output terminal, wherein the DC output terminal is configured to couple with an external battery;

a single-ended primary-inductor converter configured to receive an input voltage within predetermined input voltage range and to output a predetermined charge voltage to said internal lithium ion battery; and

a power management circuit operatively coupled to the processor, the power management circuit configured to electrically couple the DC output terminal with said internal lithium ion battery, thereby providing the predetermined output energy from said internal lithium ion battery to said external battery.

Claim 5. The compact battery charger of claim 4, further comprising a supercapacitor, wherein the single-ended primary-inductor converter charges the supercapacitor.

Claim 6. The compact battery charger of claim 4, further comprising a supercapacitor, wherein the supercapacitor draws current from the external battery to charge the supercapacitor.

Claim 7. The compact battery charger of claim 4, wherein the predetermined input voltage range is 5 volts to 20 volts.

Claim 8. The compact battery charger of claim 4, wherein the predetermined charge voltage is greater than the input voltage.

DELTRAN EX1002
IPR2024-01219

Claim 9. The compact battery charger of claim 4, wherein the predetermined output energy is a boosting energy for starting an engine coupled to the external battery.

Claim 10. The compact battery charger of claim 4, wherein the predetermined output energy is a charging energy for charging the external battery.

Claim 11. The compact battery charger of claim 4, further comprising (1) a reverse polarity sensor configured to detect a polarity of the external battery; (2) a temperature sensor configured to detect a temperature of said internal lithium ion battery and to provide a temperature signal to said processor; and (3) a voltage sensor configured to detect a voltage of said internal lithium ion battery.

Claim 12. The compact battery charger of claim 4, further comprising a removable internal data storage device.

Claim 13. The compact battery charger of claim 4, further comprising an internal induction coil, wherein the internal induction coil receives energy from an electromagnetic field created by an external induction coil and converts the electromagnetic field to produce the input voltage.

Claim 14. The compact battery charger of claim 4, further comprising a second DC output terminal, wherein the DC output terminal provides a boosting energy for starting an engine coupled to the external battery, and wherein the second DC output terminal provides a charging energy to a portable electronic device.

Claim 15. The compact battery charger of claim 14, wherein said second DC output terminal is a Universal Serial Bus (USB) port.

Claim 16. The compact battery charger of claim 4, wherein the display device enters into a sleep mode after a predetermined time period of inactivity.

DELTRAN EX1002
IPR2024-01219

Claim 17. The compact battery charger of claim 4, wherein the DC output terminal runs a predetermined current through the external battery to preheat the external battery.

Claim 18. The compact battery charger of claim 4, further comprising a DC to alternating current (AC) converter coupled between the internal lithium ion battery and an AC output terminal.

Claim 19. The compact battery charger of claim 4, further comprising an internal data storage device, wherein the internal data storage device backs up digital content stored to a portable electronic device via a USB port.

Claim 20. A compact battery charger comprising:

an internal lithium ion battery, said internal lithium ion battery configured to provide a predetermined output energy;

a direct current (DC) output terminal, wherein the DC output terminal is configured to couple with an external battery;

an internal induction coil, wherein the internal induction coil receives energy from an electromagnetic field created by an external induction coil and converts the electromagnetic field to produce an input voltage;

a DC to DC converter that receives the input voltage and outputs a predetermined output voltage to said internal lithium ion battery; and

a power management circuit operatively coupled to the processor, the power management circuit configured to electrically couple the DC output terminal with said internal lithium ion battery, thereby providing the predetermined output energy from said internal lithium ion battery to said external battery.

DELTRAN EX1002
IPR2024-01219

Claim 21. The compact battery charger of claim 19, further comprising a removable data storage device.

DELTRAN EX1002
IPR2024-01219

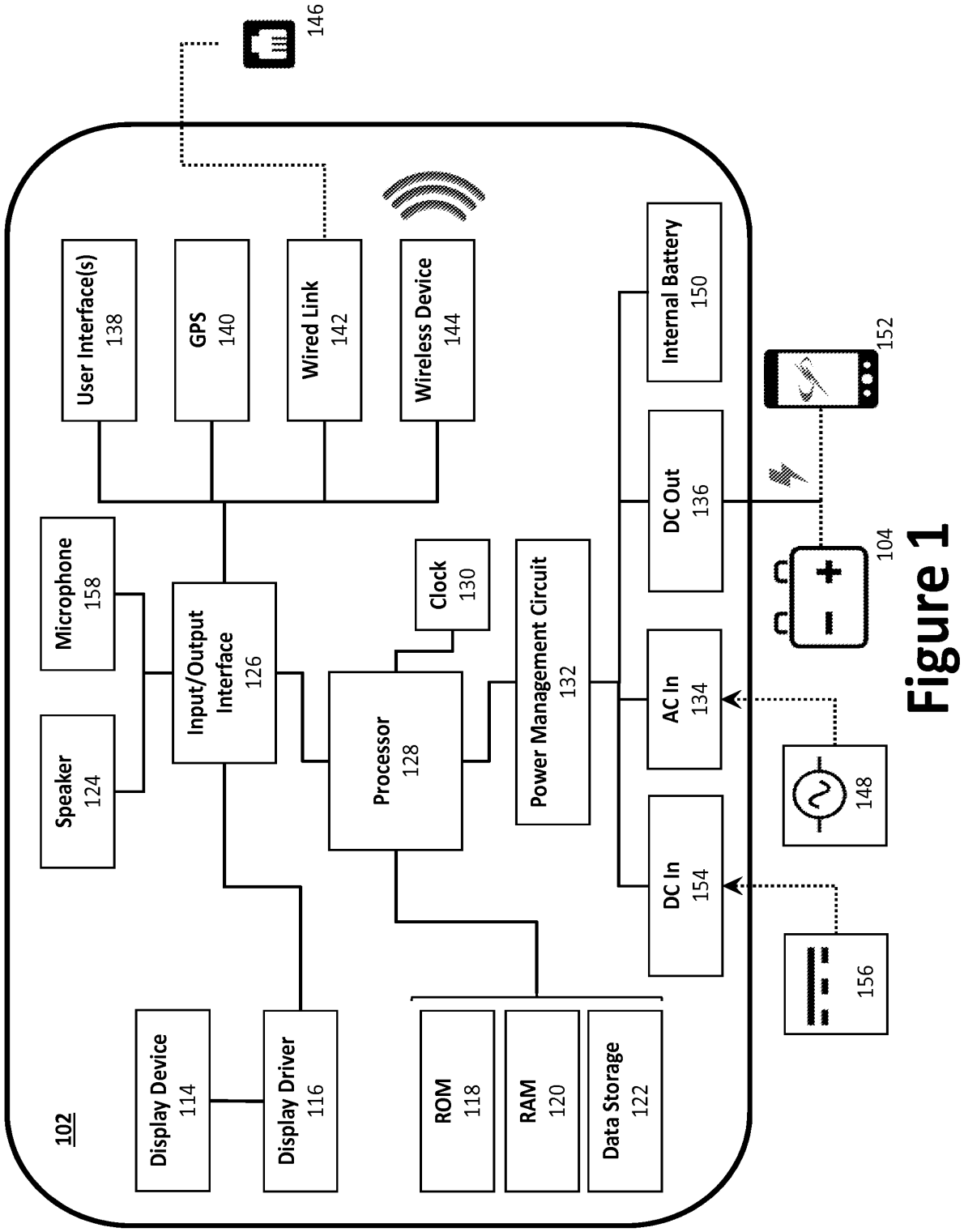


Figure 1

DELTRAN EX1002
IPR2024-01219

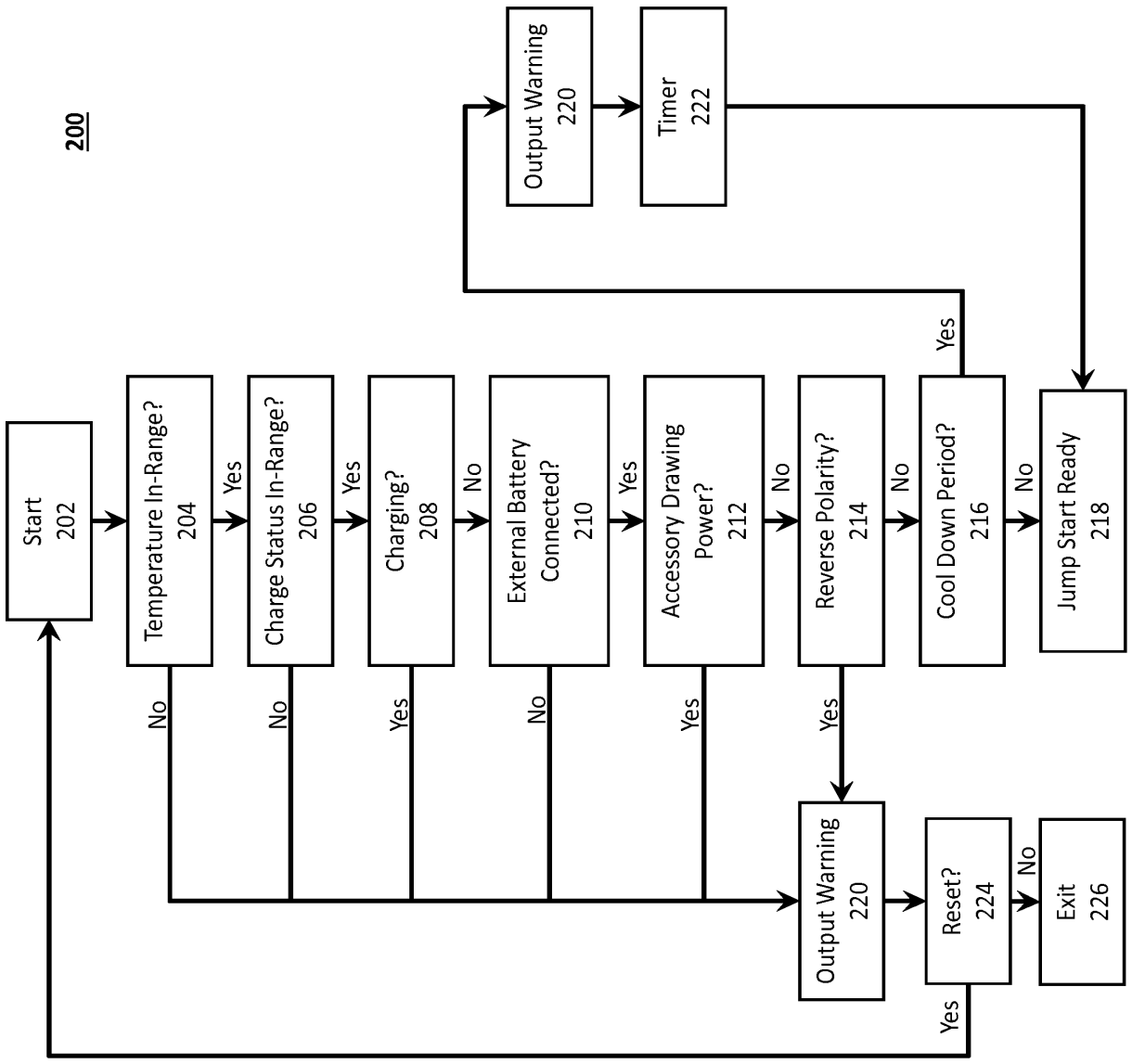


Figure 2

DELTRAN EX1002
IPR2024-01219

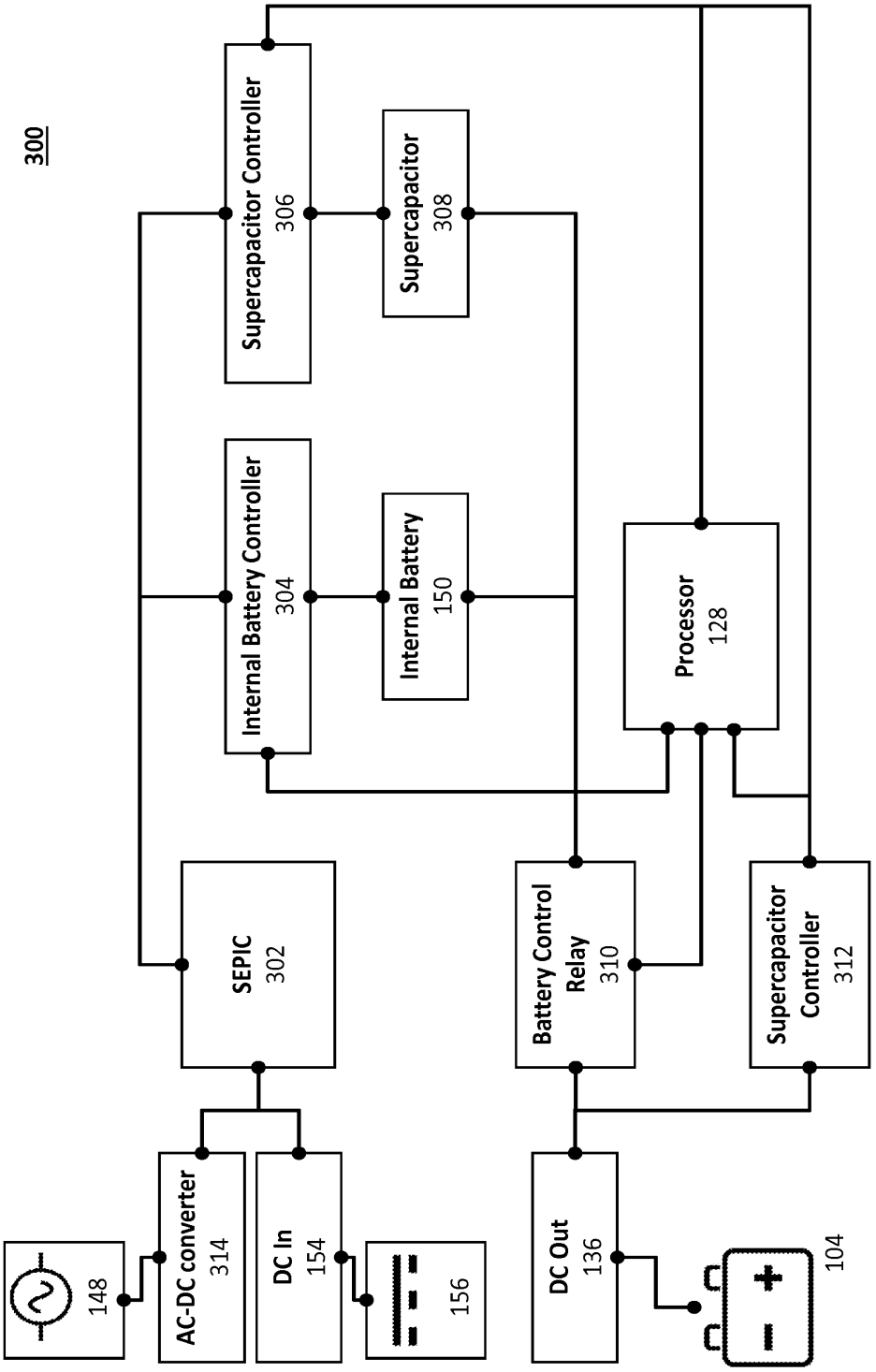


Figure 3

DELTRAN EX1002
IPR2024-01219

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/045335

A. CLASSIFICATION OF SUBJECT MATTER
IPC (2015.01) H02M 3/18, H02J 7/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2015.01) H02M 3/18, H02J 7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Databases consulted: THOMSON INNOVATION, Esp@cenet, Google Patents, Google Scholar, FamPat database
Search terms used: battery, booster, starter, crank, auxiliary power unit (APU), ground power unit (GPU), Supercapacitor (SC), electric double-layer capacitor (EDLC), ultracapacitor, Pseudocapacitance, Processor, display, user interface (UI), DC/DC converter

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2013264875 A1 MAXWELL TECHNOLOGIES INC [US] 10 Oct 2013 (2013/10/10) Figs 11-15	1-21
A	US 2011100735 A1 ISE CORP [US] 05 May 2011 (2011/05/05) Figs 1-7	1-21
A	US 2010315046 A1 TPL INC [US] 16 Dec 2010 (2010/12/16) Fig 3	1-21
A	US 2008246443 A1 DOLJACK FRANK ANTHONY, COOPER TECHNOLOGIES COMPANY 09 Oct 2008 (2008/10/09) Figs 1B, 5-6	1-21

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 Nov 2015	23 Nov 2015
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616	Authorized officer COHAY Mattan Telephone No. 972-2-5651611

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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DELTRAN EX1002
IPR2024-01219

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Information on patent family members

International application No.
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DELTRAN EX1002
IPR2024-01219

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ABSTRACT JP3185027U

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13 PROBLEM TO BE SOLVED: To provide a booster cable for a portable auxiliary power feeding device having a function as a jump starter, which is compact and lightweight and has excellent portability, which can withstand relatively intense bending motion and does not cause disconnection of a core wire. Provide booster cables. SOLUTION: A connector cover 240 is attached to a two-pole connector 230 having a male-female structure for connecting two connection cables 120A and 120B to a portable auxiliary power supply device, and two cables are derived from the two-pole connector 230. The lead-out portion of the connection cable is fixed by the connector cover 240. When the booster cable is grasped and the auxiliary power supply device is lifted and moved as it is, a strong pulling force is applied and the lead-out portion of the cable that is repeatedly bent is pinched and protected by the connector cover, so that there is no risk of disconnection in the core wire. [Selection diagram] Fig. 6

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25 【課題】ジャンプスタータとしての機能を有し、小型軽量で携帯性に優れた可搬型補助給電装置用のブースタケーブルであって、比較的激しい屈曲運動に耐え、心線の断線を引き起こす虞のないブースタケーブルを提供する。【解決手段】２本の接続ケーブル１２０Ａ，１２０Ｂを可搬型補助給電装置に接続するための雄雌同体構造の２極コネクタ２３０にコネクタカバー２４０を取り付け、２極コネクタ２３０から導出される２本の接続ケーブルの導出部分をコネクタカバー２４０により固定する。ブースタケーブルを掴んで補助給電装置を持ち上げそのまま移動した場合、強い引っ張り力が加わり、繰り返し屈曲されるケーブルの導出部分がコネクタカバーにより挟持保護されるので、心線に断線の虞がなくなる。【選択図】図６

DELTRAN EX1002
IPR2024-01219

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文献表示

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実登3185027

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DELTRAN EX1002
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要約 開く ＋

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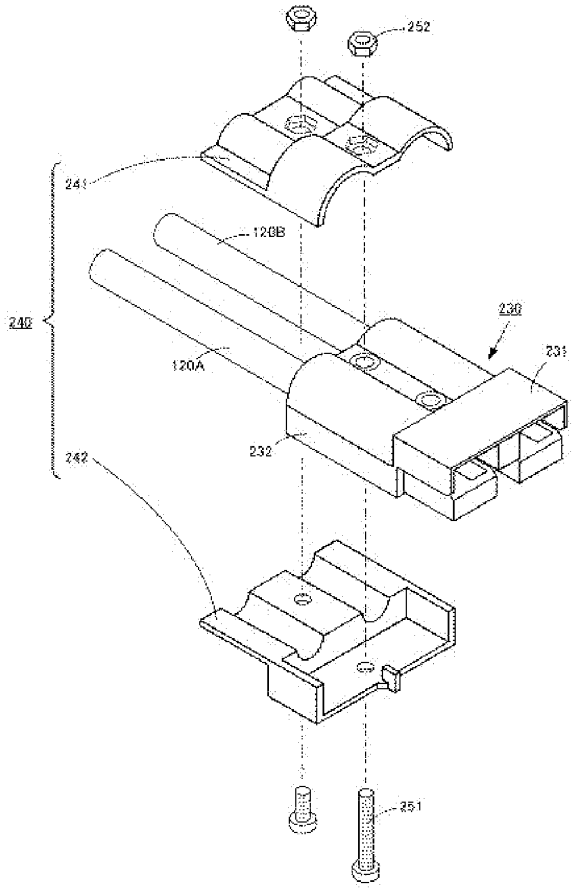
図面 開く ＋

図面 閉じる －

代表図面 1 2 3 4 5 6 7

DELTRAN EX1002
IPR2024-01219

拡大および回転



代表図面

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DELTRAN EX1002
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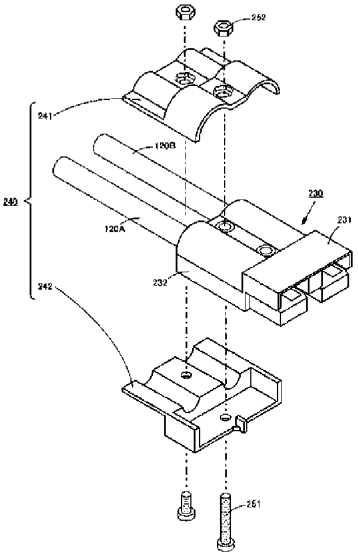
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最終頁に続く

(54)【考案の名称】可搬型補助給電装置用のブースタケーブル

(57)【要約】　(修正有)
【課題】ジャンプスタータとしての機能を有し、小型軽量で携帯性に優れた可搬型補助給電装置用のブースタケーブルであって、比較的激しい屈曲運動に耐え、心線の断線を引き起こす虞のないブースタケーブルを提供する。
【解決手段】２本の接続ケーブル１２０Ａ，１２０Ｂを可搬型補助給電装置に接続するための雄雌同体構造の２極コネクタ２３０にコネクタカバー２４０を取り付け、２極コネクタ２３０から導出される２本の接続ケーブルの導出部分をコネクタカバー２４０により固定する。ブースタケーブルを掴んで補助給電装置を持ち上げそのまま移動した場合、強い引っ張り力が加わり、繰り返し屈曲されるケーブルの導出部分がコネクタカバーにより挟持保護されるので、心線に断線の虞がなくなる。
【選択図】図６



DELTRAN EX1002
IPR2024-01219

【実用新案登録請求の範囲】
【請求項１】
ジャンプスタータとしての機能を有する可搬型補助給電装置用のブースタケーブルであって、
２本の接続ケーブルと、
上記２本の接続ケーブルの一端部に接続された２つのジャンプスタータ用鰐口クリップと、
上記２本の接続ケーブルの他端端部に設けられ、上記２本の接続ケーブルを上記可搬型補助給電装置に接続するための雄雌同体構造の２極コネクタと、
上記２極コネクタに取り付けられ、上記２本の接続ケーブルの上記２極コネクタから導出される導出部分を固定するコネクタカバーと
を備える可搬型補助給電装置用のブースタケーブル。
【請求項２】
上記２極コネクタは、上記接続ケーブルに接続された接触子が挿入される接触子挿入部と、上記接触子に接続された上記接続ケーブルを覆うケーブル導出部とが設けられたコネクタハウジングを有し、
上記コネクタカバーは、上記接続ケーブルに沿った面で二分割された上ハーフと下ハーフからなり、上記上ハーフと下ハーフにより構成される上記コネクタハウジングの上記ケーブル導出部を覆う取り付け部と、上記２極コネクタのハウジングから導出された上記２本の接続ケーブルを挟持するケーブル支持部と有し、上記取り付け部において上記ケーブル導出部に一体的に組み付け固定されることを特徴とする請求項１記載の可搬型補助給電装置用のブースタケーブル。
【考案の詳細な説明】
【技術分野】
【０００１】
本考案は、車両のバッテリが上がった場合に、車載バッテリに接続されて、エンジンを始動させるスタータを含む車両の電気負荷に対して電力を供給して、上記エンジンを始動させるジャンプスタートさせるための可搬型補助給電装置用のブースタケーブルに関する。
【背景技術】
【０００２】
従来より、例えば路上等において、消費電気量の増加等により、車両に搭載されたバッテリが放電気味となりバッテリ容量が不足して電圧が低下し、電装品が作動しなくなった場合（いわゆるバッテリあがりの場合）に、他の自動車のバッテリや非常携帯電源（ジャンプスタータ）からブースタケーブルを介して電力を供給することによりエンジンを始動させるジャンプスタートが行われている。そして、ジャンプスタートのための電気的な接続を容易にする技術（例えば、特許文献１，２参照）や、ジャンプスタートを判定する技術（例えば、特許文献３参照）など各種提案がなされている。
【０００３】
従来、ジャンプスタータでは、コストと容量の関係から密閉式鉛蓄電池が用いられていた。
【０００４】
また、ＡＣアダプタを用いて充電可能なバッテリ駆動型のノートＰＣやその付帯機器などの情報機器が広く普及している。また、車両の車内に標準的に搭載されているＤＣ１２Ｖ／２４Ｖの車内用電源ソケット、いわゆるシガーソケットに接続して利用可能な車載対応の電気機器が数多く提供されている。また、近年の携帯電話やＵＳＢ（Universal Serial Bus）で給電可能な携帯音楽プレーヤ等の省電力で駆動可能な電子機器が広く使用されている。従来から、屋外で電気機器を使用するためにポータブル電源装置が用いられている。
【０００５】

DELTRAN EX1002
IPR2024-01219

ところで、一般的な密閉式鉛蓄電池を用いた従来のジャンプスタータでは、５～７ｋｇ程度の重量があり、携帯性に欠けるという問題点があった。また、満充電に平均１０～１５時間程度を要し、満充電状態での始動（ジャンプスタート）可能回数は平均で５回程度であった。さらに、鉛蓄電池は、過放電や過充電を行うと劣化が早くなり、自己放電も進みやすい性質があり、通常の鉛蓄電池の放電率は３０％程度であって、不使用状態でも自己放電して充電の必要性が出てくる。なれない人では適正な時期に充電操作が行えず、過充電や過放電を起こしてしまうことが多く、誰でも簡単に取り扱いができるものではなく、使い勝手が非常に悪いものであった。

【０００６】

また、従来のポータブル電源装置においても、鉛蓄電池が使われていたので重く、可搬性や使い勝手等の観点から従来のジャンプスタータと同様な問題点があった。

【先行技術文献】

【特許文献】

【０００７】

【特許文献１】特開２００４－１３４２７８号公報

【特許文献２】特開２０１１－９７７１０号公報

【特許文献３】特開２００７－２７８２１６号公報

【考案の概要】

【考案が解決しようとする課題】

【０００８】

本件出願人は、上述の如き従来の実情に鑑み、ジャンプスタータとしての機能を有し、しかも、バッテリ駆動型のノートＰＣやその付帯機器などの情報機器、シガーソケットに接続して利用可能な車載対応の電気機器、携帯電話やＵＳＢで給電可能な携帯音楽プレーヤ等の使用を可能にするポータブル電源としての機能を有し、さらに、ＯＢＤ（On-Board Diagnostic system）システムに対応した車両のメモリバックアップ用のポータブル電源として機能する小型軽量で携帯性に優れ、使い勝手のよい車両用補助給電装置を先に提案し、提供している。

【０００９】

ところで、上記車両用補助給電装置の場合、小型軽量で携帯性に優れることから、当該給電装置にブースタケーブルを接続した状態で、上記ブースタケーブルを掴んで当該給電装置を持ち上げそのまま移動するユーザが多いことが判明した。

【００１０】

上記ブースタケーブルを掴んで上記車両用補助給電装置を持ち上げそのまま移動した場合、上記ブースタケーブルは、上記車両用補助給電装置の重量により強い引っ張り力が加わった状態で、当該ブースタケーブルに設けられたコネクタの近傍において繰り返し屈曲されることになり、心線に断線の虞が生じる。

【００１１】

本考案は、上述の如き従来の実情に鑑みてなされたものであり、その目的は、ジャンプスタータとしての機能を有し、小型軽量で携帯性に優れた可搬型補助給電装置用のブースタケーブルであって、比較的激しい屈曲運動に耐え、心線の断線を引き起こす虞のないブースタケーブルを提供することにある。

【００１２】

本考案のさらに他の目的、本考案によって得られる具体的な利点は、以下において図面を参照して説明される実施に形態から一層明らかにされる。

【課題を解決するための手段】

【００１３】

本考案は、ジャンプスタータとしての機能を有する可搬型補助給電装置用のブースタケーブルであって、２本の接続ケーブルと、上記２本の接続ケーブルの一端部に接続された２つのジャンプスタータ用鰐口クリップと、上記２本の接続ケーブルの他端端部に設けられ、上記２本の接続ケーブルを上記可搬型補助給電装置に接続するための雄雌同体構造の

DELTRAN EX1002
IPR2024-01219

２極コネクタと、上記２極コネクタに取り付けられ、上記２本の接続ケーブルの上記２極コネクタから導出される導出部分を固定するコネクタカバーとを備えることを特徴とする。

【００１４】

本考案に係る可搬型補助給電装置用のブースタケーブルにおいて、上記２極コネクタは、上記接続ケーブルに接続された接触子が挿入される接触子挿入部と、上記接触子に接続された上記接続ケーブルを覆うケーブル導出部とが設けられたコネクタハウジングを有し、上記コネクタカバーは、上記接続ケーブルに沿った面で二分割された上ハーフと下ハーフからなり、上記上ハーフと下ハーフにより構成される上記コネクタハウジングの上記ケーブル導出部を覆う取り付け部と、上記２極コネクタのハウジングから導出された上記２本の接続ケーブルを挟持するケーブル支持部と有し、上記取り付け部において上記ケーブル導出部に一体的に組み付け固定されるものとすることができる。

【考案の効果】

【００１５】

本考案によれば、ジャンプスタータとしての機能を有し、小型軽量で携帯性に優れた可搬型補助給電装置用のブースタケーブルであって、比較的激しい屈曲運動に耐え、心線の断線を引き起こす虞のないブースタケーブルを提供することにある。

【図面の簡単な説明】

【００１６】

【図１】本考案を適用したブースタケーブルを接続した車両用補助給電装置を前方側斜め上方から見た外観斜視図である。

【図２】上記車両用補助給電装置の電気的な構成を示すブロック図である。

【図３】２極コネクタにコネクタカバーを取り付けた状態を示すブースタケーブルの平面図である。

【図４】上記ブースタケーブルに接続されている２極コネクタのコネクタハウジングと接触子を示す平面図である。

【図５】上記２極コネクタの接続状態を示す要部縦断面である。

【図６】上記２極コネクタに取り付けられるコネクタカバーの分解斜視図である。

【図７】上記２極コネクタに上記コネクタカバーを取り付けた状態を示す外観斜視図であり、（Ａ）は上面側から見た状態を示し、（Ｂ）は上記２極コネクタを裏返した状態を示している。

【考案を実施するための形態】

【００１７】

以下、本考案の実施の形態について、図面を参照しながら詳細に説明する。なお、本考案は、以下の実施の形態のみに限定されるものではなく、本考案の要旨を逸脱しない範囲内において種々の変更が可能であることは言うまでもない。

【００１８】

本考案は、例えば図１に示すように、車両用補助給電装置１００に接続されるブースタケーブル２００に適用される。

上記車両用補助給電装置１００は、ジャンプスタータとしての機能を有する可搬型補助給電装置であって、図１の外観斜視図に示すように薄型箱状の筐体１０を備え、また、図２のブロック図に示すように上記筐体１０の内部に設置された充電回路部１、リチウムイオン蓄電池２、出力回路部３及び制御回路部４を備えている。

【００１９】

そして、この車両用補助給電装置１００では、家庭用電源や自動車バッテリから例えば１２Ｖの電源供給を受けるための充電用の給電ケーブルがＤＣプラグを介して外部接続されるＤＣジャックからなるＤＣ入力端子２０が上記筐体１０の左側面壁に設置されている。このＤＣ入力端子２０には、上記充電回路部１が内部接続されている。上記充電回路部１には、上記リチウムイオン蓄電池２が内部接続されている。また、上記リチウムイオン蓄電池２には、上記出力回路部３が内部接続されている。さらに、上記充電回路部１及び

DELTRAN EX1002
IPR2024-01219

出力回路部３には、上記制御回路部４が内部接続されている。

【００２０】

また、この車両用補助給電装置１００は、上記出力回路部３に内部接続されたジャンプスタート用の第１のＤＣ出力端子３１、ＰＣ電源用の第２のＤＣ出力端子３２、ＵＳＢ電源用の第３のＤＣ出力端子３３及びメモリバックアップ電源用の第４のＤＣ出力端子３４を備える。

【００２１】

上記第１のＤＣ出力端子３１は、ブースタケーブル２００が雄雌同体構造の所謂アンダーソンコネクタを用いたプラグを介して外部接続されるジャックからなる。

【００２２】

上記第２のＤＣ出力端子３２は、ＰＣ電源ケーブルがプラグを介して外部接続されるジャックからなる。

【００２３】

上記第３のＤＣ出力端子３３は、ＵＳＢケーブルがＵＳＢプラグを介して外部接続されるＵＳＢソケットからなる。

【００２４】

上記第４のＤＣ出力端子３４は、外部電源ケーブルがシガープラグを介して外部接続されるシガーソケットからなる。

【００２５】

上記ジャンプスタート用の第１のＤＣ出力端子３１と、ＰＣ電源用の第２のＤＣ出力端子３２は、上記筐体１０の右側面壁に設置されている。また、上記ＵＳＢ電源用の第３のＤＣ出力端子３３は、上記筐体１０の正面壁１３に設置されており、上記メモリバックアップ電源用の第４のＤＣ出力端子３４は、上記筐体１０の左側面壁１１に設置されている。

【００２６】

また、この車両用補助給電装置１００は、上記制御回路部４に内部接続された電源スイッチ４１、ジャンプスタートスイッチ４２、ライトセレクトスイッチ４３及びサイドライト・オン／オフ・スイッチ４４を備える。上記電源スイッチ４１、ジャンプスタートスイッチ４２、ライトセレクトスイッチ４３及びサイドライト・オン／オフ・スイッチ４４は、上記筐体１０の正面壁１３に設置されている。

【００２７】

さらに、この車両用補助給電装置１００は、上記制御回路部４に内部接続された充電量表示部５１、バッテリロー表示灯５２、一対の非常用警告灯５３Ａ，５３Ｂ及び一対の側面照明灯５４Ａ，５４Ｂを備える。

【００２８】

上記充電量表示部５１及び一対の非常用警告灯５３Ａ，５３Ｂは、上記筐体１０の正面壁１３に設置されている。

【００２９】

上記充電量表示部５１は、直線状に配置された発光色の異なる複数（この実施の形態では、赤・橙・黄・緑の４色）のＬＥＤにより構成されている。この充電量表示部５１は、上記制御回路部４により制御されて、充電量をバー表示する機能を果たすばかりでなく、緑点灯によりパワーランプとして機能し、また、黄点灯によりジャンプスタートランプとして機能する。また、上記一対の非常用警告灯５３Ａ，５３Ｂは、赤色ＬＥＤと白色ＬＥＤからなり、上記制御回路部により制御されて、交互に点滅することにより非常用警告灯として機能する。

【００３０】

また、上記バッテリロー表示灯５２は、上記筐体１０の右側面壁に設置されている。

【００３１】

上記バッテリロー表示灯５２は、赤色ＬＥＤからなり、上記制御回路部４により制御されて、上記リチウムイオン蓄電池２の電圧が所定値まで低下すると点滅状態あるいは点灯

DELTRAN EX1002
IPR2024-01219

状態となることにより、バッテリロー表示灯として機能する。

【００３２】

また、上記一対の側面照明灯５４Ａ，５４Ｂは、それぞれ直線状に配置された複数の白色ＬＥＤにより構成されている。

【００３３】

このような構成の車両用補助給電装置１００において、上記筐体１０内に設置された制御回路部４は、上記充電回路部１の動作を制御する充電制御部、上記出力回路部１の動作を制御する出力制御部、充電量表示部５１等の動作を制御する表示制御部として機能するマイクロコンピュータからなり、内部接続された上記充電回路部１及び出力回路部３の動作を次のように制御する。

【００３４】

ここで、この車両用補助給電装置１００に接続される充電用の給電ケーブルとしては、家庭用電源から充電用の１２Ｖの電源供給するためのＡＣアダプタケーブルと、自動車バッテリから例えば１２Ｖの電源供給を供給するためのシガープラグケーブルが準備されている。

【００３５】

そして、上記車両用補助給電装置１００における上記制御回路部４は、上記ＤＣ入力端子２０にＡＣアダプタケーブル又はシガープラグケーブルが外部接続され、家庭用電源又は自動車バッテリから充電用の電源が供給されることにより、上記ＤＣ入力端子２０に所定電圧値以上の電圧が印加されたことを検出すると、充電モードの制御を行う。

【００３６】

この充電モードの制御において、上記制御回路部４は、充電制御部により上記充電回路部１の動作を制御して、上記充電回路部１を介して上記リチウムイオン蓄電池２を充電し、上記リチウムイオン蓄電池２が満充電まで充電されると過充電保護回路を機能させ、充電を終了する。

【００３７】

また、上記制御回路部４は、充電制御中には、出力制御部により上記出力回路部３の動作を制御して、上記出力回路部３から外部への電源供給を禁止する。

【００３８】

さらに、上記制御回路部４は、充電制御中には、表示制御部により上記充電量表示部５１の動作を制御して、上記充電量表示部５１を制御して充電量をバー表示する。

【００３９】

上記充電量表示部５１は、上記制御回路部４により動作が制御されて、未充電状態から、バッテリ残量２０％以下を示す赤色点状態、バッテリ残量２０％から３０％を示す赤色点灯、バッテリ残量３０％から４０％を示す橙色点滅状態、バッテリ残量４０％から７０％を示す黄色点灯状態、バッテリ残量７０％から１００％を示す緑色点灯状態へと、満充電状態まで充電が進むに従って、点灯状態が順次変化する。

【００４０】

上記車両用補助給電装置１００は、上記リチウムイオン蓄電池２を充電した状態で、可搬型ジャンプスタータとして機能し、また、屋外で電気機器を使用するためにポータブル電源装置として使用することができる。

【００４１】

ここで、この車両用補助給電装置１００には、上記ジャンプスタート用の第１のＤＣ出力端子３１を構成している雄雌同体構造の所謂アンダーソンコネクタからなるジャック１３０にプラグ２３０を介して外部接続されるジャンプスタート用のブースタケーブル２００が準備されている。

【００４２】

上記ブースタケーブル２００は、図３に示すように、２本の接続ケーブルケーブル２１０Ａ、２１０Ｂの一端部に接続された２つのジャンプスタータ用鰐口クリップ２２０Ａ、２２０Ｂと、上記２本の接続ケーブルケーブル２１０Ａ、２１０Ｂの他端端部に設けられ

DELTRAN EX1002
IPR2024-01219

、上記２本の接続ケーブルケーブル２１０Ａ、２１０Ｂを上記車両用補助給電装置１００に接続するための雄雌同体構造の２極コネクタ２３０と、上記２極コネクタ２３０に取り付けられ、上記２本の接続ケーブル２１０Ａ、２１０Ｂの上記２極コネクタ２３０から導出される導出部分を固定するコネクタカバー２４０とを備える。

【００４３】

上記２極コネクタ２３０は、図４に示すように、上記接続ケーブル２１０Ａ、２１０Ｂに接続された接触子２３５Ａ，２３５Ｂが挿入される接触子挿入部２３１と、上記接触子に接続された上記接続ケーブル２１０Ａ、２１０Ｂを覆うケーブル導出部２３２とが設けられ、図５に接続状態の要部縦断面図を示すように、雄雌の区別がないにも拘わらず誤接続を物理的に不可能とした構造のコネクタハウジング２３３を有する雄雌同体構造の所謂アンダーソンコネクタからなる。

【００４４】

また、上記コネクタカバー２４０は、図６に示すように、上記接続ケーブル２１０Ａ、２１０Ｂに沿った面で二分割された上ハーフ２４１と下ハーフ２４２からなり、上記上ハーフ２４１と下ハーフ２４２により構成される上記コネクタハウジング２３３の上記ケーブル導出部２３２を覆う取り付け部２４４と、上記コネクタハウジング２３３から導出された上記２本の接続ケーブル２１０Ａ、２１０Ｂを挟持するケーブル支持部２４５と有する。そして、上記コネクタカバーは、図７の（Ａ），（Ｂ）に示すように、上記取り付け部において上ハーフ２４１と下ハーフ２４２が上記ケーブル導出部２３２にネジ２５１とナット２５２により一体的に組み付け固定される。

【００４５】

このような構造のコネクタカバー２４０を上記２極コネクタ２３０のケーブル導出部２３２に取り付けた上記ブースタケーブル２００では、上記２極コネクタ２３０のケーブル導出部２３２から導出された上記２本の接続ケーブルケーブル２１０Ａ、２１０Ｂの導出部分が上記コネクタカバー２４０のケーブル支持部２４５により挟持されるので、比較的激しい屈曲運動に耐え、心線の断線を引き起こす虞がなくなる。

【００４６】

そして、この車両用補助給電装置１００は、上記ブースタケーブル２００を介してジャンプスタートさせる車両の車載バッテリに接続され、次のようにしてジャンプスタータとして使用される。

【００４７】

すなわち、この車両用補助給電装置１００をジャンプスタータとして使用する場合、当該車両用補助給電装置１００の電源スイッチ４１がＯＦＦの状態で、上記ジャンプスタート用のブースタケーブル２００がユーザにより上記第１のＤＣ出力端子３１に接続される。

【００４８】

上記車両用補助給電装置１００のユーザは、上記充電量表示部５１を構成している複数のＬＥＤが全て消灯していることで、電源スイッチ４１がＯＦＦの状態であることを確認することができる。

【００４９】

次に、ユーザが電源スイッチ４１を押して電源ＯＮにすると、この車両用補助給電装置１００の制御回路部４は、電源ＯＮを検知して上記表示制御部により充電量表示部５１の動作を制御し、上記充電量表示部５１を緑色点灯状態とする。上記充電量表示部５１は、緑色点灯により電源ＯＮを表示するパワーランプとして機能する。

【００５０】

そして、この電源ＯＮ状態でユーザがジャンプスタートスイッチ４２を押してジャンプスタートすると、この車両用補助給電装置１００の制御回路部４は、上記ジャンプスタートスイッチ４２の短時間操作によるジャンプスタートを検知して、ジャンプスタートモードの制御を行う。

【００５１】

DELTRAN EX1002
IPR2024-01219

このジャンプスタートモードの制御において、上記制御回路部４は、上記ジャンプスタート用の第１のＤＣ出力端子３１にブースタケーブル２００を介してジャンプスタートさせる自動車の車載バッテリの電圧を正常に検知できた場合に、上記出力制御部により出力回路部３の動作を制御し、上記リチウムイオン蓄電池２をジャンプスタート用の電源として上記出力回路部３を介して上記ジャンプスタート用の第１のＤＣ出力端子３１に接続するとともに、上記表示制御部により充電量表示部５１の動作を制御し、上記充電量表示部５１を黄色点灯状態とする。上記充電量表示部５１は、黄色点灯によりジャンプスタートを表示するジャンプスタートランプとして機能する。このジャンプスタートモードでは、上記充電量表示部５１は、緑色点灯により電源ＯＮを表示するとともに黄色点灯によりジャンプスタートを表示している。

【００５２】

このジャンプスタートモードの状態で、ユーザは、この車両用補助給電装置１００が接続されている上記車載バッテリを搭載した自動車のエンジンを始動させるジャンプスタートを行うことができる。

【００５３】

ここで、従来の一般的な鉛蓄電池を用いた１２Ｖ／４．５Ａｈ程度の容量のジャンプスタータは、本体重量が５ｋｇ～７ｋｇ程度あり、満充電電状態での始動可能回数は平均５回程度であったのに対し、本考案を適用した上記車両用補助給電装置１００は、例えば３０ｍｍ×１５０ｍｍ×１００ｍｍ（縦×幅×奥行き）の大きさの筐体１０内に例えば３．６Ｖの充電式リチウムイオンを３個直列接続して実装することにより、重さ８３０ｇ程度で３０００ｃｃまでのガソリン乗用車に対応する１２Ｖ／４．５Ａｈの容量の可搬型ジャンプスタータとして機能し、小型軽量で、しかも、満充電電状態での始動可能回数も１０～２０回程度に向上している。

【００５４】

また、上記車両用補助給電装置１００は、例えば４５ｍｍ×１９０ｍｍ×１８０ｍｍ（縦×幅×奥行き）の大きさの筐体１０を用いて、２倍の６個の充電式リチウムイオンを実装することにより、重さ１３００ｇ程度でガソリン乗用車全般及び３０００ｃｃ４気筒までのディーゼル車に対応する１２Ｖ／９Ａｈの容量の可搬型ジャンプスタータとして機能する。

【００５５】

なお、この車両用補助給電装置１００における上記制御回路部４は、上記電源ＯＮ状態でユーザがジャンプスタートスイッチ４２を長時間操作すなわち例えば５秒以上長押しすると、チャージブーストモードの制御状態となり、上記リチウムイオン蓄電池２に充電されている電気を１度に放出するように、上記出力制御部により上記出力回路部３の動作を制御する。このチャージブーストモードの制御状態では、上記表示制御部により充電量表示部５１の動作を制御し、上記充電量表示部５１を黄色点灯状態とする。すなわち、上記充電量表示部５１は、黄色点灯によりチャージブーストモードを表示するチャージブーストモードとして機能する。このチャージブーストモードは、車載バッテリが深放電状態になっている場合に使用される。

【００５６】

また、この車両用補助給電装置１００は、上述の如く１２Ｖ／４．５Ａｈの容量のもので重さ８３０ｇ程度、１２Ｖ／９Ａｈの容量のものでも１３００ｇ程度の重量で小型軽量であるので、可搬性に優れ、しかも、上記ジャンプスタート用の第１のＤＣ出力端子３１の他に、屋外で電気機器を使用するための外部接続用の第２乃至第４のＤＣ出力端子３２～３４を備えているので、次のようにポータブル電源として使用することができる。

【００５７】

すなわち、この車両用補助給電装置１００において、上記第２のＤＣ出力端子３２には、ＰＣ電源ケーブルを介してＰＣを外部接続することができる。

【００５８】

また、この車両用補助給電装置１００において、上記第３のＤＣ出力端子３３には、Ｕ

DELTRAN EX1002
IPR2024-01219

ＳＢ（Universal Serial Bus）で給電可能な携帯音楽プレーヤ等の電子機器を市販のＵＳＢケーブルを介して接続することができる。

【００５９】

また、この車両用補助給電装置１００は、上記第４のＤＣ出力端子３４に外部接続されるシガーゲーブルを介して車載対応の電気機器を駆動するポータブル電源として機能する。

さらに、この車両用補助給電装置１００は、上記第４のＤＣ出力端子３４に外部接続されるシガーゲーブルを介してＯＢＤ（On-Board Diagnostic system）システムに対応した車両のメモリバックアップ用のポータブル電源として機能する。

【００６０】

すなわち、この車両用補助給電装置１００は、ジャンプスタータとしての機能を有し、しかも、バッテリ駆動型のノートＰＣやその付帯機器などの情報機器、シガーソケットに接続して利用可能な車載対応の電気機器、携帯電話やＵＳＢで給電可能な携帯音楽プレーヤ等の使用を可能にするポータブル電源としての機能を有し、さらに、ＯＢＤ（On-Board Diagnostic system）システムに対応した車両のメモリバックアップ用のポータブル電源として機能する小型軽量で携帯性に優れ、使い勝手のよい車両用補助給電装置となっている。さらに、この車両用補助給電装置１００は、上述の如きジャンプスタータやポータブル電源として機能するばかりでなく、非常時に使用する警告表示灯や照明灯として機能する。

【００６１】

以上説明した本考案の実施の形態のように、可搬性に優れた小型軽量でジャンプスタータとしての機能を有する車両用補助給電装置１００に接続される可搬型補助給電装置用のブースタケーブル２００では、上記２極コネクタ２３０のケーブル導出部２３２から導出された上記２本の接続ケーブルケーブル２１０Ａ、２１０Ｂの導出部分が上記コネクタカバー２４０のケーブル支持部２４５により挟持されるので、比較的激しい屈曲運動に耐え、心線の断線を引き起こす虞がなく、所期の目的を達成することができる。

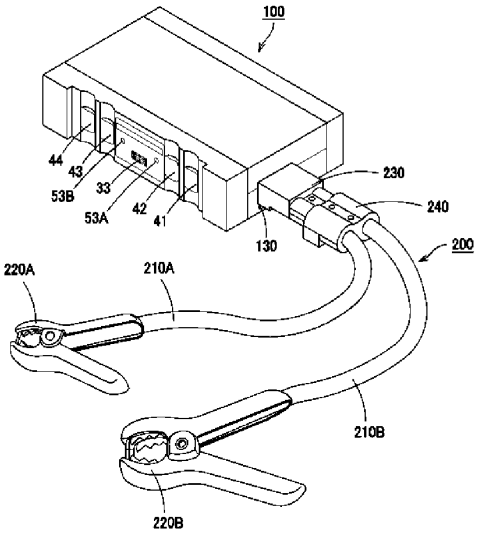
【符号の説明】

【００６２】

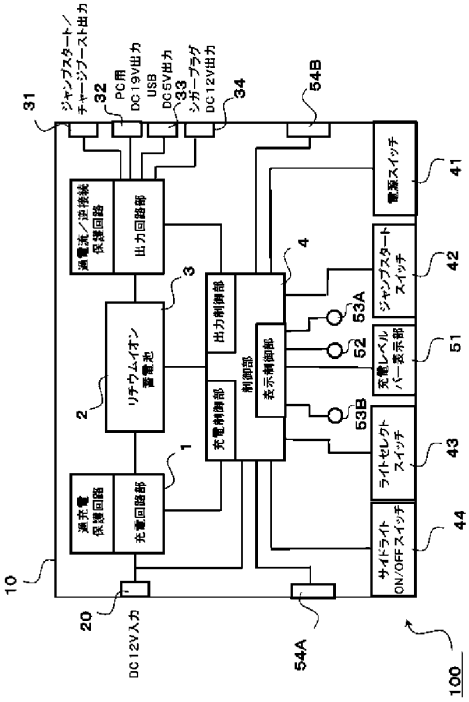
１　充電回路部、２　リチウムイオン蓄電池、３　出力回路部、４　制御回路部、１０　筐体、１１　左側面壁、１２　右側面壁、１３　正面壁、２０　ＤＣ入力端子、３１　第１のＤＣ出力端子、３２　第２のＤＣ出力端子、３３　第３のＤＣ出力端子、３４　第４のＤＣ出力端子、４１　電源スイッチ、４２　ジャンプスタートスイッチ、４３　ライトセレクトスイッチ、４４　サイドライト・オン／オフ・スイッチ、５１　充電量表示部、５２　バッテリロー表示灯、５３Ａ，５３Ｂ　非常用警告灯、５４Ａ，５４Ｂ　側面照明灯、１００　車両用補助給電装置、２００　ブースタケーブル、２１０Ａ，２１０Ｂ　ケーブル、２２０Ａ，２２０Ｂ　ジャンプスタータ用鰐口クリップ、２３０　２極コネクタ、２３１　接触子挿入部、２３２　ケーブル導出部、２３３　コネクタハウジング、２３５Ａ，２３５Ｂ　接触子、２４０　コネクタカバー、２４１　上ハーフ、２４２　下ハーフ、２４４　取り付け部、２４５　ケーブル支持部

DELTRAN EX1002
IPR2024-01219

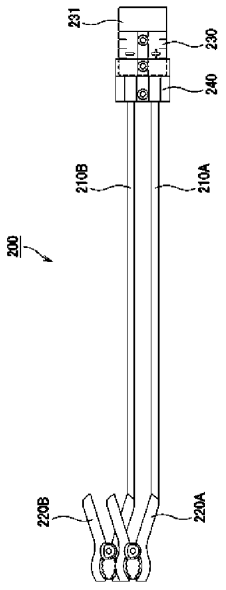
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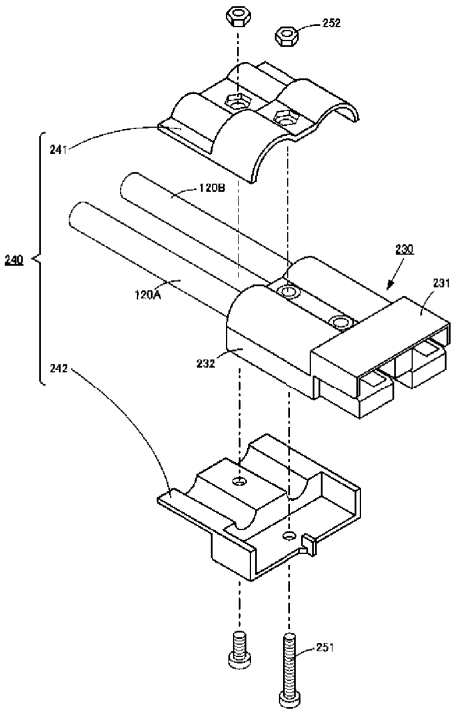
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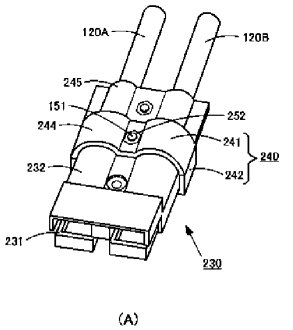


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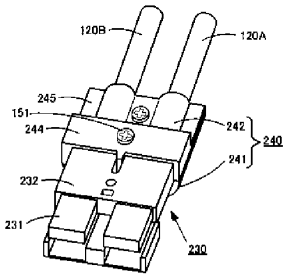


DELTRAN EX1002
IPR2024-01219

【図７】

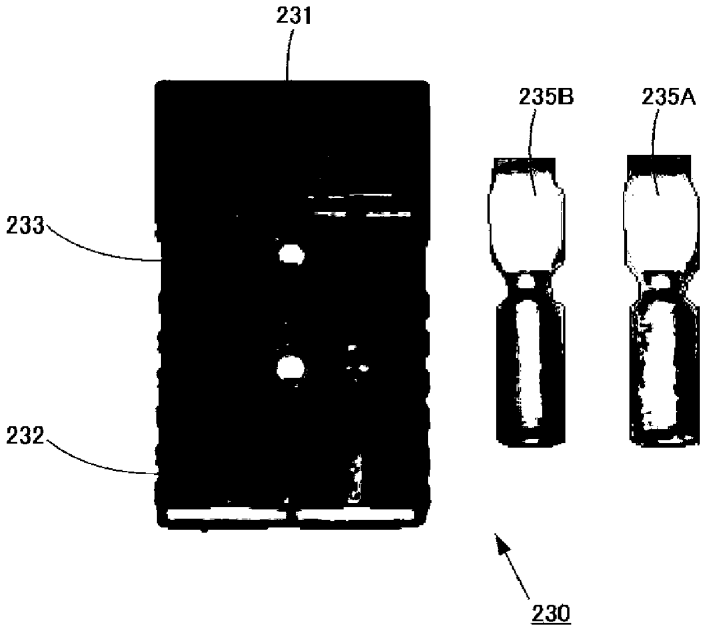

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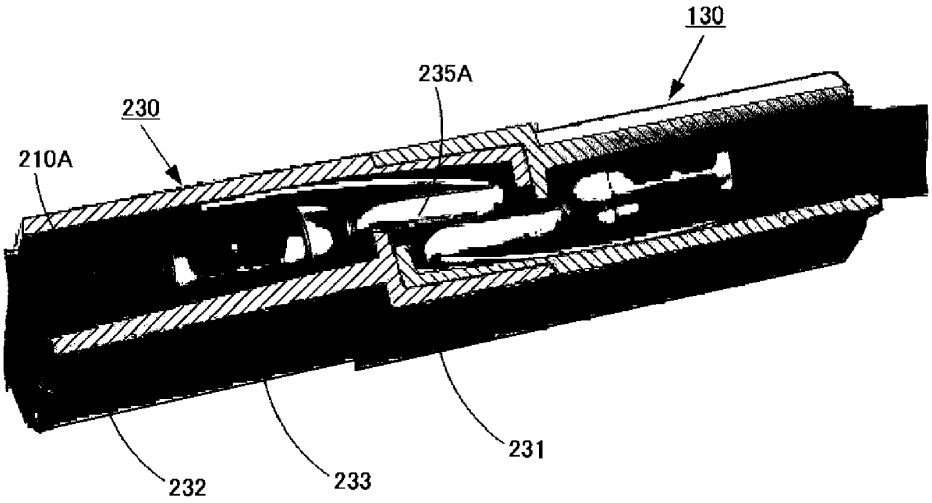

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(B)

【図４】


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【図５】



フロントページの続き

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DELTRAN EX1002
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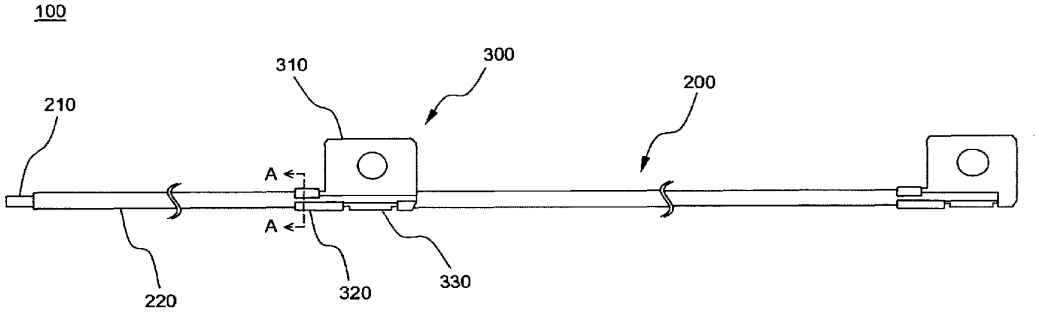
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ELECTRODE CONNECTOR CONTAINING PLATE AND BATTERY MODULE EMPLOYED WITH THE SAME



(57) Abstract: An electrode connector includes a conductive wire and plates mounted on the wire such that the plates can be electrically connected to electrodes of cells. The plates are electrically connected to the wire. A battery module is manufactured with the electrode connector. The electrode connector is electrically connected to the electrodes of the cells by means of the plates. Consequently, the coupling of the electrode connector to the electrodes of the cells is easily accomplished by welding while damage to the cells is minimized. Furthermore, the electrical connection between the plates is accomplished by means of the flexible wire. Consequently, the assembly operation for the electrode connection is very easily carried out, and the electrode connector can be manufactured inexpensively.

WO 2006/057497 A1

ELECTRODE CONNECTOR CONTAINING PLATE AND BATTERY MODULE EMPLOYED WITH THE SAME

FIELD OF THE INVENTION

The present invention relates to an electrode connector for connecting electrodes of cells with each other, and, more particularly, to an electrode connector having plates, which are weldable to electrodes, mounted on a wire, thereby accomplishing easy and convenient electrical connection between the electrodes while minimizing damage to the cells and enabling inexpensive manufacture of the electrode connector. Also, the present invention relates to a battery module manufactured with such an electrode connector.

BACKGROUND OF THE INVENTION

As mobile devices have been increasingly developed, and the demand of such mobile devices has increased, the demand of secondary batteries has also sharply increased as a power source for the mobile devices. One of the secondary batteries is a lithium secondary battery having high energy density and discharge voltage, into which much research has been carried out and which is now commercially and widely used.

Based on kinds of external devices in which the secondary battery is used, the secondary battery may be used in the form of a single unit cell or in the form of a battery pack including a plurality of unit cells electrically connected with each other.

DELTRAN EX1002
IPR2024-01219

For example, small-sized devices, such as a mobile phone, can be operated for a predetermined period of time from the output and the capacity of a single unit cell. On the other hand, large-sized devices, such as lap-top computers or electric vehicles, require use of a medium- or large-sized battery pack because a high output and a large capacity are necessary.

The battery pack is a battery structure including a plurality of unit cells electrically connected in series and/or parallel with each other. A wire, a plate, and a flexible printed circuit board (FPCB) are used in the battery pack so as to accomplish the electrical connection between electrodes of the unit cells.

The wire is a linear conductive member. Generally, an insulating resin is covered on the outer surface of the wire, and therefore, the wire has advantages in that the linear conductive member is easily deformed, and the costs of the liner conductive member are inexpensive. However, the wire has problems in that it is difficult to accomplish the electrical connection between the electrodes of the cells by a welding process, such as spot welding, ultrasonic welding, or laser welding, and a large amount of heat is transferred to the cells during the welding process, which causes damage to the cells.

The plate, which is a plate-shaped conductive member, has an advantage in that the electrical connection between the electrodes of the cells can be easily accomplished by the above-mentioned welding process. However, the plate has a problem in that it is difficult to accomplish the electrical connection between the electrodes of the cells even with only a slight-degree error.

The FPCB, which is widely used in recent years, has advantages in that the electrical connection between the electrodes of the cells can be easily accomplished like

DELTRAN EX1002
IPR2024-01219

the plate, and it is suitable for the electrical connection in a complicated structure. However, the FPCB has problems in that the FPCB is very expensive, the formability is lowered, and the assembly operation is difficult.

Processes for constituting a battery module through the electrical connection between electrodes of a plurality of cells using an FPCB are partially shown in FIGS. 1 and 2. FIG. 1 illustrates a normal assembly process of the battery module in which the connection between the electrodes is normally accomplished, and FIG. 2 illustrates an abnormal assembly process of the battery module in which the connection between the electrodes is abnormally accomplished.

Referring to FIGS. 1 and 2, an FPCB 10 includes a flexible board 12, on which a circuit 14 is formed. To the circuit 14 are connected electrodes 22 of cells 20. When the connection circuit 14 of the FPCB 10 is properly arranged on the electrodes 22 of the cells 20, which are disposed regularly, as shown in FIG. 1, normal electrical connection between the electrodes is accomplished. When an error occurs at the first connection process as shown in FIG. 2, on the other hand, it is difficult to accomplish subsequent electrical connections between the electrodes. Consequently, the assembly operation is inaccurately carried out.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to substantially obviate the above-mentioned problems of the conventional arts as well as the technical problems requested from the past.

The inventors have performed various experiments and research, and finally have developed an electrode connector having advantages of both the wire and the

DELTRAN EX1002
IPR2024-01219

plate. Specifically, the electrode connector includes a flexible wire and plates, which can be easily welded to electrodes of cells, mounted on the wire. Consequently, the electrode connector can be manufactured inexpensively, the assembly operation is easily carried out due to the characteristics of the deformable wire, and the electrical connection between the electrodes of the cells is accomplished by the plates, which can be easily welded to the electrodes.

In accordance with one aspect of the present invention, the above and other objects can be accomplished by the provision of an electrode connector comprising: a conductive wire; and plates mounted on the wire such that the plates can be electrically connected to electrodes of cells, wherein the plates are electrically connected to the wire.

The conductive wire is a linear conductive member. Preferably, the conductive wire is covered with an insulating resin such that a short circuit to a peripheral device is prevented. The material for the wire is not particularly restricted so long as the material is conductive. For example, conductive materials generally used in electrical engineering applications, such as copper, iron, and lead, may be used for the wire. Preferably, the wire is made of copper, which has excellent flexibility and electrical conductivity.

The plates are plate-shaped conductive members, which are parts of the electrode connector and which are electrically connected to the electrodes of the cells. The material for the plates is not particularly restricted so long as the electrical connection between the plates and the electrodes of the cells is accomplished. For example, nickel, aluminum, copper, iron, and alloy thereof may be used for the plates. Preferably, the plates are made of nickel or nickel alloy, which is excellent in terms of

DELTRAN EX1002
IPR2024-01219

cost and electrical conductivity.

The electrical connection between the plates and the electrodes of the cells may be accomplished in various manners. For example, the plates and the electrodes of the cells may be electrically connected with each other by welding, mechanical coupling, or adhesion. Preferably, the electrical connection between the plates and the electrodes of the cells is accomplished by spot welding, ultrasonic welding, laser welding, or soldering.

The present invention is characterized in that the electrical connection between the electrode connector and the electrodes of the cells is accomplished by the plates, and the interconnection of the plates is accomplished by the wire. Consequently, the coupling between the electrodes and the plate is easy, and the electrical connection of the plates is accomplished using the flexible wire irrespective of the distance between the electrodes.

The electrode connector according to the present invention may be constructed by separately manufacturing the wire and the plates and then coupling the wire and the plates with each other. Alternatively, the wire and the plates are integrally formed in a single body to construct the electrode connector. In a preferred embodiment, the electrode connector is constructed by clamping a plurality of plates to a single wire. According to circumstances, a plurality of unit members, each of which is manufactured by coupling a single plate to a single wire, are connected with each other to construct the electrode connector according to the present invention.

In accordance with another aspect of the present invention, there is provided a battery module manufactured with the electrode connector as described above.

DELTRAN EX1002
IPR2024-01219

The battery module includes two or more cells, which are electrically and mechanically connected with each other to provide high-output, large-capacity current, which cannot be obtained by a single cell. In the battery module is used a connector for connecting the unit cells in series and/or parallel with each other. The electrode connector serves to electrically connect a plurality of cells (unit cells), and therefore, the electrode connector is useful to connect the electrodes of the unit cells with each other and to connect the electrodes of the unit cells to a predetermined external device when manufacturing a medium- or large-sized battery module.

The structure of the battery module manufactured with two or more unit cells to provide high output and large capacity may be various. The structure of the battery module is well known to those skilled in the art to which the present invention pertains, and therefore, a detailed description thereof will not be given. It should be noted, however, that the structure of the battery module using the electrode connector according to the present invention falls into the scope of the present invention.

Preferably, the battery module according to the present invention is used in a battery pack, which is a power source for small-sized devices, such as lap-top computers, and large-sized devices, such as electric vehicles or hybrid electric vehicles.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIGS. 1 and 2 are typical views respectively illustrating normal and abnormal

DELTRAN EX1002
IPR2024-01219

assembly processes when electrodes of cells are connected with each other using a flexible printed circuit board (FPCB) according to a conventional art;

FIG. 3 is a partial typical view illustrating an electrode connector according to a preferred embodiment of the present invention;

FIG. 4 is a typical view illustrating an exemplary plate used in the electrode connector according to the present invention; and

FIG. 5 is a sectional view taken along line A-A of FIG. 3.

<Description of Main Reference Numerals of the Drawings>

100: electrode connector

200: wire

300: plate

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Now, a preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings. It should be noted, however, that the scope of the present invention is not limited by the illustrated embodiment.

FIG. 3 is a partial typical view illustrating an electrode connector 100 according to a preferred embodiment of the present invention.

Referring to FIG. 3, the electrode connector 100 includes a wire 200 and a plurality of plates 300 mounted on the wire 200. The wire 200 includes a conductive core member 210 and an insulating sheath 220 for covering the conductive core member 210.

DELTRAN EX1002
IPR2024-01219

The structure of the plate 300 is shown in more detail in FIG. 4. As shown in FIG. 4, the plate 300 has a side clamping part 320 formed at one side end of a plate-shaped body 310 and a lower clamping part 330 formed at the lower end of the plate-shaped body 310. The plate 300 is securely mounted on the wire core member 210 (chain double-dashed line) by the clamping parts 320 and 330, and therefore, the electrical connection between the plate and the wire is accomplished. The side clamping part 320 may be formed at the other side end of the plate-shaped body 310. Each electrode of cells (not shown) is electrically connected to the plate-shaped body 310, preferably, by welding.

Referring back to FIG. 3, the conductive core member 210 is exposed at the area of the wire 200 where the plate 300 is mounted. Consequently, the plate 300 is connected to the wire 200 by the clamping parts 320 and 330 of the plate 300, and therefore, the electrical connection between the plate and the wire is accomplished.

FIG. 5 is a sectional view taken along line A-A of FIG. 3. The insulating sheath 220 (chain double-dashed line) is not present at the area of the wire where the plate is connected to the wire. Consequently, the conductive core member 210 is brought into direct contact with the side clamping part 320 of the plate 300, and therefore, the electrical connection between the plate and the wire is accomplished.

Although the preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

For example, the structure of the plate and the electrical connection between the plate and the wire may be modified in various ways based on the illustrative

DELTRAN EX1002
IPR2024-01219

example of FIG. 3.

INDUSTRIAL APPLICABILITY

As apparent from the above description, the electrode connector according to the present invention is electrically connected to the electrodes of the cells by means of the plates. Consequently, the coupling of the electrode connector to the electrodes of the cells is easily accomplished by welding while damage to the cells is minimized. Furthermore, the electrical connection between the plates is accomplished by means of the flexible wire. Consequently, the assembly operation for the electrode connection is very easily carried out, and the electrode connector can be manufactured inexpensively.

DELTRAN EX1002
IPR2024-01219

WHAT IS CLAIMED IS:

1. An electrode connector comprising:

a conductive wire; and

plates mounted on the wire such that the plates can be electrically connected to electrodes of cells, wherein

the plates are electrically connected to the wire.

2. The electrode connector as set forth in claim 1, wherein the wire is covered with an insulating resin.

3. The electrode connector as set forth in claim 1, wherein the wire is made of copper, and the plates are made of nickel.

4. The electrode connector as set forth in claim 1, wherein the electrical connection between the plates and the electrode of the cells is accomplished by spot welding, ultrasonic welding, laser welding, or soldering.

5. The electrode connector as set forth in claim 1, wherein the electrode connector is constructed by clamping a plurality of plates to a single wire.

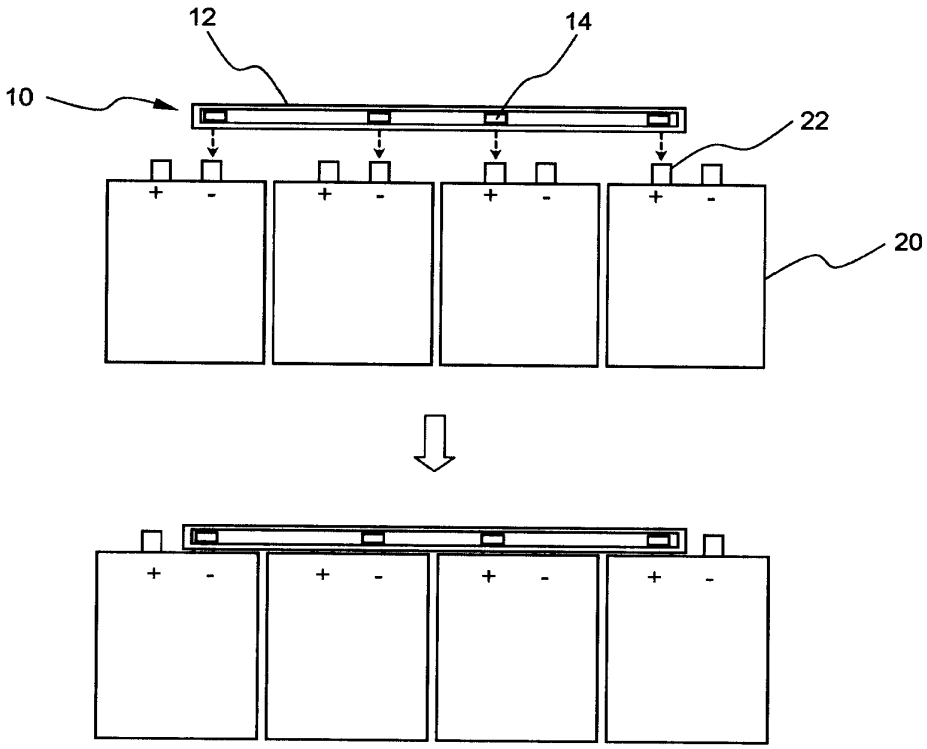
6. A battery module manufactured with an electrode connector as set forth in any one of claims 1 to 5.

7. The battery module as set forth in claim 6, wherein the electrode connector is used to connect electrodes of a plurality of cells (unit cells) with each other or to connect the electrode of one of the unit cells with a predetermined external device.

DELTRAN EX1002
IPR2024-01219

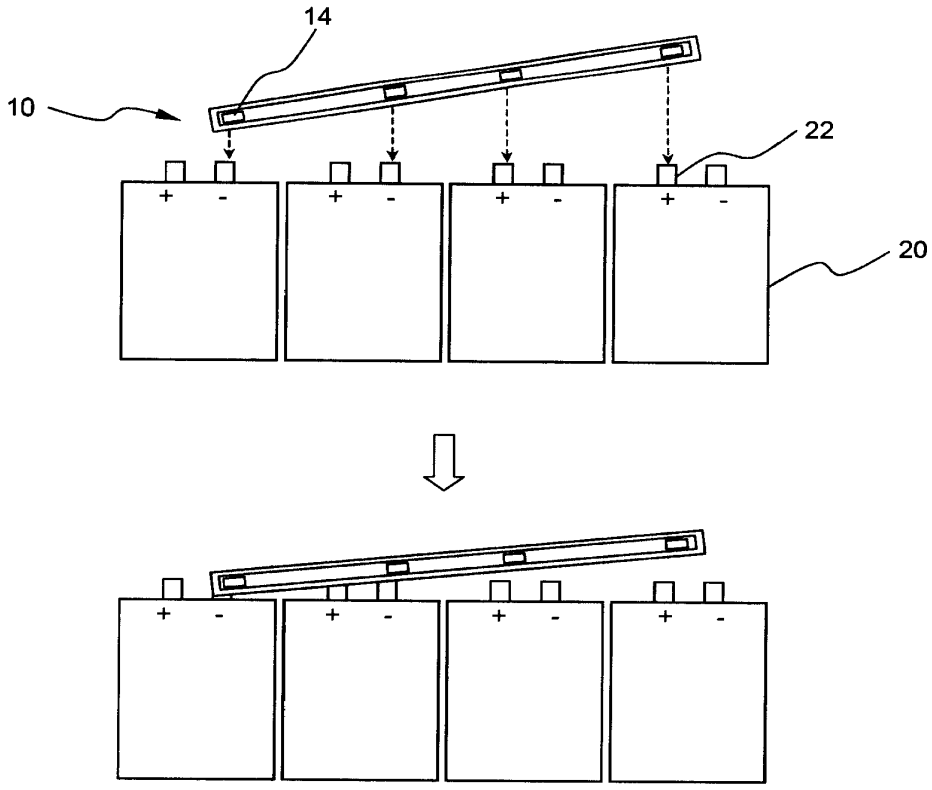
DRAWINGS

FIG. 1



DELTRAN EX1002
IPR2024-01219

FIG. 2



DELTRAN EX1002
IPR2024-01219

FIG. 3

DELTRAN EX1002
IPR2024-01219

FIG. 4

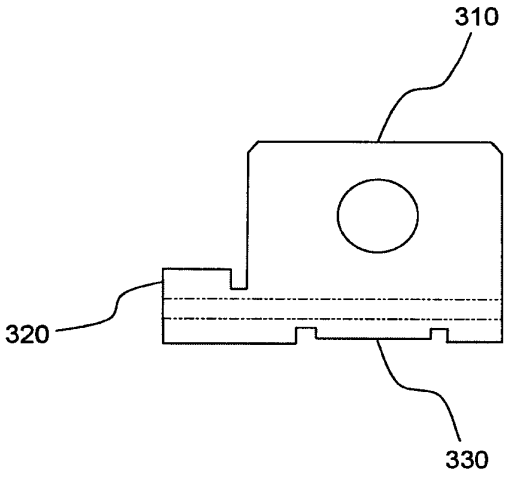
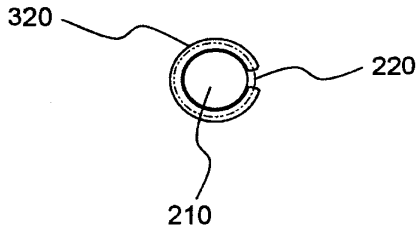


FIG. 5



DELTRAN EX1002
IPR2024-01219

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/003899

A. CLASSIFICATION OF SUBJECT MATTER

H01M 2/20(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01M 2/10(2006.01)i, H01M 2/20(2006.01)i, H01M 2/22(2006.01)i, H01M 2/26(2006.01)i

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1976.
Korean Utility models and applications for Utility models since 1976.

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)
KIPONET II

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-6644 A2 (MATSUSHITA ELECTRIC IND. CO. LTD.) 12 JANUARY 2001 * the whole document *	1 - 7
A	US 5158842 A (ACME ELECTRIC CORPORATION) 27 OCTOBER 1992 * the whole document *	1 - 7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 MARCH 2006 (02.03.2006)	**03 MARCH 2006 (03.03.2006)**

Name and mailing address of the ISA/KR
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Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
SONG, Won Seon
Telephone No. 82-42-481-5735

DELTRAN EX1002
IPR2024-01219

GB40 Lithium 1000A 12V | 6.0L 3.0L Diesel

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Ultra-safe, ultra-compact, rugged, and portable lithium-ion jump starter. Features **spark proof technology** and **reverse polarity protection**. Instantly jump starts most single-battery applications, up to **20 times** on a single charge. Ideal for a wide range of vehicles including trucks and engines up to **6.0L Gas** and **3.0L Diesel**.

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UltraSafe™

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20X

Jump Starts Per Charge

Full power to jump start a vehicle up to 20 times in one charge. Compatible with engines up to 6.0L.

USB

2.1A

Recharge virtually any USB device (smartphones, tablets). Recharge the unit from any USB port or 12V charger (inc).

2XLED

Ultra-bright dual LED flashlight for visibility and with 7 modes, including SOS and emergency strobe.

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More **Power**,

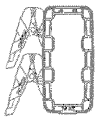
A Fraction Of The Size.

8X Lighter

8X Smaller

+ Holds Charge 4 Times Longer

Available Starting Power (joules) = Power (w) X Time (sec)



Genius BOOST+ ™

2.3lbs

7035joules[3S]

VS



Leading Traditional Jump Starter

18lbs

6950joules[3S]

Manual Override is a special feature designed for rare situations when a vehicle's battery is below 2-volts. Simply press and hold the manual overide button for 3 seconds, until the Boost LED starts flashing, to enter into the mode. Press the button again (Or the power button) to exit Manual Override. This mode should be used cautiously, as Manual Override disables safety protection while enabled.



Technical Specifications

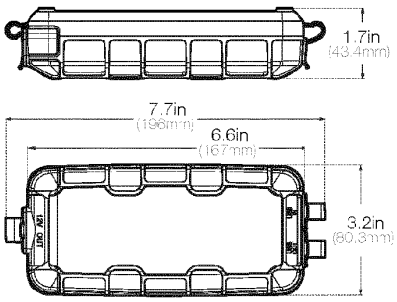
Internal Battery:	Lithium Ion	Micro USB (Input):	5V, 2.1A
Peak Current Rating:	1000A	USB (Output):	5V, 2.1A
Joules[3S]:	7000 J	Housing Protection:	IP65 (w/ Ports closed)
Operating Temperature:	30°C to +50°C	Cooling:	Natural Convection
Charging Temperature:	0°C to +40°C	Dimensions (LxWxH):	6.7 x 3.2 x 1.7 in
Storage Temperature:	-20°C to +50°C (Average Temperature)	Weight:	2.4 Pounds
		Lumens (LEDs):	100L

What's In The Box

- GB40 Boost+ Jump Starter
- 40" Micro USB Cable
- 12V USB Charger
- X Connect HD Battery Clamps
- User Guide and Information Guide & Warranty

Recharging a GB40

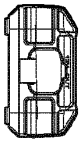
USB Charger Rating	Charging Time
.5A	12hr
1A	6hr
2A	3hr



Retail Packaging:
Dimensions: 4.6"x4.2"x8.2"
Weight: 2.7lbs
UPC: 0-46221-15002-5
Inner Carton:
Dimensions: 8.5"x4.9"x4.7"
Weight: 3lbs

Master Carton:
Dimensions: 15.6"x9.1"x10.3"
Weight: 18.9lbs
Quantity: 6
UCC: 10046221150022
Units Per Pallet: 360 Units

CE FC RoHS



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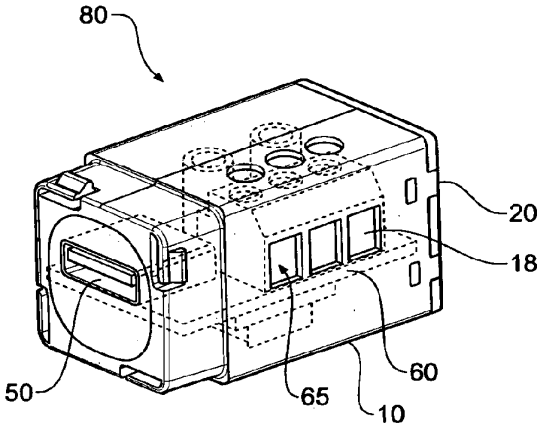


Figure 8

(57) **Abstract**: Disclosed is a Universal Serial Bus (USB) charging module for installation with a surface mounted power outlet. The charging module allows convenient and flexible installation in certain new and already installed power outlets to provide a convenient charging facility of devices with USB connection. Also disclosed is a housing for the charging module, a charging circuit and a method of installation.

WO 2012/068635 A1

USB OUTLET CHARGER

FIELD OF THE INVENTION

The present invention relates to an electrical power outlet in a building such as a hotel, office or home. In a particular form, the invention relates to a power outlet providing an interface for charging Universal Serial Bus (USB) compatible devices.

PRIORITY

The present application claims priority from Australian Provisional Patent Application No. 2010905218 entitled "USB Outlet Charger" filed on 25 November 2010.

The entire contents of this document are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Many electronic devices such as mobile phones, mp3 players and digital cameras are charged through USB ports in either a computer or a USB Alternating Current (AC) adaptor which may be plugged into a wall socket or power outlet. Charging devices through a USB port on a computer requires the computer to be switched on and also prevents other peripheral devices such as mice and memory devices from accessing the port while in use. By using a USB AC adaptor the electronic device may be charged at a wall socket or power outlet. One portion of the adaptor has AC prongs which engage into AC receptacles of the wall socket while another portion of the adaptor has a USB port to interface with a USB connector of an appliance or electronic device to be charged. The disadvantage with this arrangement is that the USB AC adaptor is a separate component that must be purchased and carried around and also that the AC prongs will only be suitable for a particular country or region. This leads to another drawback with using USB AC adaptors in foreign countries, namely that additional AC adaptors are necessary to engage with sockets found in different areas around the world.

There are also USB wall outlets wherein the USB charger is integral with the power outlet. Having the USB charger integral with the power outlet can lead to increased complexity during installation and costly repair and replacement of parts.

An object of the present invention is to ameliorate one or more of the above described difficulties or at least provide a useful alternative for charging USB compatible devices.

Other advantages of the present invention will become apparent from the following description, taken in connection with the accompanying drawings, wherein, by way of illustration and example, several aspects and embodiments of the present invention are disclosed.

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IPR2024-01219

SUMMARY

In one aspect of the invention, there is proposed a Universal Serial Bus (USB) charging module housing adapted for securement to a surface mountable power outlet, the housing including:

an engaging portion for connecting the housing to a supporting portion of the power outlet;

access means to allow a USB charging circuit to be inserted into the housing; and

an aperture for allowing external access to a USB port.

In one form, the USB charging module housing further includes at least one aperture for receiving wires carrying mains power.

In one form, the access means to allow the USB charging circuit to be inserted into the housing is provided by an aperture in an external face of the housing.

In one form, the aperture is covered by a removable portion.

In one form, the removable portion includes at least one aperture for receiving wires carrying mains power.

In one form, the supporting portion of the power outlet is an integral portion of a grid or face plate.

In another form, the supporting portion of the power outlet is located in a mounting plate that is adapted to be connected to the rear of a grid or face plate.

In one form, the housing is connected to the supporting portion of the power outlet from the front of the grid or face plate.

In one form, the housing is connected to the supporting portion of the power outlet from the rear of the grid or face plate.

In one form, the engaging portion of the USB charging module housing includes a plurality of clips extending outwardly from one or more exterior faces of the housing, said clips for engagement with one or more surfaces of the supporting portion of the power outlet in a snap fit arrangement.

In one form, the clips have a tapered front face and a substantially vertical rear face.

DELTRAN EX1002
IPR2024-01219

In one form, the USB charging module housing has an aperture located on the front face of the housing for allowing external access to a USB port.

In a further aspect of the invention there is proposed a USB charging module adapted for securement to a surface mountable power outlet, the charging module including:

a USB port;

a USB charging circuit that is capable of receiving a mains power input;

a housing, said housing including an engaging portion for connecting the housing to a supporting portion of the power outlet; access means to allow the USB charging circuit to be inserted into the housing and an aperture for allowing external access to the USB port.

In one form, the USB charging module includes a USB charging circuit with a printed circuit board (PCB).

In one form, the USB charging module includes a plurality of wires that are soldered directly to the PCB for connection to mains power either directly or via a switch.

In another form, the USB charging module includes a terminal block mounted on the PCB for connection to wires carrying mains power either directly or via a switch.

In other embodiments, there are provided screwed terminals for wire termination.

In a further aspect of the invention there is proposed a surface mountable power outlet for allowing a user to charge a USB compatible device, the power outlet including:

a supporting portion;

a USB charging module including a USB port; a USB charging circuit that is capable of receiving a mains power input; a housing, said housing including an engaging portion for connecting the housing to the supporting portion of the power outlet; access means to allow the USB charging circuit to be inserted into the housing and an aperture for allowing external access to the USB port;

a grid or face plate adapted to allow a user to access the USB port;

a connection between the USB charging module and mains power; and

mounting means for mounting the power outlet to a mounting surface.

In one form, the mounting surface is a wall or floor.

In one form, the power outlet further includes a cover plate.

DELTRAN EX1002
IPR2024-01219

In one form, the mains power is between about 100-240V alternating current (AC).

In a further aspect of the invention there is proposed a method of installing a power outlet for allowing a user to charge a USB compatible device as herein described, comprising the steps of:

connecting the engaging portion of the USB charging module housing to the supporting portion of the power outlet;

connecting the mains power to the USB charging module; and

mounting the power outlet to the mounting surface.

In a further aspect of the invention there is proposed a method of installing a power outlet for allowing a user to charge a USB compatible device as herein described, comprising the steps of:

connecting the engaging portion of the USB charging module housing to the supporting portion of the power outlet;

connecting the mounting plate to the rear of a grid or face plate.

connecting the mains power to the USB charging module; and

mounting the power outlet to the mounting surface.

In one form, the power outlet is attached or mounted to the mounting surface by fastening the grid or face plate to the surface by screws.

It will be understood that the term "comprise" and any of its derivatives (e.g. comprises, comprising) as used in this specification is to be taken to be inclusive of features to which it refers, and is not meant to exclude the presence of any additional features unless otherwise stated or implied.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that such prior art forms part of the common general knowledge of the technical field.

DRAWINGS

Various aspects of the present invention will be described in detail with reference to the following drawings in which:

FIGURE 1 is a front perspective view of a USB charging module housing according to a first aspect of the present invention;

FIGURE 2 is a rear perspective view of the USB charging module housing of Figure 1;

FIGURE 3 is a detailed view of part of an engaging portion of the USB charging module housing as shown in Figure 1;

DELTRAN EX1002
IPR2024-01219

FIGURE 4 is a view of a removable cover that fits into the rear opening of a USB charging module housing;

FIGURE 5 shows an embodiment of a supporting portion of a surface mountable power outlet adapted to engage with a USB charging module housing;

FIGURE 6 is a detailed view of the mating interface of the supporting portion shown in Figure 5;

FIGURE 7 is a perspective view of a USB charging module according to an embodiment of a second aspect of the present invention;

FIGURE 8 is a perspective view of a USB charging module according to another embodiment of the second aspect of the present invention;

FIGURE 9 is a side view of the USB charging module shown in Figure 8;

FIGURE 10 is an end or rear view of the USB charging module shown in Figure 7 (wires not shown);

FIGURE 11 is a view of a USB charging module engaged with a grid or face plate of a surface mountable power outlet according to an embodiment of the present invention;

FIGURE 12 is a view of a USB charging module engaged with a grid or face plate of a surface mountable power outlet according to another embodiment of the present invention;

FIGURE 13 is a surface mountable power outlet according to an embodiment of a third aspect of the present invention;

FIGURE 14 shows a surface mountable power outlet according to another embodiment of the third aspect of the present invention;

FIGURE 15 is a circuit schematic depicting an embodiment of the AC mains voltage step down and regulation component of the USB charging circuit;

FIGURE 16 is a circuit schematic of a power conditioning circuit with a DC-DC converter to regulate the current and voltage suitable for the USB charging module;

FIGURE 17 is a top view of a USB charging circuit adapted to fit inside the USB charging module housing of Figure 1;

FIGURE 18 is a perspective view of the USB charging circuit as shown in Figure 17;

FIGURES 19a-19c depict a sequential series of views of a method of installing a USB charging module to a surface mountable power outlet according to a fourth aspect of the present invention; and

FIGURE 20 shows a flow diagram illustrating a general method of installing a USB charging module into a surface mountable power outlet according to a fourth aspect of the present invention.

FIGURE 21 is a perspective view of an embodiment of a USB charging module suitable for front entry engagement with a power outlet.

FIGURE 22 is a section view through A-A of the engaging portion of the USB charging module housing of Figure 23;

FIGURE 23 is a front view of the USB charging module housing as depicted in Figure 21;

FIGURE 24 is a section view B-B of the supporting portion of the grid or face plate depicted in Figure 25;

DELTRAN EX1002
IPR2024-01219

FIGURE 25 is a front view of a grid or face plate suitable for engagement with the USB charging module of Figure 21;

FIGURE 26 shows the USB charging module of Figure 21 to be connected from the front of the grid or face plate according to an embodiment of the present invention; and

FIGURE 27 shows the USB charging module of Figure 21 to be connected from the front of the grid or face plate according to another embodiment of the present invention.

In the following description, like reference characters designate like or corresponding parts throughout the several views of the drawings.

DESCRIPTION

Referring now to Figures 1-4, there is shown a USB charging module housing 10 according to a first aspect of the present invention. The housing 10 has an aperture 12 through a front face 11 that is large enough to provide access for a USB connector to plug into a USB port or socket 50 enclosed within the housing (see Figure 7). At the rear of the housing 10 (see Figure 2) is an opening or aperture 13 which enables access for inserting a USB charging circuit 60 (see Figure 7) into the housing 10. Although this embodiment shows the rear of the housing as being open to provide an access means for the USB charging circuit 60, it is possible that the opening 13 could be located on a different face and may constitute an entire face or a part thereof. Figure 4 shows a removable cover 20 that engages with the rear of the housing 10 to substantially seal the enclosure from dust and ingress. The removable cover 20 has angled clips 26 and 27 that engage into mating apertures 16 and 15 respectively of the housing 10 in a snap fit arrangement. The lip of the angled clips 27 are inserted directly into apertures 15 and then the cover 20 is closed by applying force proximate the clips 26 until they snap into apertures 16. The clips 26, 27 are flexible and resilient so that they may bend sufficiently to allow fitment into the apertures 15, 16 whereupon they return to their undeformed positions.

In one embodiment, a feature of the housing 10 is the clip interface comprising four clips 14 that are positioned around the four side faces of the housing 10. These clips form an engaging portion that connects the housing 10 to a supporting portion 30 (see Figure 5) of a surface mountable power outlet. The supporting portion 30 may be integral with a grid or face plate of the power outlet or located on a mounting plate that is adapted to be connected to the rear of a grid or face plate. Figure 3 shows a detailed view of a clip 14, in particular illustrating a type of clip with a tapered front face 14b and substantially vertical rear face 14a. These clips are designed to engage with the mating interface 34 of the supporting portion 30 which is most clearly illustrated in Figure 6. Figure 6 shows detail of a typical mating interface 34 which will connect to a USB charging module housing 10. As the housing 10 is inserted into the supporting portion 30, the tapered surface 14b of the clip 14 will engage a corresponding tapered surface 35 of the supporting portion 30. As more insertion force is applied, the

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IPR2024-01219

clip 14 will deflect slightly as it passes the vertical surface 37 of the supporting portion 30. The substantially vertical rear face 14a of the clip 14 will eventually pass the lowest point of the vertical surface 37, upon which it reaches the recessed horizontal surface 36 of the supporting portion 30. The compression force acting on the clip 14 is then released and it deflects back to its undeformed position and the substantially vertical rear face 14a engages in surface to surface contact with the horizontal recessed surface 36 of the supporting portion 30 to thereby retain housing 10 to the supporting portion 30. In the embodiment shown in Figure 5, the supporting portion 30 has only two mating interfaces 34 requiring that only two of the four clips 14 be used to connect the housing 10 to the supporting portion 30. In practice, two or more of the clips 14 may be used to secure the housing, and the supporting portion 30 may also have two or more mating interface 34.

Referring now to Figure 7, there is shown a USB charging module 40 according to an embodiment of a second aspect of the present invention. Enclosed inside the housing 10 is a USB port 50 and a USB charging circuit 60. Wires 70, 71 to be connected to mains power are soldered directly onto a printed circuit board (PCB) 62 of the charging circuit 60 (see Figure 16). The wires 70, 71 exit the housing 10 through apertures 22 located through the removable cover 20 (see Figure 10). During installation these wires may be connected to mains power either directly or via a switch. In other embodiments, there may be simply provided screwed terminals for wire termination instead of a terminal block.

Referring now to Figures 8 and 9, there is shown a USB charging module 80 according to another embodiment of the second aspect of the present invention. Enclosed inside the housing 10 is USB port 50 and USB charging circuit 60 with a terminal block 65 to be connected to mains power. During installation, wires carrying mains power either directly or via a switch are connected to the terminal block 65 to power the USB charging circuit 60. The wires enter the housing 10 through apertures 18 located on one side of the housing 10.

In the USB charging module embodiments described above, the power input to the module is mains power (also known as household, supply or grid power) supplied between about 100-240V alternating current (AC). The USB charging circuit 60 regulates the voltage and steps it down to a usable 4.75-5.25V direct current (DC) which is typically required to charge many electronic devices.

Referring now to Figures 11-14, there are shown various embodiments of the USB charging module 40 or 80 connected to a grid or face plate of a surface mountable power outlet. Figure 11 shows USB charging module 40 engaged with a supporting portion 30 which is integral with a grid or face plate 100. In one example, the supporting portion 30 is integrally machined into the grid or face plate 100 during manufacture. In other embodiments, the supporting portion 30 is provided as a separate piece and is attached to the grid or faceplate during or before installation. The grid or face plate 100 can be

DELTRAN EX1002
IPR2024-01219

constructed from plastic, metal or any other suitable materials. Figure 11 shows a grid or face plate 100 with two apertures 102 (only one visible in this view) capable of receiving switches or other electrical connectors in addition to USB ports. Further, as the USB charging module is modular in design, it can always be easily interchanged for a switch or other desired user interface. The grid or face plate 100 shown in Figure 11 may be adapted in many ways such as providing for AC receptacles as commonly found in most household power outlets. The grid or face plate 100 is fastened to a wall by screws or other suitable fasteners through mounting lugs 101. These may be arranged in any suitable position on the grid or face plate 100 and may vary in quantity.

Figure 12 shows a USB charging module 80 engaged with a supporting portion 30 located in a mounting plate 200 that is adapted to be inserted into the rear of a grid or face plate 110. In this arrangement the supporting portion 30 is integrally machined into mounting plate 200. Such a mounting plate 200 (also known as a base or base plate) in standard power outlets, commonly includes electrical contacts for AC receptacles, switch mounting and terminals to connect mains power wiring. The mounting plate 200 is designed to be received by the rear of a grid or face plate 110. As shown in Figure 12, the mounting plate 200 is fastened to the grid or face plate 110 by screws at mounting positions 201. The grid or face plate 110 is mounted onto a wall by screws at mounting locations 111, 112.

Figure 13 more specifically shows a surface mountable power outlet 500 according to a third aspect of the present invention allowing a user to charge USB compatible devices. In this arrangement the USB charging module 40 or 80 is connected to a supporting portion 30 that may either by integral with the grid or face plate or located on a mounting plate adapted to be connected to the rear of the grid or face plate. In this embodiment the power outlet 500 has a pair of switches and AC receptacles in addition to the USB charging module 40 or 80. A power outlet 500 such as this allows a user to plug in normal AC type connectors with power switched on or off and advantageously also provides a user with access to a USB port 50 for charging electronic devices. If the USB charging module 40 or 80 is wired directly to mains without a switch then the charging module 40 or 80 is constantly connected to mains power so that when a user connects their device into the USB port; charging will begin automatically. If the USB charging module 40 or 80 is wired to mains via a switch, then power will not be drawn until the user engages the switch to an "ON" position. As shown in Figure 14 in another embodiment of a wall mounted power outlet 510, there is a USB charging module 40 or 80 provided additionally with LED status lights 55 that indicate whether the device connected to the port is charging or not. In both Figures 13 and 14 there is also shown a cover plate 90, 91 that is adapted to fit around the periphery of the power outlet. The cover plate 90, 91 usually snap fits around the grid or face plate and is provided primarily for aesthetics when the power outlet is mounted to a surface such a wall or floor.

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It will be appreciated by those skilled in the art that the surface mountable power outlet embodiments illustrated in this text are by no means limiting to how the invention may be performed. The geometric arrangement of switches, AC receptacles, USB ports or other network connection ports may be customised to suit a particular application. The supporting portion 30 also need not necessarily be limited to being an integral portion of a grid or face plate or located on a mounting plate adapted to be inserted into the rear of a grid or face plate. The supporting portion 30 could be mounted or machined into almost any structure, including a box or other structural housing. Further, the engaging portion of the USB charging module housing and supporting portion of the power outlet may be designed with alternative interfaces to the clip arrangement shown which achieves the principle aim of the invention in providing a modular USB housing which is adapted to be installed in a surface mountable power outlet thereby allowing a user to charge USB compatible devices.

Referring now to Figures 15-19, there is shown the USB charging circuit 60 that receives a 240V AC mains power input and provides a 5V DC output to the USB port 50, suitable for charging USB compatible electronic devices. The USB charging circuit 60 comprises the following stages. In the first stage, shown in Figure 15, the 240V AC mains input is first stepped down using a transformer 61 to reduce the high AC voltage to a low AC voltage (e.g. 15V, 1.2A). This stepped down AC voltage is then passed through a rectifier circuit 63 (e.g. bridge rectifier) that outputs a full wave varying rectified voltage shown as the output across load R_L. As shown in Figure 16, this varying voltage is then smoothed with a capacitor to produce a relatively smooth DC voltage with a small ripple. A voltage regulator (e.g. 7812 Integrated Circuit (IC)) is then used to output a regulated 12V DC output as will be understood by the person skilled in the art.

In the second stage, an embodiment of which is shown in Figure 16, a DC-DC converter (e.g. Texas Instruments TPS40210 current mode boost controller) is then used to regulate the output suitable for the USB charger. The TPS40210 implements a DC-DC single-ended primary inductance converter (SEPIC) with input and output current regulation, as well as output voltage regulation implemented by closed loop feedback control. The TPS40210 ensures that the output voltage of the USB charger is between about 4.75 and 5.25 V (nominally 5V DC) with an operating current of about 1A and also prevents overcharging. The voltage input in Figure 16 is the regulated 12V from the first stage, which is converted to a regulated 5V DC voltage output by the circuit shown. It should be understood that this is just one example of how a USB charging circuit may be implemented and any other suitable circuit arrangement may be used.

Referring specifically to Figures 17 and 18 there is shown an embodiment of the physical circuit layout of the USB charging circuit 60. A double layered PCB 62 is used which provides a compact

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IPR2024-01219

and efficient way to house all of the components inside the housing 10. On one layer of the PCB 62 there is mounted the USB port 50, an optional terminal block 65 and the circuit components for the AC mains voltage step down and first stage regulation (including transformer, capacitors, 7812 IC voltage regulator and rectifier circuit). On the second layer of the PCB 62 there is provided the power conditioning circuitry for the USB charger output (including the TPS40210 and various other capacitors, inductors, resistors and diodes).

In other embodiments, there is provided 2 or 3 or more PCBs over which the circuit components are arranged, rather than (or as well as) a double layered arrangement.

Referring now to Figures 19a-19c there is shown a sequential series of views of a method of installing the USB charging module 80 to a surface mountable power outlet according to a fourth aspect of the present invention. In this embodiment, the mounting surface is a wall 90. In Figure 19a there is shown the step of connecting the engaging portion of the USB charging module housing 10 to a supporting portion 30 of the power outlet. Figure 19a shows the USB charging module 80 already having been engaged with the supporting portion 30. Figure 19b illustrates the next step of connecting the mains power to the USB charging circuit 60. The USB charging module 80 and grid or face plate assembly is held in close proximity to a wall opening where the power outlet is to be located. The wiring from the mains (typically active and neutral wires, with earth optional) is physically connected to the USB charging circuit 60. The particular embodiment illustrated in Figures 19a-19c shows a USB charging module 80 with a terminal block 65 for terminating the mains wires. The final step in the installation is to attach or mount the power outlet to the wall 90 as illustrated in Figure 19c. The grid or face plate is held flat against the wall 90 and screws or other suitable fastening means are inserted through mounting apertures in the grid or face plate and fastened securely to the wall 90. In another example, the USB charging module 40 may be connected using wires 70, 71 as previously described.

Figure 20 illustrates a flow diagram of a method of installing the USB charging module 40 or 80 to a surface mountable power outlet. In step 600, the installer begins with the USB charging module. In step 601, the engaging portion of the USB charging module housing 10 is connected to the supporting portion 30 of the power outlet. In step 602, a determination is made as to whether the supporting portion is located in a mounting plate that is not integral with the grid or faceplate. If the supporting portion 30 is integral with the grid or face plate, the mains power is connected to the USB charging circuit 60 and the power outlet is attached or mounted to the mounting surface (which may be a wall or floor or other appropriate surface) in step 604. If the supporting portion 30 is located in a mounting plate that is not integral with the grid or face plate, then there is an additional step 603 of connecting the mounting plate to the grid or face plate.

DELTRAN EX1002
IPR2024-01219

In step 605, the installer then connects the AC mains power to the USB and then in step the power outlet assembly is mounted or attached to the mounting surface such as the wall 90 or a floor. In step 606, the resulting product of the method is a surface mounted USB power or charging outlet.

Once installation is complete, the power outlet provides an interface to charge USB compatible devices. The USB charging module 40,80 receives a mains input power between about 100-240V AC and converts this to a regulated 5V DC output suitable for charging USB compatible electronic devices. The modular housing 10 enables the power outlet to have interchangeable interfaces to suit operational requirements. The USB charging module 40,80 may be removed from the power outlet and replaced with a switch or any other interface without having to replace the entire power outlet.

Referring now to Figures 21-27, there is shown a further embodiment whereby the USB charging module 40,80 is connected to the supporting portion 130 of a grid or face plate 120 of a surface mountable power outlet from the front thereby providing a 'front entry' insertion option. Whereas previously described the USB charging module 40,80 is connected into a supporting portion 30 in the rear of the grid or face plate, it is also desirable to be able to insert the module from the front of the grid or face plate. It will be appreciated that this connection may be facilitated in many ways, an example of which is shown in Figures 21-27. Figure 21 generally shows a USB charging module 40,80 which can be connected to mains power as previously described. In one form, the module may have a clip interface comprising clips 18 as shown in more detail in Figures 22-23. Figure 23 is a front view of a USB charging module housing 10 showing the location of two clips 18 suitable for front entry connection of the module. Figure 22 is a sectional view through A-A of Figure 23 providing detail of a possible clip arrangement. This clip arrangement allows the housing 10 to engage with a supporting portion 130 of a grid or face plate 120 as shown in Figure 25. Figure 24 shows as a sectional view through B-B of Figure 25 which generally shows the supporting portion 130 in more detail. The housing 10 of the USB charging module 40,80 is inserted through aperture 132 of the supporting portion 130. The clip arrangement facilitates a snap-fit connection between the clips 18 and the supporting portion 130. As the module is inserted into the grid or face plate, the resilient clips 18 bend slightly as force is applied such that the outer most surface 18b of the clips 18 can pass the inner most surface 133 of the supporting portion 130.Once engaged, surface 19 of the housing 10 mates with recessed surface 131 of the supporting portion 130 and surface 18a of the clips 18 is in contact with surface 134 of the supporting portion 130.

Figures 26-27 show exploded views of the USB charging module 40,80 and grid or face plate front entry installation. Figure 26 shows a grid or face plate 120 with two apertures 132 which enables more than one USB charging module 40,80 to be inserted. Figure 27 shows a grid or face plate 140 with a single aperture 132 for receiving a USB charging module 40,80 from the front. In addition, Figure 27

DELTRAN EX1002
IPR2024-01219

shows a cover plate 145 that is attached or mounted to the grid or face plate after the USB charging module 40,80 has been connected and screws 146 for attaching or mounting the grid or face plate to a surface such as a wall or floor.

Although various illustrative embodiments of the present invention have been described in the foregoing detailed description, it will be understood that the invention is not limited to the embodiments disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the invention as set forth and defined by the following claims.

DELTRAN EX1002
IPR2024-01219

CLAIMS:

1. A Universal Serial Bus (USB) charging module housing adapted for securement to a surface mountable power outlet, the housing including:

an engaging portion for connecting the housing to a supporting portion of the power outlet;

access means to allow a USB charging circuit to be inserted into the housing; and

an aperture for allowing external access to a USB port.

2. The housing according to claim 1 further including at least one aperture for receiving wires carrying mains power.

3. The housing according to claim 1 wherein the access means is provided by an aperture in an external face of the housing.

4. The housing according to claim 3 wherein the aperture is covered by a removable portion.

5. The housing according to claim 4 wherein the removable portion includes at least one aperture for receiving wires carrying mains power.

6. The housing according to claim 1 wherein the supporting portion of the power outlet is an integral portion of a grid or face plate.

7. The housing according to claim 1 wherein the supporting portion of the power outlet is located in a mounting plate that is adapted to be connected to the rear of a grid or face plate.

8. The housing according to claim 1 wherein said housing is connected to the supporting portion of the power outlet from the front of the grid or face plate.

9. The housing according to claim 1 wherein said housing is connected to the supporting portion of the power outlet from the rear of the grid or face plate.

10. The housing according to any one of the preceding claims wherein the engaging portion includes:

a plurality of clips extending outwardly from one or more exterior faces of the housing, said clips for engagement with one or more surfaces of the supporting portion of the power outlet in a snap fit arrangement.

DELTRAN EX1002
IPR2024-01219

11. The housing according to claim 10 wherein the clips have a tapered front face and a substantially vertical rear face.

12. The housing according to any one of the preceding claims wherein the aperture for allowing external access to a USB port is located on a front face of the housing.

13. A Universal Serial Bus (USB) charging module adapted for securement to a surface mountable power outlet, the charging module including:

a USB port;

a USB charging circuit that is capable of receiving a mains power input;

a housing, said housing including an engaging portion for connecting the housing to a supporting portion of the power outlet; access means to allow the USB charging circuit to be inserted into the housing and an aperture for allowing external access to the USB port.

14. The USB charging module according to claim 13 wherein the USB charging circuit includes a printed circuit board (PCB).

15. The USB charging module according to claim 14 wherein a plurality of wires are soldered directly to the PCB for connection to mains power either directly or via a switch.

16. The USB charging module according to claim 14 wherein a terminal block is mounted on the PCB for connection to wires carrying mains power either directly or via a switch.

17. The USB charging module according to claim 14 wherein there are provided screwed terminals for wire termination.

18. A surface mountable power outlet for allowing a user to charge a USB compatible device, the power outlet including:

a supporting portion;

a USB charging module including a USB port; a USB charging circuit that is capable of receiving a mains power input; a housing, said housing including an engaging portion for connecting the housing to the supporting portion of the power outlet; access means to allow the USB charging circuit to be inserted into the housing and an aperture for allowing external access to the USB port;

a grid or face plate adapted to allow a user to access the USB port;

a connection between the USB charging module and mains power; and

DELTRAN EX1002
IPR2024-01219

mounting means for mounting the power outlet to a mounting surface.

19. The power outlet according to claim 18 wherein the supporting portion is an integral portion of the grid or face plate.

20. The power outlet according to claim 18 wherein the supporting portion is located in a mounting plate that is adapted to be connected to the rear of the grid or face plate.

21. The power outlet according to claim 18 wherein the USB charging module housing is connected to the supporting portion from the front of the grid or face plate.

22. The power outlet according to claim 18 wherein the USB charging module housing is connected to the supporting portion from the rear of the grid or face plate.

23. The power outlet according to claim 18 wherein the mounting surface is a wall or floor.

24. The power outlet according to claim 18 further including a cover plate.

25. The power outlet according to claim 18 wherein the mains power is between about 100-240V alternating current (AC).

26. A method of installing a power outlet for allowing a user to charge a USB compatible device, the power outlet according to claim 18, comprising the steps of:

connecting the engaging portion of the USB charging module housing to the supporting portion of the power outlet;

connecting the mains power to the USB charging module; and

mounting the power outlet to the mounting surface.

27. A method of installing a power outlet allowing a user to charge USB compatible devices, the power outlet according to claim 20, comprising the steps of:

connecting the engaging portion of the USB charging module housing to the supporting portion of the power outlet;

connecting the mounting plate to the rear of a grid or face plate;

connecting the mains power to the USB charging module; and

mounting the power outlet to the mounting surface.

DELTRAN EX1002
IPR2024-01219

28. The method of installing a power outlet according to any one of claims 26 or 27 wherein the power outlet is mounted to the mounting surface by fastening the grid or face plate to the surface by screws.

DELTRAN EX1002
IPR2024-01219

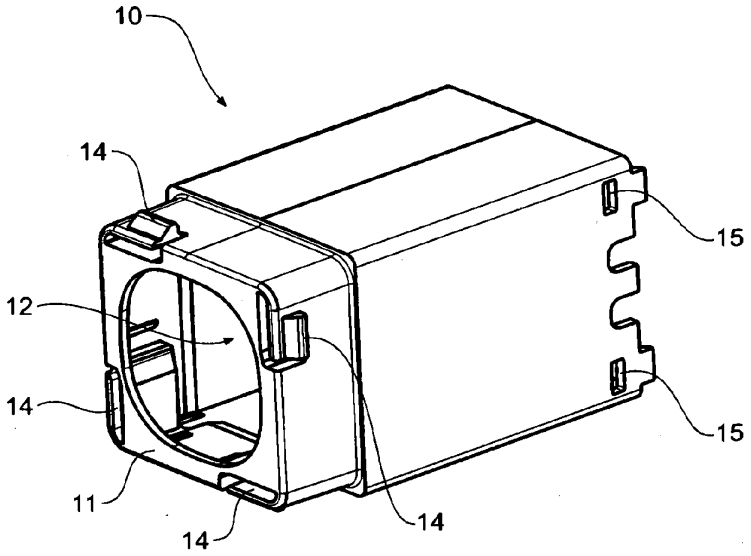


Figure 1

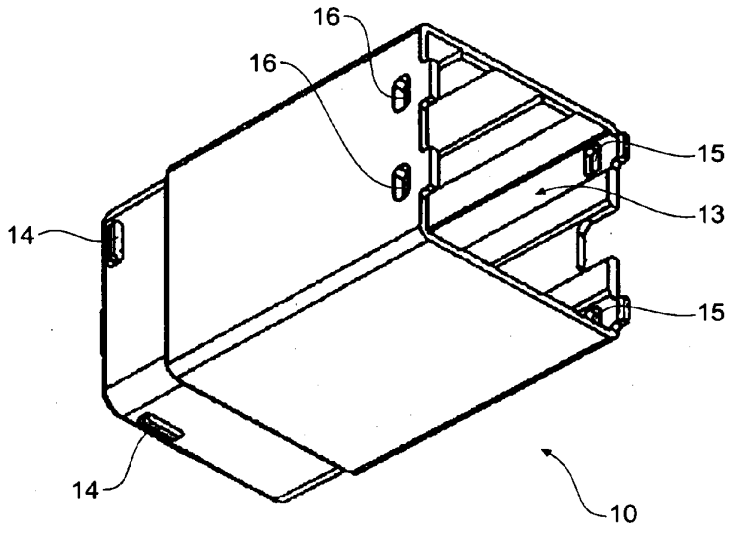


Figure 2

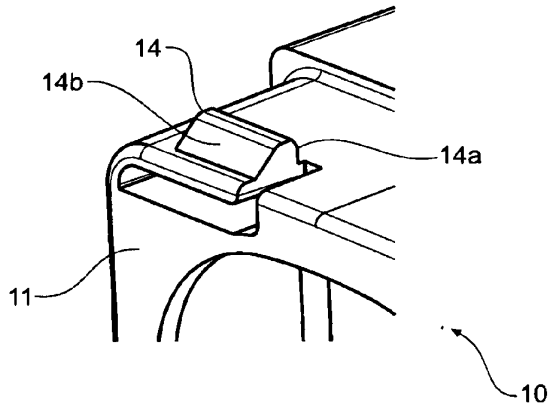


Figure 3

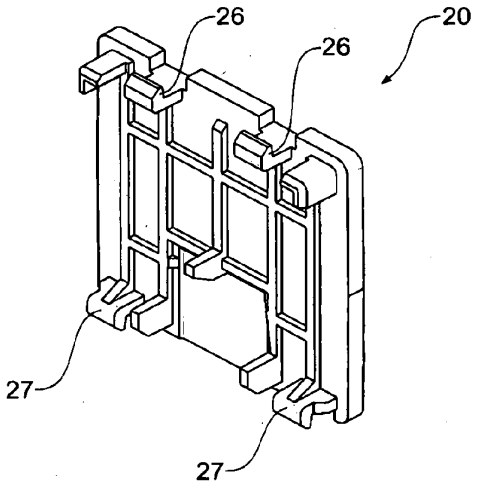


Figure 4

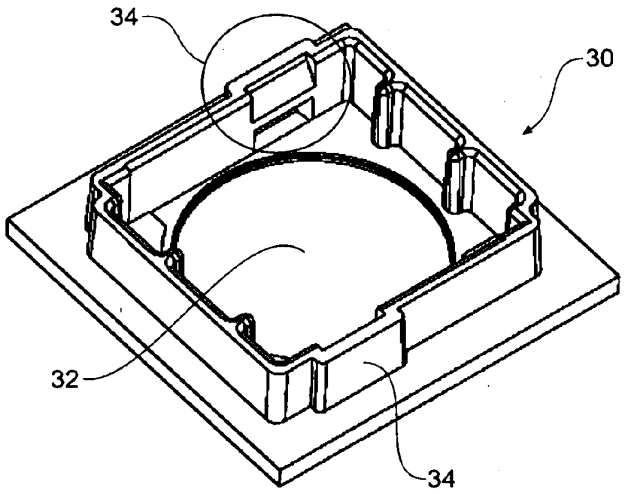


Figure 5

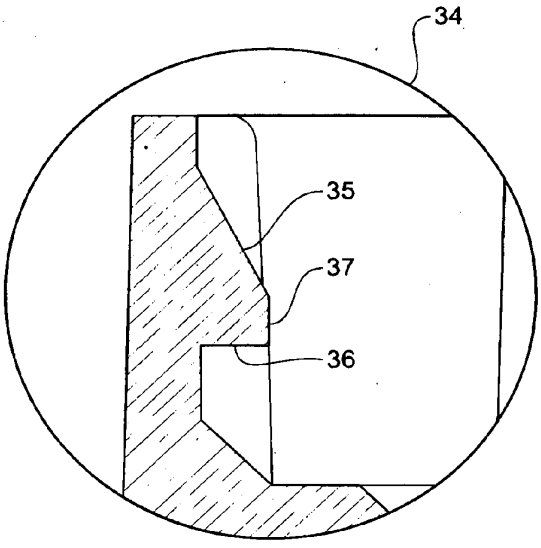


Figure 6

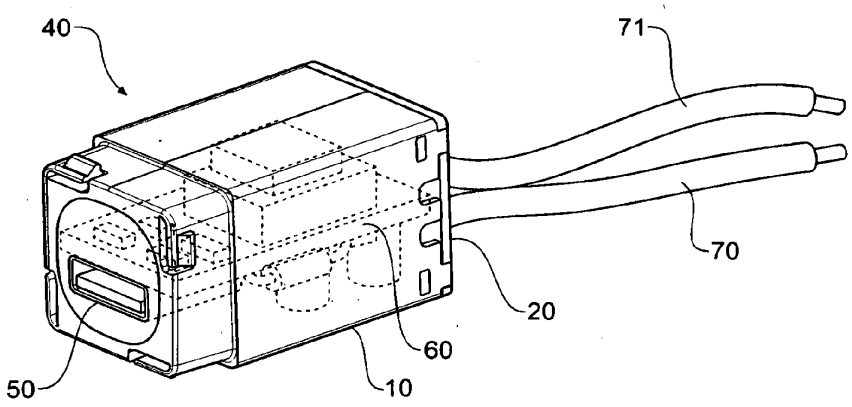


Figure 7

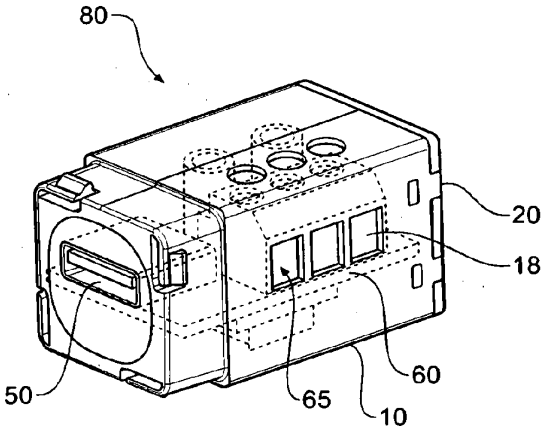


Figure 8

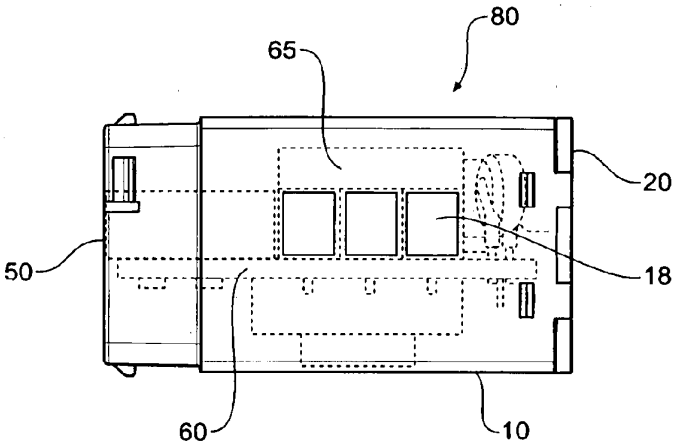


Figure 9

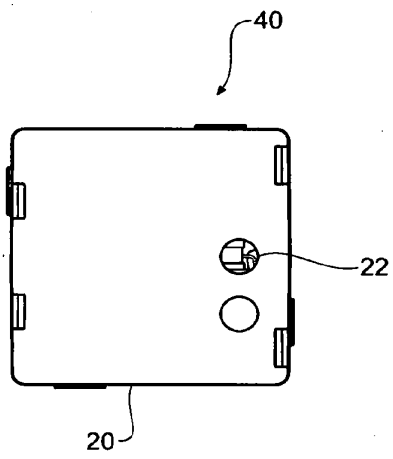


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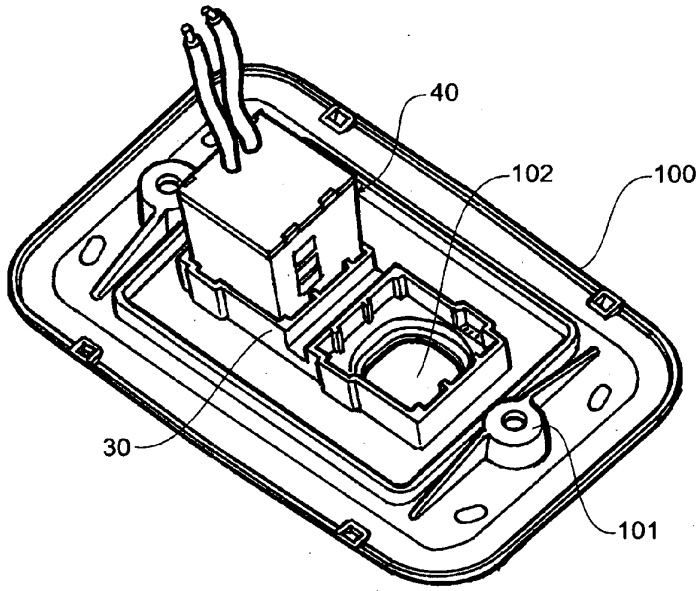


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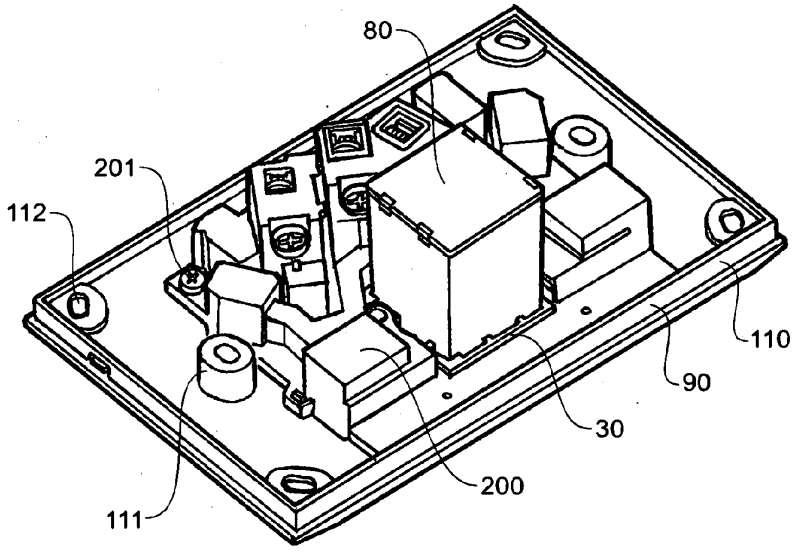


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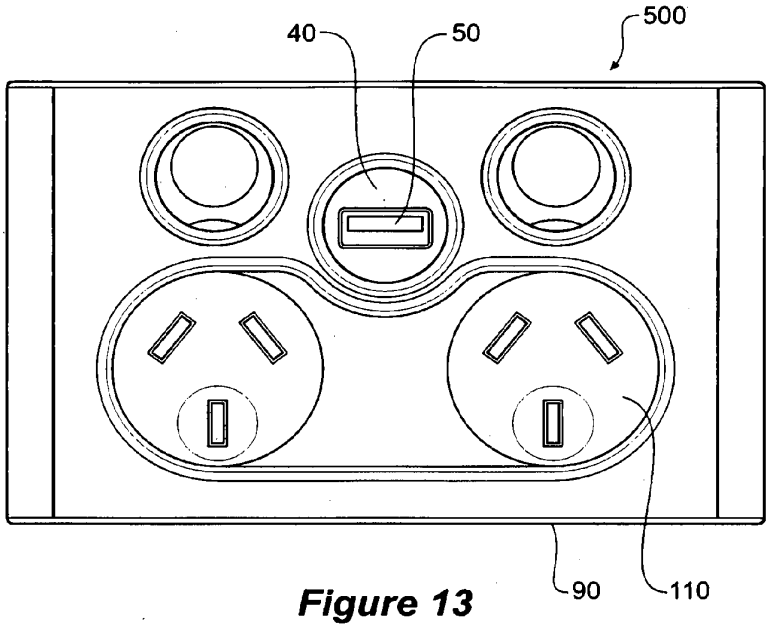


Figure 13

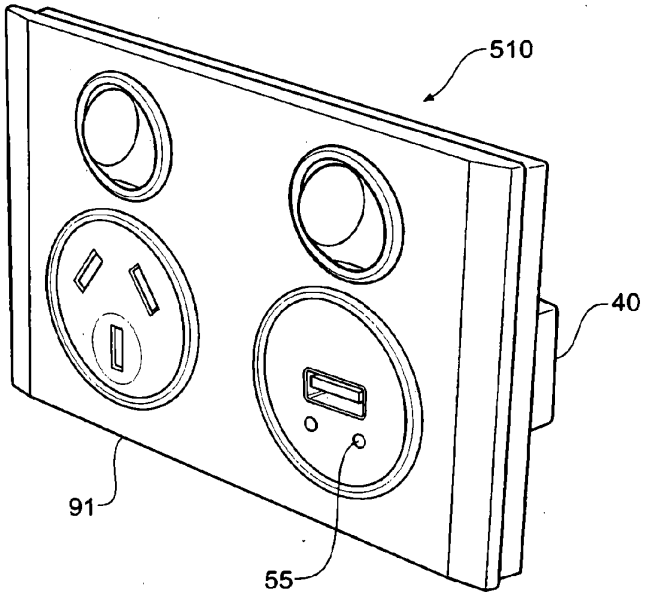


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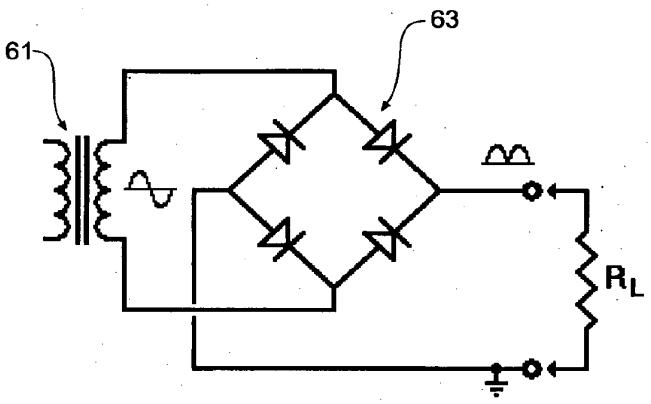


Figure 15

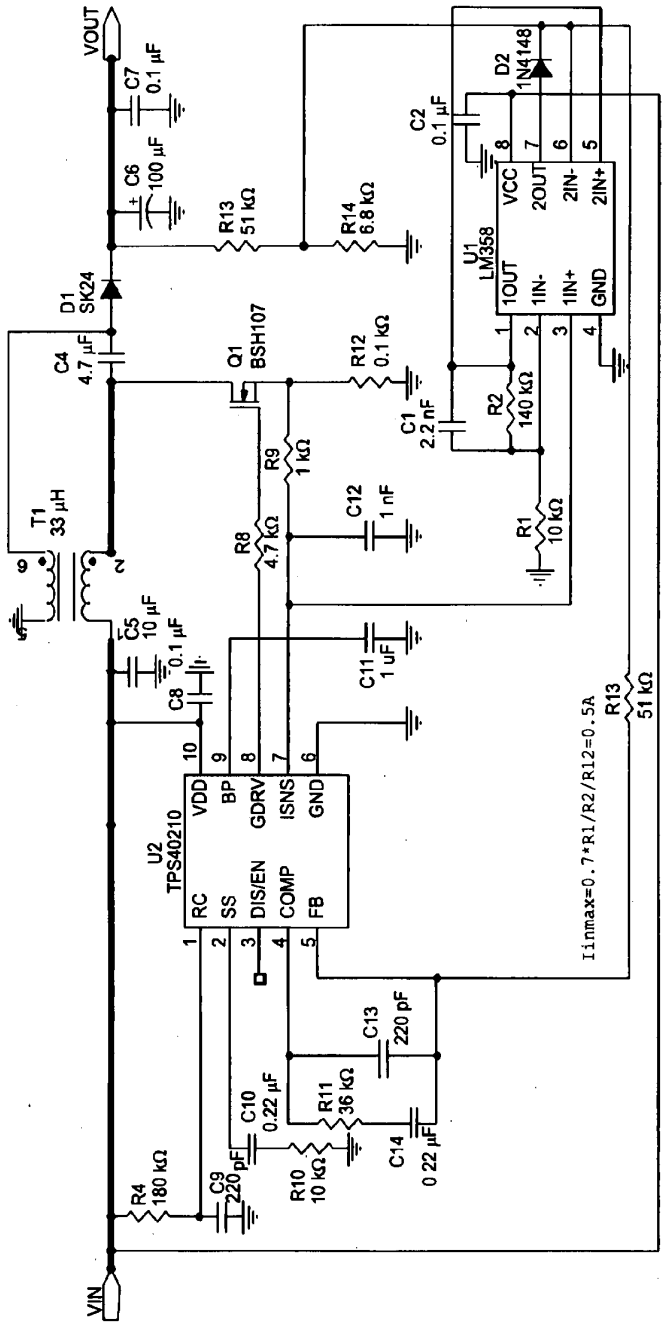

VOUT
VIN
C7 0.1 µF
C6 100 µF
R13 51 kΩ
R14 6.8 kΩ
C2 0.1 µF
D2 1N4148
U1 LM358
1OUT
1IN-
1IN+
GND
VCC
2OUT
2IN-
2IN+
D1 SK24
C4 4.7 µF
Q1 BSH107
R12 0.1 kΩ
C1 2.2 nF
R2 140 kΩ
R1 10 kΩ
T1 33 µH
R9 1 kΩ
R8 4.7 kΩ
C12 1 nF
C5 10 µF
C8 0.1 µF
C11 1 uF
U2 TPS40210
VDD
BP
GDRV
ISNS
GND
RC
SS
DIS/EN
COMP
FB
R13 51 kΩ
Iinmax=0.7*R1/R2/R12=0.5A
C13 220 pF
C10 0.22 µF
R11 36 kΩ
C14 0 22 µF
C9 220 pF
R10 10 kΩ
R4 180 kΩ

Figure 16

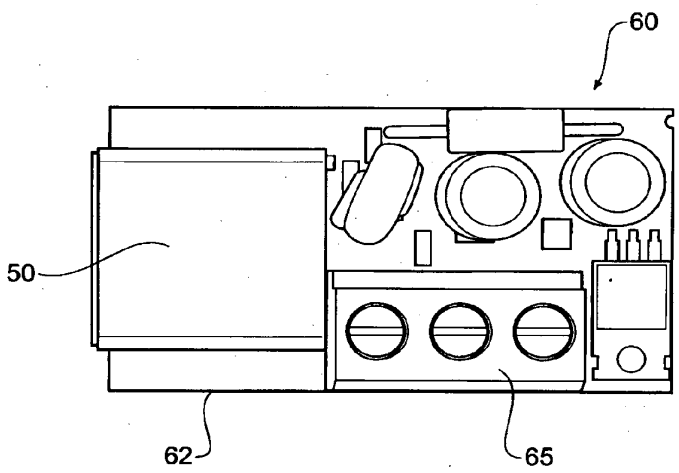


Figure 17

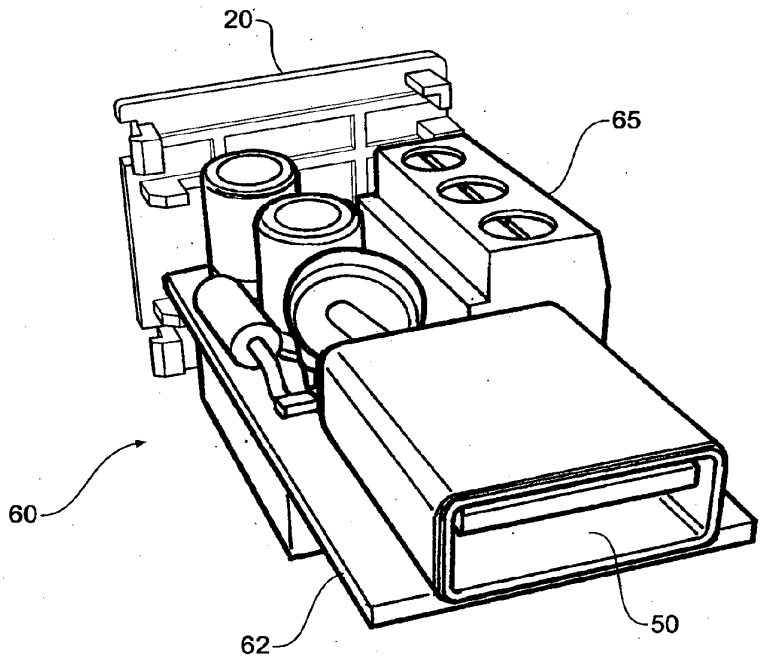


Figure 18

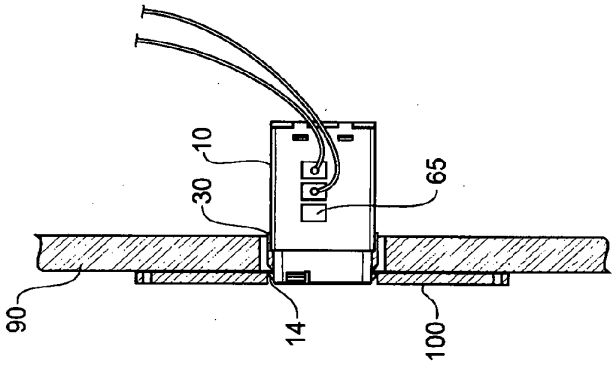


Figure 19c

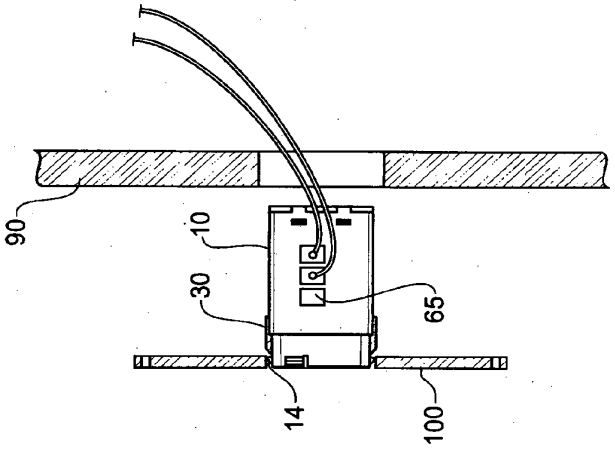


Figure 19b

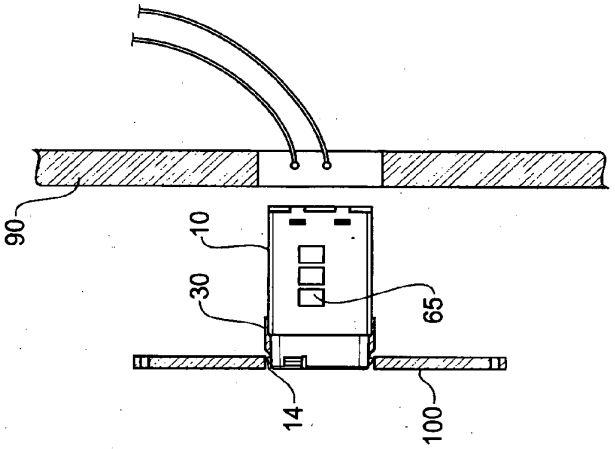


Figure 19a

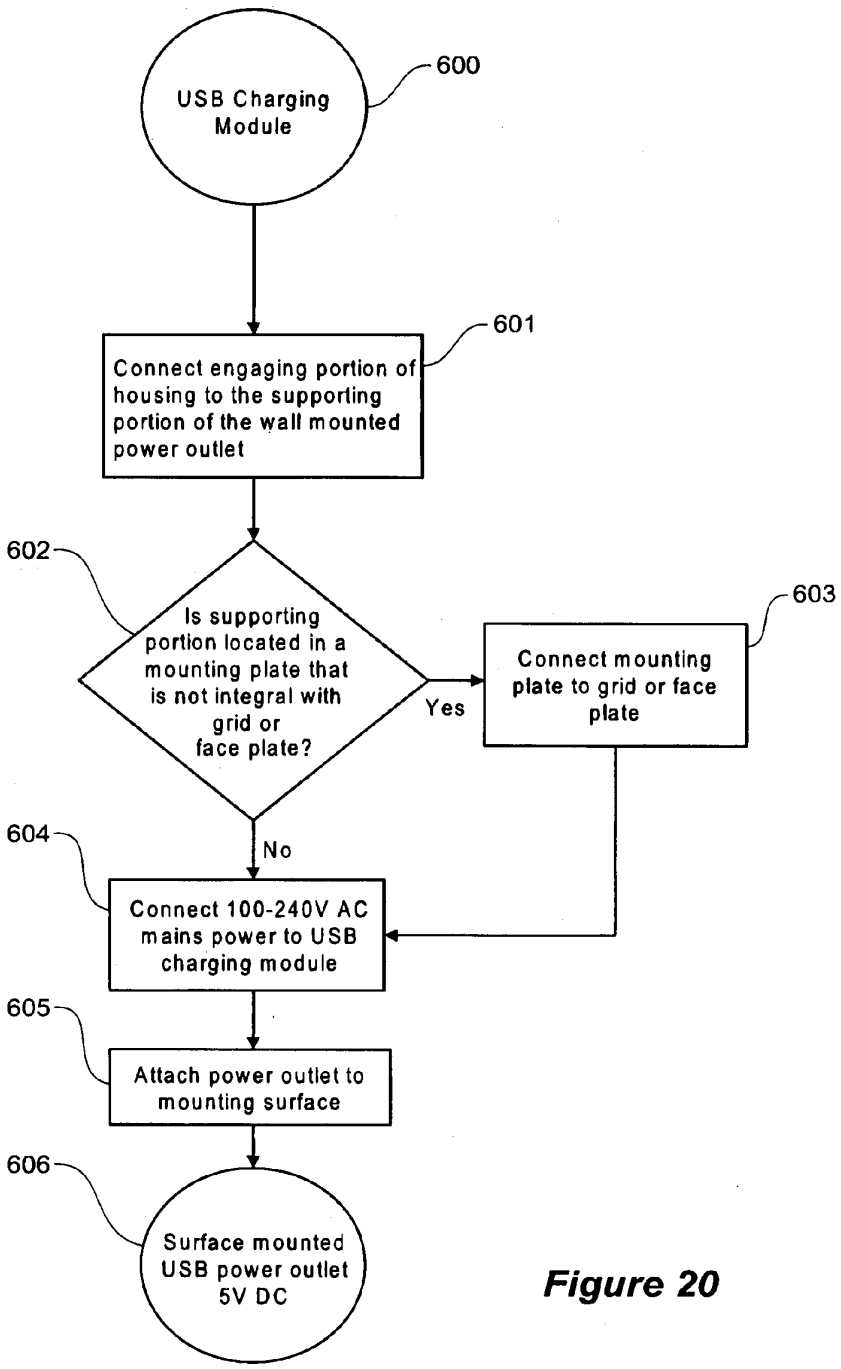

USB Charging Module
600
Connect engaging portion of housing to the supporting portion of the wall mounted power outlet
601
602
Is supporting portion located in a mounting plate that is not integral with grid or face plate?
Yes
603
Connect mounting plate to grid or face plate
No
604
Connect 100-240V AC mains power to USB charging module
605
Attach power outlet to mounting surface
606
Surface mounted USB power outlet 5V DC

Figure 20

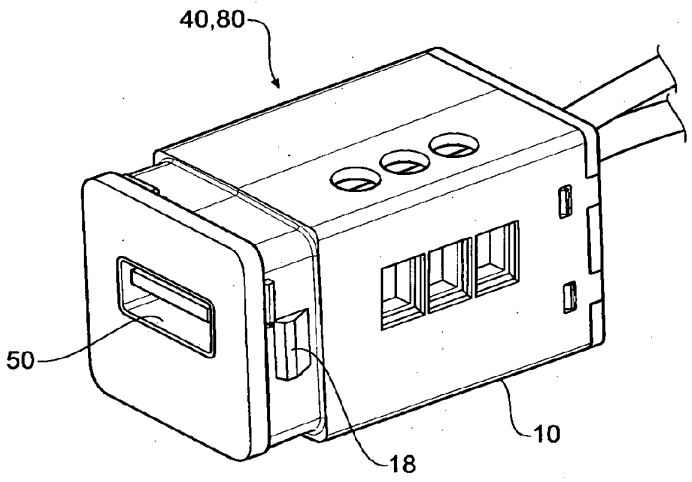


Figure 21

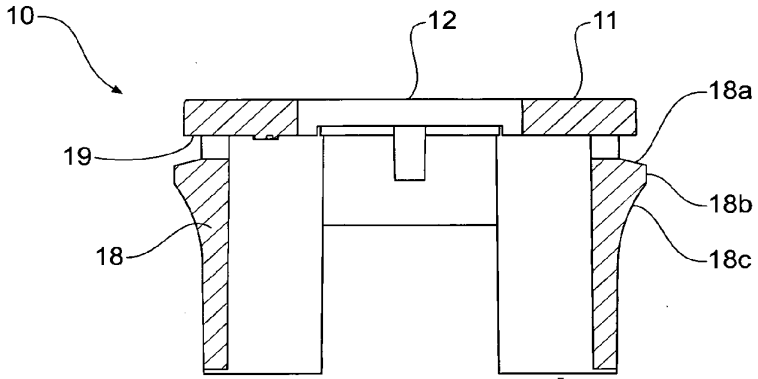


Figure 22

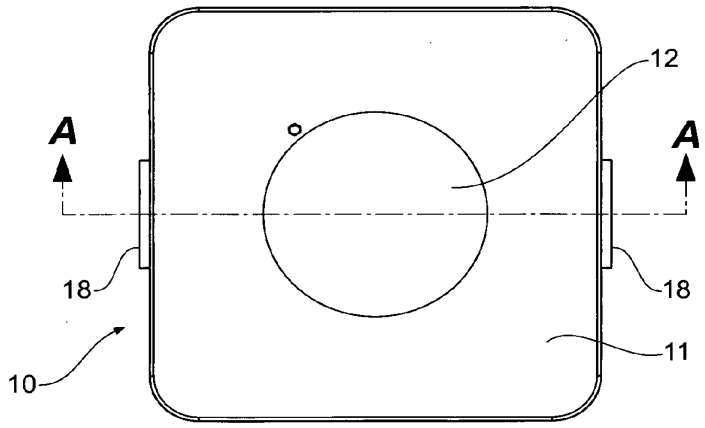


Figure 23

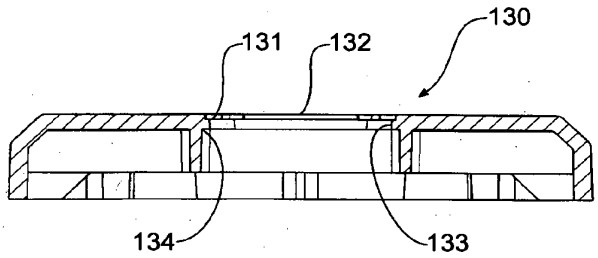


Figure 24

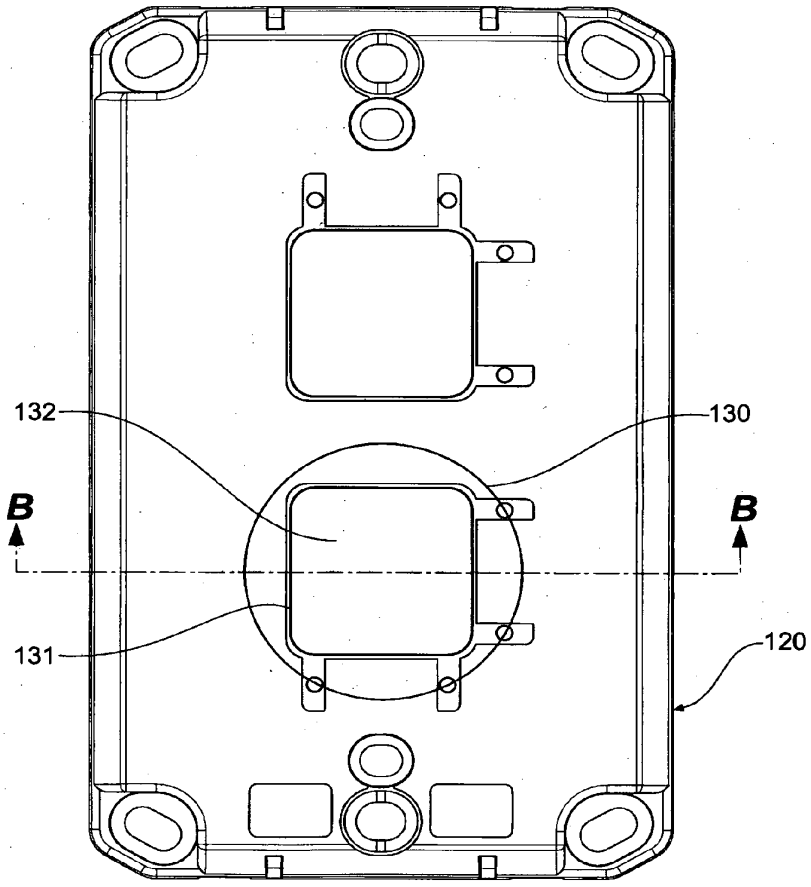


Figure 25

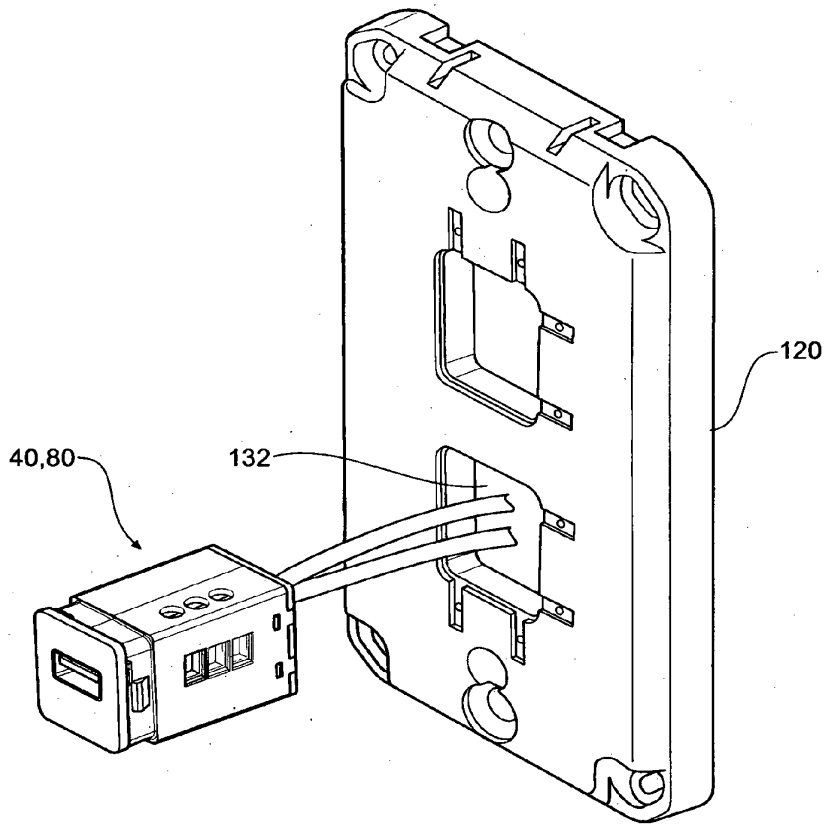


Figure 26

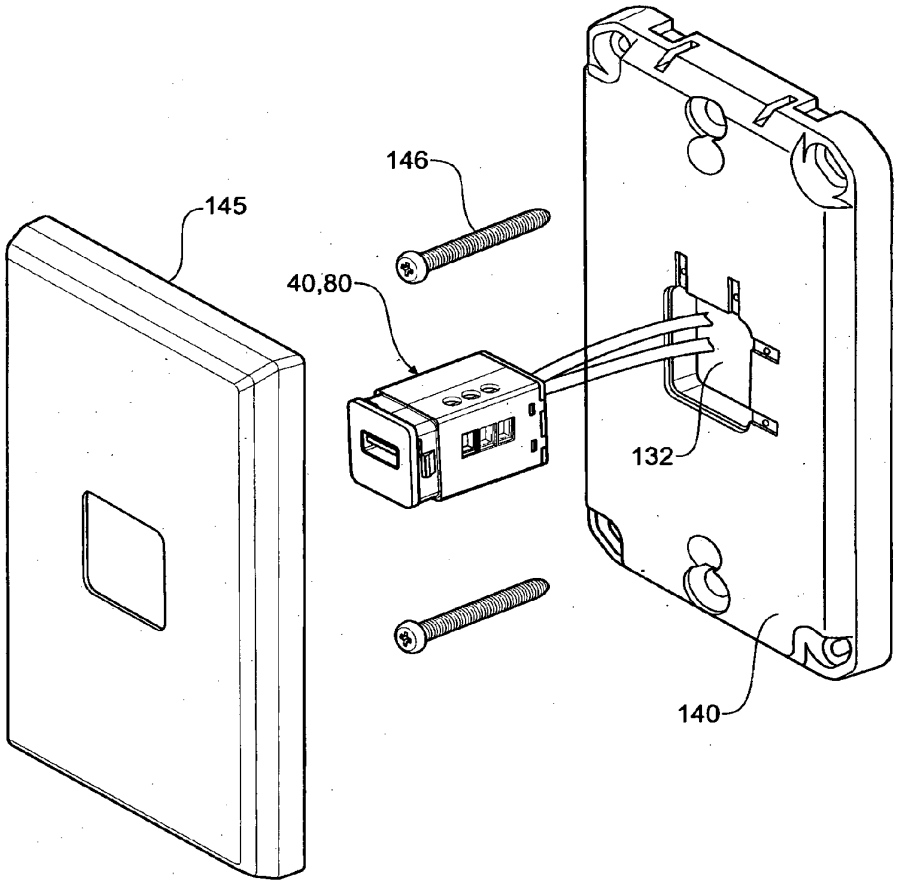


Figure 27

Espacenet

CN204113515U Remote control vehicle storage battery auxiliary starting device

Applicants: ZHANG KAILONG

Inventors: ZHANG KAILONG

Classifications:
IPC ***F02N11/08;***

Priorities: CN201420456352U 2014-08-13

Application: CN201420456352U·2014-08-13

Publication: CN204113515U·2015-01-21

Published as: CN204113515U

Remote control vehicle storage battery auxiliary starting device

Abstract

The utility model provides a remote control vehicle storage battery auxiliary starting device which is characterized by comprising a lithium battery pack, a control chip, a power management chip, a first controllable switch circuit, a second controllable switch circuit, a battery voltage detection circuit, a storage battery voltage detection circuit, a starting circuit, an electric heater, a wireless receiving head and a remote controller corresponding to the wireless receiving head, a negative electrode of the lithium battery pack is connected with a negative electrode of a vehicle storage battery, a positive electrode of the lithium battery pack is connected with a positive electrode of the vehicle storage battery through the first controllable switch circuit, the vehicle storage battery, the second controllable switch circuit and the electric heater form a circuit loop, and connection and disconnection of the loop are controlled by the second controllable switch circuit. The remote control vehicle storage battery auxiliary starting device effectively solves the problem that a vehicle cannot be started due to insufficient power supply caused by low temperature or aging of the vehicle storage battery, a remote control heating function is added, the vehicle storage battery is preheated in advance, and the remote control vehicle storage battery auxiliary starting device has high practicability in actual life.

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(12)实用新型专利

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代理人 邹常友

(51)Int.Cl.
F02N 11/08(2006.01)

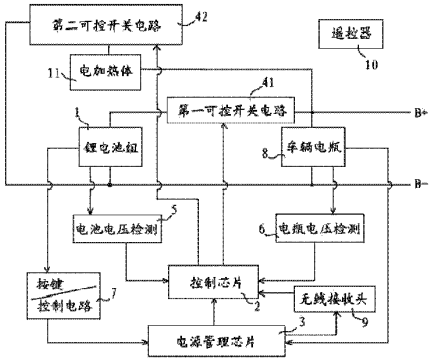
权利要求书2页 说明书4页 附图2页

(54)实用新型名称

遥控型车辆电瓶辅助启动装置

(57)摘要

本实用新型提出一种遥控型车辆电瓶辅助启动装置，其特征在于：包括锂电池组、控制芯片、电源管理芯片、第一可控开关电路、第二可控开关电路、电池电压检测电路、电瓶电压检测电路、启动电路、电加热体、无线接收头及与所述无线接收头对应的遥控器；所述锂电池组的负极与车辆电瓶的负极连接，锂电池组的正极经第一可控开关电路与车辆电瓶正极连接；所述车辆电瓶、第二可控开关电路及电加热体构成电路回路，并由所述第二可控开关电路控制其所在回路的通断。本实用新型很好地解决了车辆电瓶因温度低或老化而供电不足导致的车辆不能启动的问题，同时增添遥控加热功能，实现车辆电瓶的提前预热，在实际生活中具有较高的实用性。



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1. 一种遥控型车辆电瓶辅助启动装置，其特征在于：包括锂电池组、控制芯片、电源管理芯片、第一可控开关电路、第二可控开关电路、电池电压检测电路、电瓶电压检测电路、启动电路、电加热体、无线接收头及与所述无线接收头对应的遥控器；所述锂电池组的负极与车辆电瓶的负极连接，锂电池组的正极经第一可控开关电路与车辆电瓶正极连接；所述车辆电瓶、第二可控开关电路及电加热体构成电路回路，并由所述第二可控开关电路控制其所在回路的通断；所述第一可控开关电路和第二可控开关电路由控制芯片控制其通断；所述电源管理芯片分别连接锂电池组与车辆电瓶，电源管理芯片与锂电池组之间设有启动电路，所述启动电路控制电源管理芯片与锂电池组线路的通断；所述电池电压检测电路用于获取锂电池组两端输出的实时电压，并将其反馈至控制芯片；所述电瓶电压检测电路用于获取车辆电瓶两端输出的实时电压，并将其反馈至控制芯片；所述无线接收头的输出端与所述控制芯片连接。

2. 根据权利要求 1 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述启动电路包括接于电源管理芯片与锂电池组之间的按键开关 K1、NPN 晶体管 Q2 与 PNP 晶体管 Q3；所述 PNP 晶体管 Q3 的发射极连接锂电池组的正极，其集电极连接电源管理芯片的输入端，其基极连接 NPN 晶体管 Q2 的集电极；所述 NPN 晶体管 Q2 的发射极接地，其基极通过按键开关 K1 与锂电池组的正极连接。

3. 根据权利要求 1 或 2 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述第一可控开关电路包括继电器 T1、NPN 晶体管 Q1、二极管 D1 以及电阻 R3、R4、R5，所述二极管 D1、电阻 R3 与 NPN 晶体管 Q1 依次串接；所述二极管 D1 的阴极与锂电池组的正极连接，其阳极与电阻 R3 连接；所述 NPN 晶体管 Q1 的集电极与电阻 R3 连接，其发射极接地，其基极经电阻 R5 与控制芯片连接，所述 NPN 晶体管 Q1 的发射极与基极之间接有电阻 R4；所述继电器 T1 的开关部接于锂电池组正极与车辆电瓶正极之间的线路上，其电磁部与所述二极管 D1 并联。

4. 根据权利要求 3 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述第二可控开关电路包括继电器 T2、NPN 晶体管 Q31、二极管 D31 以及电阻 R33、R34、R35，所述二极管 D31、电阻 R33 与 NPN 晶体管 Q31 依次串接；所述二极管 D31 的阴极与车辆电瓶的正极连接，其阳极与电阻 R33 连接；所述 NPN 晶体管 Q31 的集电极与电阻 R33 连接，其发射极接地，其基极经电阻 R35 与控制芯片连接，所述 NPN 晶体管 Q31 的发射极与基极之间接有电阻 R34；所述车辆电瓶与电加热体两端并联，所述继电器 T2 的开关部接于车辆电瓶与电加热体之间的线路上，其电磁部与所述二极管 D31 并联。

5. 根据权利要求 4 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述电池电压检测电路包括与锂电池组并联连接两个分压电阻 R1、R2，电阻 R1 与 R2 串联，二者的连结点与控制芯片连接。

6. 根据权利要求 5 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述电瓶电压检测电路包括与车辆电瓶并联连接两个分压电阻 R6、R7，电阻 R6 与 R7 串联，二者的连结点与控制芯片连接。

7. 根据权利要求 6 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述无线接收头包括无线收发芯片、匹配电路及天线，所述匹配电路包括电感 L、电容 C24 和下拉电阻 R26，所述电感 L 两端分别连接天线和无线收发芯片，所述电感 L 与天线连接的一端接有电容 C24，所述电感 L 与无线收发芯片连接的一端接有下拉电阻 R26。

DELTRAN EX1002
IPR2024-01219

8. 根据权利要求 7 所述的遥控型车辆电瓶辅助启动装置，其特征在于：所述电加热体包括内置有电热丝或电热膜层的电加热垫。

DELTRAN EX1002
IPR2024-01219

遥控型车辆电瓶辅助启动装置

技术领域

[0001] 本实用新型涉及一种遥控型车辆电瓶辅助启动装置。

背景技术

[0002] 目前，车辆基本上都是通过电子打火的方式启动，而电子点火装置是靠蓄电池来供给电源的。蓄电池的内阻较大，从而导致其在启动时瞬时电流输出值偏小，且其内阻的阻值会随使用时间或气温的下降而变大。因此，在使用较长时间后或是在气温较低的情况下，蓄电池输出的启动电流显著变小，常常导致车辆很难打着火。特别是在低温条件下，车辆的电子点火装置对启动电流的要求比平时更高，而此时蓄电池的输出电流又比平时小，因而会造成点火失败，车辆不能启动。

实用新型内容

[0003] 针对背景技术中提及的问题，本实用新型提出一种带遥控型车辆电瓶辅助启动装置，旨在解决车辆电瓶因温度低或老化而供电不足导致的车辆不能启动的问题，同时，有效延长车辆电瓶的使用寿命。其采用的技术方案如下：

[0004] 一种遥控型车辆电瓶辅助启动装置，包括锂电池组、控制芯片、电源管理芯片、第一可控开关电路、第二可控开关电路、电池电压检测电路、电瓶电压检测电路、启动电路、电加热体、无线接收头及与所述无线接收头对应的遥控器；所述锂电池组的负极与车辆电瓶的负极连接，锂电池组的正极经第一可控开关电路与车辆电瓶正极连接；所述车辆电瓶、第二可控开关电路及电加热体构成电路回路，并由所述第二可控开关电路控制其所在回路的通断；所述第一可控开关电路和第二可控开关电路由控制芯片控制其通断；所述电源管理芯片分别连接锂电池组与车辆电瓶，电源管理芯片与锂电池组之间设有启动电路，所述启动电路控制电源管理芯片与锂电池组线路的通断；所述电池电压检测电路用于获取锂电池组两端输出的实时电压，并将其反馈至控制芯片；所述电瓶电压检测电路用于获取车辆电瓶两端输出的实时电压，并将其反馈至控制芯片；所述无线接收头的输出端与所述控制芯片连接。

[0005] 上述方案的原理：所述启动电路接通，由锂电池组为电源管理芯片供电，从而唤醒控制芯片；所述控制芯片分别获取的锂电池组与车辆电瓶两端电压，并作判比；在车辆电瓶电两端电压较低的情况下，所述控制芯片令继电器开关电路导通，从而使得锂电池组与车辆电瓶并联，同时向点火装置供电；同时，在接收到所述遥控器的控制信号（启动加热）时，所述控制芯片令继电器开关电路导通，闭合电加热体所在回路，实现对车辆电瓶的加热。随着电瓶温度的回升，电瓶电压趋于正常（即比锂电池组两端电压高）的情况下，所述控制芯片令继电器开关电路断开，仅由车辆电瓶为电源管理芯片和点火装置供电。

[0006] 本实用新型的技术方案进一步包括：

[0007] 所述启动电路包括接于电源管理芯片与锂电池组之间的按键开关 K1、NPN 晶体管 Q2 与 PNP 晶体管 Q3；所述 PNP 晶体管 Q3 的发射极连接锂电池组的正极，其集电极连接电源

DELTRAN EX1002
IPR2024-01219

管理芯片的输入端，其基极连接 NPN 晶体管 Q2 的集电极；所述 NPN 晶体管 Q2 的发射极接地，其基极通过按键开关 K1 与锂电池组的正极连接。

[0008] 作为优选方案，所述第一可控开关电路包括继电器 T1、NPN 晶体管 Q1、二极管 D1 以及电阻 R3、R4、R5，所述二极管 D1、电阻 R3 与 NPN 晶体管 Q1 依次串接；所述二极管 D1 的阴极与锂电池组的正极连接，其阳极与电阻 R3 连接；所述 NPN 晶体管 Q1 的集电极与电阻 R3 连接，其发射极接地，其基极经电阻 R5 与控制芯片连接，所述 NPN 晶体管 Q1 的发射极与基极之间接有电阻 R4；所述继电器 T1 的开关部接于锂电池组正极与车辆电瓶正极之间的线路上，其电磁部与所述二极管 D1 并联。

[0009] 作为优选方案，所述第二可控开关电路包括继电器 T2、NPN 晶体管 Q31、二极管 D31 以及电阻 R33、R34、R35，所述二极管 D31、电阻 R33 与 NPN 晶体管 Q31 依次串接；所述二极管 D31 的阴极与车辆电瓶的正极连接，其阳极与电阻 R33 连接；所述 NPN 晶体管 Q31 的集电极与电阻 R33 连接，其发射极接地，其基极经电阻 R35 与控制芯片连接，所述 NPN 晶体管 Q31 的发射极与基极之间接有电阻 R34；所述车辆电瓶与电加热体两端并联，所述继电器 T2 的开关部接于车辆电瓶与电加热体之间的线路上，其电磁部与所述二极管 D31 并联。

[0010] 作为优选方案，所述电池电压检测电路包括与锂电池组并联连接两个分压电阻 R1、R2，电阻 R1 与 R2 串联，二者的连结点与控制芯片连接。

[0011] 作为优选方案，所述电瓶电压检测电路包括与车辆电瓶并联连接两个分压电阻 R6、R7，电阻 R6 与 R7 串联，二者的连结点与控制芯片连接。

[0012] 作为优选方案，所述无线接收头包括无线收发芯片、匹配电路及天线，所述匹配电路包括电感 L、电容 C24 和下拉电阻 R26，所述电感 L 两端分别连接天线和无线收发芯片，所述电感 L 与天线连接的一端接有电容 C24，所述电感 L 与无线收发芯片连接的一端接有下拉电阻 R26。

[0013] 作为优选方案，所述电加热体包括内置有电热丝或电热膜层的电加热垫。

[0014] 本实用新型采用锂电池组与车辆电瓶配合供电结构，很好地解决了车辆电瓶因温度低或老化而供电不足导致的车辆不能启动的问题，延长车辆电瓶的使用寿命。同时，更增添遥控加热功能，实现车辆电瓶的提前预热。本实用新型电路结构简单，在实际生活中具有较高的实用性与良好的应用前景，十分适合推广使用。

附图说明

[0015] 图 1 为本实用新型的结构框架示意图。

[0016] 图 2 为本实用新型的电路结构示意图。

具体实施方式

[0017] 如下结合附图，对本申请方案作进一步描述：

[0018] 如图 1 至 2 所示，一种遥控型车辆电瓶辅助启动装置，包括锂电池组 1、控制芯片 2、电源管理芯片 3、第一可控开关电路 41、第二可控开关电路 42、电池电压检测电路 5、电瓶电压检测电路 6、启动电路 7、电加热体 11、无线接收头 9 及与所述无线接收头 9 对应的遥控器 10；

[0019] 所述锂电池组 1 的负极与车辆电瓶 8 的负极连接，锂电池组 1 的正极经第一可控

DELTRAN EX1002
IPR2024-01219

开关电路 41 与车辆电瓶 8 正极连接；所述车辆电瓶 8、第二可控开关电路 42 及电加热体 11 构成电路回路，并由所述第二可控开关电路 11 控制其所在回路的通断；所述第一可控开关电路 41 和第二可控开关电路 42 由控制芯片 2 控制其通断；所述电源管理芯片 3 分别连接锂电池组 1 与车辆电瓶 8，电源管理芯片 3 与锂电池组 1 之间设有启动电路 7，所述启动电路 7 控制电源管理芯片 3 与锂电池组 1 线路的通断；所述电池电压检测电路 5 用于获取锂电池组 1 两端输出的实时电压，并将其反馈至控制芯片 2；所述电瓶电压检测电路 6 用于获取车辆电瓶 8 两端输出的实时电压，并将其反馈至控制芯片 2；所述无线接收头 9 的输出端与所述控制芯片 2 连接。

[0020] 上述方案为本实用新型的优选实施方式之一，可以理解，所述启动电路 7 还可以为具有控制电源管理芯片 3 与锂电池组 1 线路通断功能的其它开关电路，该开关电路可由车载系统控制。

[0021] 所述启动电路 7 包括接于电源管理芯片 3 与锂电池组 1 之间的按键开关 K1、NPN 晶体管 Q2 与 PNP 晶体管 Q3；所述 PNP 晶体管 Q3 的发射极连接锂电池组的正极，其集电极连接电源管理芯片的输入端，其基极连接 NPN 晶体管 Q2 的集电极；所述 NPN 晶体管 Q2 的发射极接地，其基极通过按键开关 K1 与锂电池组的正极连接。

[0022] 所述第一可控开关电路 41 包括继电器 T1、NPN 晶体管 Q1、二极管 D1 以及电阻 R3、R4、R5，所述二极管 D1、电阻 R3 与 NPN 晶体管 Q1 依次串接；所述二极管 D1 的阴极与锂电池组的正极连接，其阳极与电阻 R3 连接；所述 NPN 晶体管 Q1 的集电极与电阻 R3 连接，其发射极接地，其基极经电阻 R5 与控制芯片连接，所述 NPN 晶体管 Q1 的发射极与基极之间接有电阻 R4；所述继电器 T1 的开关部接于锂电池组正极与车辆电瓶正极之间的线路上，其电磁部与所述二极管 D1 并联。

[0023] 所述第二可控开关电路 42 包括继电器 T2、NPN 晶体管 Q31、二极管 D31 以及电阻 R33、R34、R35，所述二极管 D31、电阻 R33 与 NPN 晶体管 Q31 依次串接；所述二极管 D31 的阴极与车辆电瓶 8 的正极连接，其阳极与电阻 R33 连接；所述 NPN 晶体管 Q31 的集电极与电阻 R33 连接，其发射极接地，其基极经电阻 R35 与控制芯片 2 连接，所述 NPN 晶体管 Q31 的发射极与基极之间接有电阻 R34；所述车辆电瓶 8 与电加热体 11 两端并联，所述继电器 T2 的开关部接于车辆电瓶 8 与电加热体 11 之间的线路上，其电磁部与所述二极管 D31 并联。

[0024] 所述电池电压检测电路 5 包括与锂电池组 1 并联连接两个分压电阻 R1、R2，电阻 R1 与 R2 串联，二者的连结点与控制芯片 2 连接。

[0025] 所述电瓶电压检测电路 6 包括与车辆电瓶 8 并联连接两个分压电阻 R6、R7，电阻 R6 与 R7 串联，二者的连结点与控制芯片 2 连接。

[0026] 上述实施方案中，控制芯片 2 对应附图 2 中的 U1，控制电源管理芯片 3 对应附图 2 中的 U2。

[0027] 所述无线接收头 9 包括无线收发芯片 U3、匹配电路及天线，所述匹配电路包括电感 L、电容 C24 和下拉电阻 R26，所述电感 L 两端分别连接天线和无线收发芯片，所述电感 L 与天线连接的一端接有电容 C24，所述电感 L 与无线收发芯片连接的一端接有下拉电阻 R26。

[0028] 所述无线收芯片 U3 的型号为 LT8900。

[0029] 所述电加热体 11 包括内置有电热丝 RL 的电加热垫。

DELTRAN EX1002
IPR2024-01219

[0030] 上述优选实施方式应视为本申请方案实施方式的举例说明，凡与本申请方案雷同、近似或以此为基础作出的技术推演、替换、改进等，均应视为本专利的保护范围。

DELTRAN EX1002
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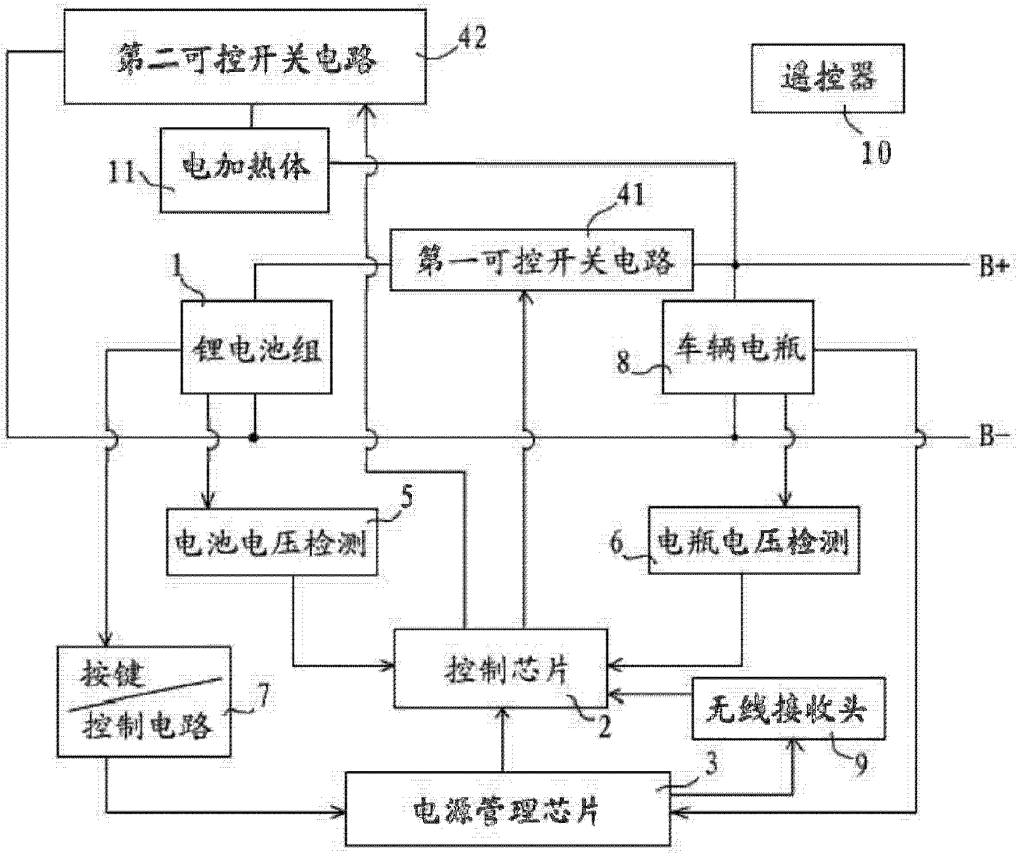


图 1

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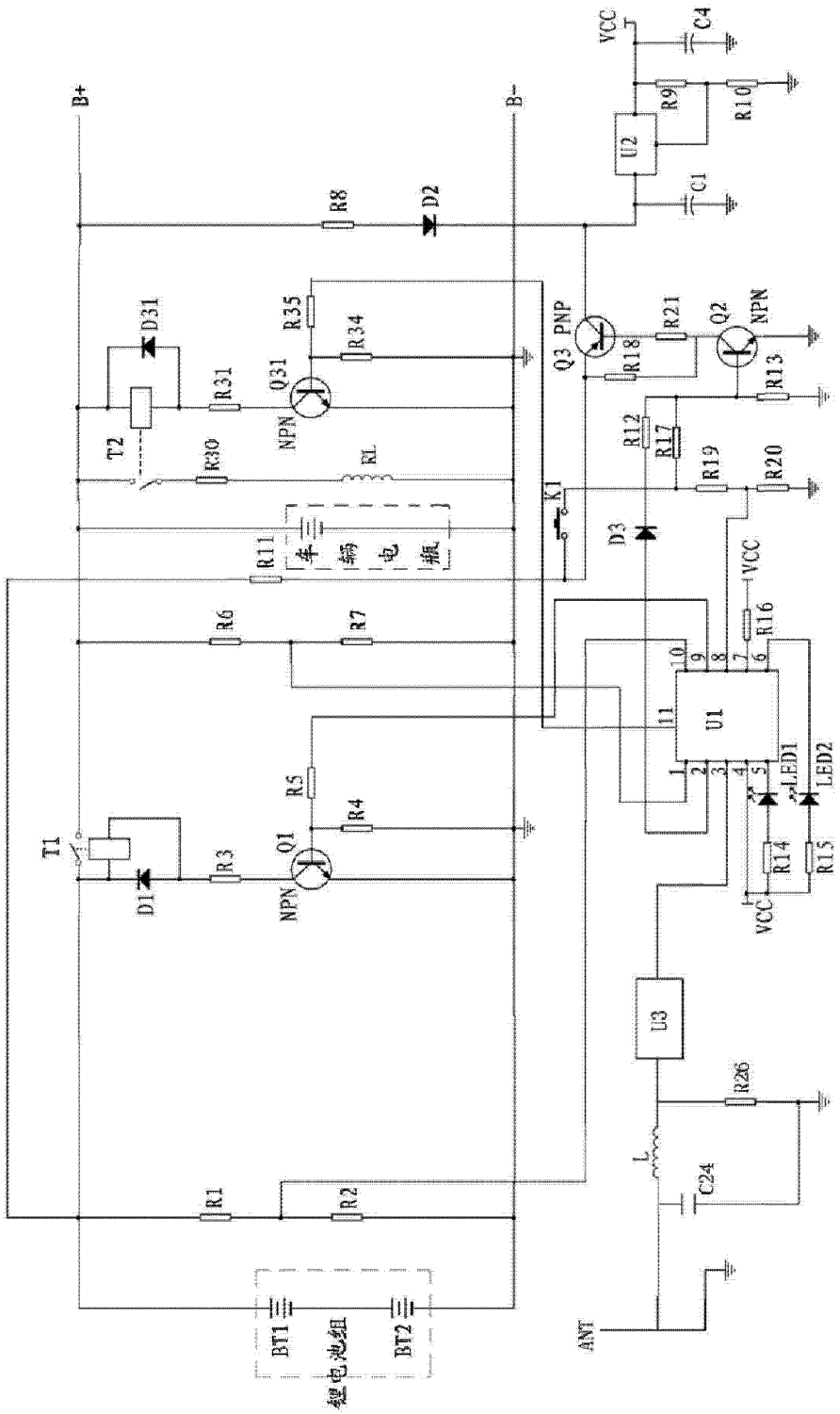


图 2

DELTRAN EX1002
IPR2024-01219

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GUANGDONG BOLTPOWER ENERGY CO.,

LTD,

Petitioner,

v.

THE NOCO COMPANY,

Patent Owner.

U.S. Patent No. 9,007,015

PETITION

For *Inter Partes* Review

TABLE OF CONTENTS

I. INTRODUCTION 1

II. BACKGROUND 1

A. The '015 patent 1

B. Prosecution History of the '015 patent 6

III. SUMMARY OF CHALLENGES AND RELIEF REQUESTED 7

IV. PERSON OF ORDINARY SKILL IN THE ART 9

V. CLAIM CONSTRUCTION 9

VI. SPECIFIC GROUNDS FOR PETITION 12

A. Ground 1: Claims 1, 7-9, 15, and 17-21 are anticipated by Richardson 12

B. Ground 2: Claims 2, 3, 12-14, and 23 would have been obvious from Richardson and Lei 41

C. Ground 3: Claims 4 and 5 would have been obvious from Richardson and Krieger 46

D. Ground 4: Claim 6 would have been obvious from Richardson and Wanzong 51

E. Ground 5: Claim 16 would have been obvious from Richardson and Baxter 55

F. Ground 6: Claims 10-13 would have been obvious from Richardson and the Epower-20 brochure or the Epower-21 brochure 56

G. Ground 7: Claim 22 would have been obvious from Richardson and Richardet 64

H. Ground 8: Claims 1, 17, and 21 are anticipated by Klang 68

I. Ground 9: Claims 4 and 5 would have been obvious from Klang and Krieger 89

J. Ground 10: Claim 22 would have been obvious from Klang and Richardet 91

K. Ground 11: Claim 23 would have been obvious from Klang and Lei 92

VII. CONCLUSION 93

VIII. CERTIFICATION OF GROUND FOR STANDING 93

IX. MANDATORY NOTICES 93

A. Real Party in Interest 93

B. Related Matters 93

C. Lead and Back-up Counsel 96

D. Service Information 96

E. Fee for Inter Partes Review (37 C.F.R. §42.103) 97

TABLE OF AUTHORITIES

Cases

Arctic Cat Inc. v. GEP Power Products, Inc., No. 18-1520 (Fed. Cir. 2019) 69

In re Translogic Tech., Inc., 504 F.3d 1249, 1257 (Fed. Cir. 2007) 12

Statutes

35 U.S.C. §102(a) 11

35 U.S.C. §103 11

Regulations

37 C.F.R. §42.104(a) 93

37 C.F.R. §42.15(a) 97

37 C.F.R §42.100(b) 12

PETITIONER'S LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 9,007,015 ("the '015 patent)
1002	Declaration of James L. Kirtley Jr., Ph.D.
1003	Prosecution History of Application No. 14/325,938 ("the '938 application")
1004	PTAB Decision Denying Institution of Inter Partes Review of the '015 patent in Case IPR2018-00503 ("Dongguan IPR")
1005	Special Master Report On Proposed Claim Construction For U.S. Patent No. 9,007,015 issued in *NOCO Co. v. Shenzhen Dika Na'Er E-Commerce Co.*, Case No.1:17CV2282 (N.D. Ohio Jun. 28, 2018) accepted and adopted by United States District Court Judge Christopher A. Boyko, 2019 WL 1723358 ("Shenzhen Dika Order")
1006	U.S. Patent Application Publication No. 2013/0154543 ("Richardson")
1007	U.S. Patent No. 6,424,158 ("Klang")
1008	U.S. Patent No. 9,954,391 ("Lei")
1009	U.S. Patent Application Publication No. US 2004/0130298 ("Krieger")
1010	U.S. Patent No. 5,319,298 ("Wanzong")

DELTRAN EX1002
IPR2024-01219

1011	WO Publication No. 2010/129723 to Baxter ("Baxter");
1012	Carku Product Brochure for the Epower-20 jump starter product ("Epower-20 brochure")
1013	Carku Product Brochure for the Epower-21 jump starter product ("Epower-21 brochure")
1014	U.S. Patent No. 8,172,603 ("Richardet")
1015	MC78XX/LM78XX/MC78XXA 3-Terminal 1A Positive Voltage Regulator from Fairchild Semiconductor Corporation 2001 ("LM7805 Datasheet")
1016	Patent Owner The NOCO Company's Preliminary Response in the Dongguan IPR
1017	Memorandum Opinion and Order of United States District Court Judge Pamela A. Barker construing the disputed terms of claims 1, 9 and 19 of the '015 patent issued in The NOCO Co. v. SmarTech Products, Inc., Case No. 1:18-cv-2780 (N.D. Ohio April 16, 2020) ("SmarTech Order")
1018	Declaration Of Yingchun Wan

I. INTRODUCTION

1. Guangdong Boltpower Energy Co., Ltd. f/k/a Dongguan Juxing Power Co., Ltd. ("Petitioner" or "Boltpower") petitions for *inter partes* review ("IPR") of claims 1-23 (the "Challenged Claims") of U.S. Patent No. 9,007,015 (the "'015 patent") (Ex. 1001) assigned to The NOCO Company ("Patent Owner"). This petition demonstrates that there is a reasonable likelihood that Petitioner will prevail on at least one of the Challenged Claims on the Grounds set forth herein.

II. BACKGROUND

A. The '015 patent

2. The '015 patent discloses an apparatus for jump starting a vehicle engine. Many such apparatus were known prior to the '015 patent's July 3, 2014 priority date. The '015 patent broadly claims conventional elements of jump starter apparatus such as an internal power supply, an output port, a microcontroller, a power switch, a vehicle battery isolation sensor, and a reverse polarity sensor. Ex. 1001, 8:6-23. The vehicle battery isolation sensor detects whether the jump starter apparatus is connected to the vehicle battery terminals (i.e., whether the vehicle battery is present or absent). Ex. 1001, 5:26-37, 41-46. The reverse polarity sensor ascertains whether the jump starter apparatus is connected to the vehicle battery with

proper polarity (i.e., whether the negative and positive terminals of the output port of the jump starter apparatus are connected to the correct respective terminals of the vehicle battery, or whether the connections are reversed.) Ex. 1001, 5:16-26, 39-41.

3. Both the vehicle battery isolation sensor and the reverse polarity sensor were used as safety features in conventional jump starter devices before the July 3, 2014 priority date of the '015 patent as will be discussed below.

4. The purported point of novelty of the '015 patent is that the vehicle battery isolation sensor is *separate* from the reverse polarity sensor, and that the microcontroller receives *distinct* signals from the two sensors and closes the power switch only when the sensors indicate that the vehicle battery is present and that the vehicle battery has been connected with a correct polarity. The purported novelty thus is that the claim requires *redundant* conventional components performing their conventional functions.[1] This should not be patentable. In any event, as discussed below, the redundancy is also disclosed in the prior art.

[1] Patent Owner discussed this purported point of novelty in its Preliminary Response in the Dongguan IPR: "Claim 1 of the '015 patent, therefore, has

5. The dependent claims of the '015 patent also cover concepts that were known before the '015 patent priority date. The concepts include other safety features such as circuitry preventing back charging and for detecting the temperature of the internal battery of the jump starter (claims 6-7). Other dependent claims cover convenience features such as a USB port for charging USB-chargeable devices, a flashlight, a visual alarm indicating an emergency situation, or visual indicators on the internal power supply capacity (claims 10, 12, 14, and 15). All these features were known before the priority date of the '015 patent. In fact, several claimed features including the USB port, flashlight, visual alarm, and battery capacity indicator features were disclosed by Shenzhen Carku Technology Co., Ltd. ("Carku") to Jonathan Nook of Patent Owner NOCO, an inventor of the '015 patent, before the July 3, 2014 priority date of the '015 patent. Among other things, Carku sent an email to Nook on or about December 22, 2013 attaching a catalog of products offered for sale from Carku. Ex. 1018 at 6.

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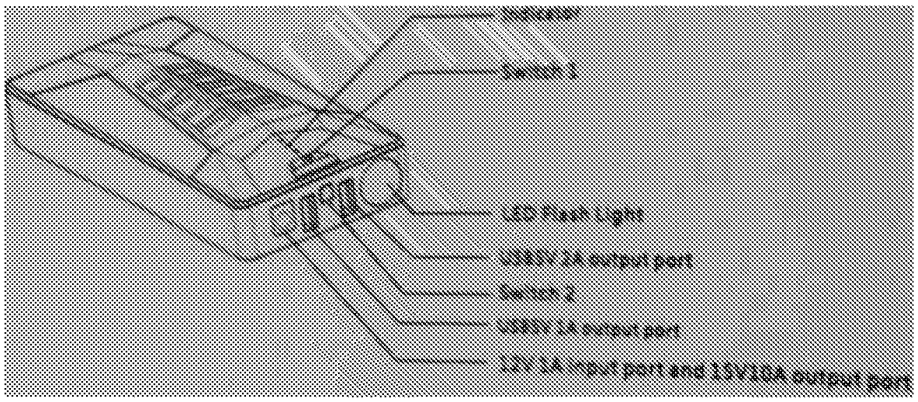
in essence a redundancy feature through which, unless the inputs from two separate sensors indicate that a battery is both present and connected with the proper polarity, the power switch will not be turned on, and the charging operation will never commence." Ex. 1016 at 4.

The catalog showed various available Carku jump starter products, including the product below, showing claimed features.



Ex. 1018 at 84

6. Carku also sent an email to Nook on March 5, 2014, enclosing Carku's brochure for the Epower-20B product also showing various claimed features. Ex. 1018 at 8.



Ex. 1018 at 33

7. The Patent Owner (with Nook listed as first inventor) later filed the patent application for the '015 patent claiming these features without disclosing Carku's prior art catalog or brochure to the examiner during prosecution, even though it was known to at least inventor Nook, and was likely the closest information he knew applying to several pending claims.

8. Other dependent claims in the '015 patent include widely known components such as lithium ion batteries or a plurality of such batteries as the power source (claims 2-3).

9. In short, none of the concepts in the Challenged Claims was new before July 3, 2014. These concepts were known before that date from at least Richardson, Klang, Lei, Wanzong, Krieger, Carku catalogs and brochures, and other references discussed in detail below.

B. Prosecution History of the '015 patent

10. The '015 patent issued from Application No. 14/325,938 ("'938 application") filed on July 8, 2014 as a continuation of PCT/US2014/045434 filed on July 3, 2014. Ex. 1001 at 1.

11. The '938 application was filed with a prioritized examination request granted on September 2, 2014. Ex. 1003 at 215.

12. An office action was issued on October 30, 2014. The examiner allowed claims 1-23, but rejected claims 24-26 as being anticipated by US2012/0091944, US2007/0285049, and US8,172,603. Ex. 1003 at 120. Applicant responded by cancelling claims 24-26. Ex. 1003 at 110.

13. Another office action was issued on December 10, 2014. The examiner rejected claims 1, 4-6, 8, 9, and 12-18 as anticipated by US2005/0110467 ("Thomason"). Claims 2, 3, 10, and 11 were rejected as unpatentable over Thomason and US2013/0241488; claims 7, 19, and 20 were rejected over Thomason and US6,362,599; and claims 21-23 were rejected over Thomason and US2007/0285049. Ex. 1003 at 48.

14. In response, the Patent Owner amended claim 1 to specify that the reverse polarity sensor is configured to "to provide an output signal indicating whether positive and negative terminals of said vehicle battery are

properly connected with said positive and negative polarity outputs of said output port." The claim was also amended to specify that the power switch "is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs." Additionally, the term "FET" relating to the power switch was deleted. Ex. 1003 at 37.

15. The examiner issued a Notice of Allowance on February 10, 2015. Ex. 1003 at 14. The '015 patent issued on April 14, 2015. Ex. 1001 at 1.

16. The'015 patent contains one independent claim (claim 1) and 22 dependent claims. Ex. 1001, 8:4-10:22.

III. SUMMARY OF CHALLENGES AND RELIEF REQUESTED

17. Petitioner asserts the following challenges supported by expert testimony of James L. Kirtley Jr. (Ex. 1002):

Ground	Reference(s)	Basis	Claims Challenged
1	Richardson	§102(a)	1, 7-9, 15, and 17-21
2	Richardson and Lei	§103	2, 3, 12-14, and 23
3	Richardson and Krieger	§103	4 and 5
4	Richardson and Wanzong	§103	6
5	Richardson and Baxter	§103	16
6	Richardson and the Epower-20 brochure or the Epower-21 brochure	§103	10-13
7	Richardson and Richardet	§103	22
8	Klang	§102(a)	1, 17, and 21
9	Klang and Krieger	§103	4 and 5
10	Klang and Richardet	§103	22
11	Klang and Lei	§103	23

18. Petitioner requests that the Board cancel claims 1-23 of the '015 patent because they are anticipated under 35 U.S.C. §102(a) and/or obvious under 35 U.S.C. §103 from the asserted prior art.

IV. PERSON OF ORDINARY SKILL IN THE ART

19. A person of ordinary skill in the art ("POSITA") in the relevant timeframe (before July 3, 2014) would have had a minimum of a bachelor's degree in electrical engineering or its equivalent and two years of experience in electrical engineering with some experience in design of battery charging systems. In lieu of a degree, a POSITA could be one whose equivalent accumulated knowledge and experience in the field of electrical engineering and specifically battery charging system design makes him or her a POSITA. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. Ex. 1002, ¶14.

V. CLAIM CONSTRUCTION

20. In an IPR, claim terms are given their "broadest reasonable construction in light of the specification of the patent in which it appears." *See* 37 C.F.R. §42.100(b). Under this broadest reasonable construction standard, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

21. Petitioner proposes the constructions below.[2] All other claim terms should be given their plain and ordinary meaning.

22. Petitioner's claim constructions are the same as the constructions made in the Shenzhen Dika Order (Ex. 1005 at 14-15) and the SmarTech Order (Ex. 1017 at 20-31).

[2] Because standards applied during IPR are different than those in litigation, Petitioner reserves all rights to advocate additional and/or different claim interpretations in any litigation or any other proceeding in accordance with the claim construction standards in such proceedings. Petitioner further reserves the right to assert that the Challenged Claims are invalid under provisions for which IPR is not available.

Term or Phrase	**Construction**
"reverse polarity sensor" (The SmarTech Order construed "reverse polarity sensor connected in circuit")	A reverse polarity sensor separate from the vehicle battery isolation sensor
"vehicle battery isolation sensor" (The SmarTech Order construed "vehicle battery isolation sensor connected in circuit")	A vehicle battery isolation sensor separate from the reverse polarity sensor
"input signals from said vehicle isolation sensor and said reverse polarity sensor"	Distinct input signals from said vehicle isolation sensor and said reverse polarity sensor, respectively
"output port"	Component through which power from an internal power supply is transmitted

VI. SPECIFIC GROUNDS FOR PETITION

A. Ground 1: Claims 1, 7-9, 15, and 17-21 are anticipated by Richardson

1. Overview of Richardson

23. Richardson is prior art under 35 U.S.C. §102(a) based on its June 20, 2013 publication date. Richardson was cited during prosecution of the '938 application, but was not the basis of any claim rejection.

24. Richardson discloses a portable supplemental power source or jump starter that provides "supplemental power to start internal combustion and turbine engines." Ex. 1006, ¶0002. It includes safety features such as a polarity protection circuit such that "only if the proper polarity is detected can the system operate." Ex. 1006, ¶0007. It also includes separate circuits for detecting the presence of a vehicle battery and whether the battery is connected with reverse polarity, temperature measurements of the internal battery, and other features that are more advanced than described in the '015 patent. Ex. 1002, ¶59.

2. Richardson anticipates Claim 1

25. Each limitation of claim 1 is disclosed by Richardson as discussed below.

(a) "Apparatus for jump starting a vehicle engine"

26. To the extent the preamble is limiting, Richardson discloses an apparatus for jump starting a vehicle engine. "The present invention relates to a portable power source for a motor vehicle and, more particularly, to a method and apparatus to provide supplemental power to start internal combustion and turbine engines." Ex. 1006, ¶0002. "The system includes one or more internal batteries and capacitors to provide the power to the battery of the vehicle to be jump started." Ex. 1006, ¶0007.

(b) "an internal power supply"

27. Richardson's apparatus includes "jump starter batteries" identified by "22" in FIG. 1 below as the internal power supply. "The system includes one or more internal batteries and capacitors to provide the power to the battery of the vehicle to be jump started." Ex. 1006, ¶0007. "A battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22." Ex. 1006, ¶0016.

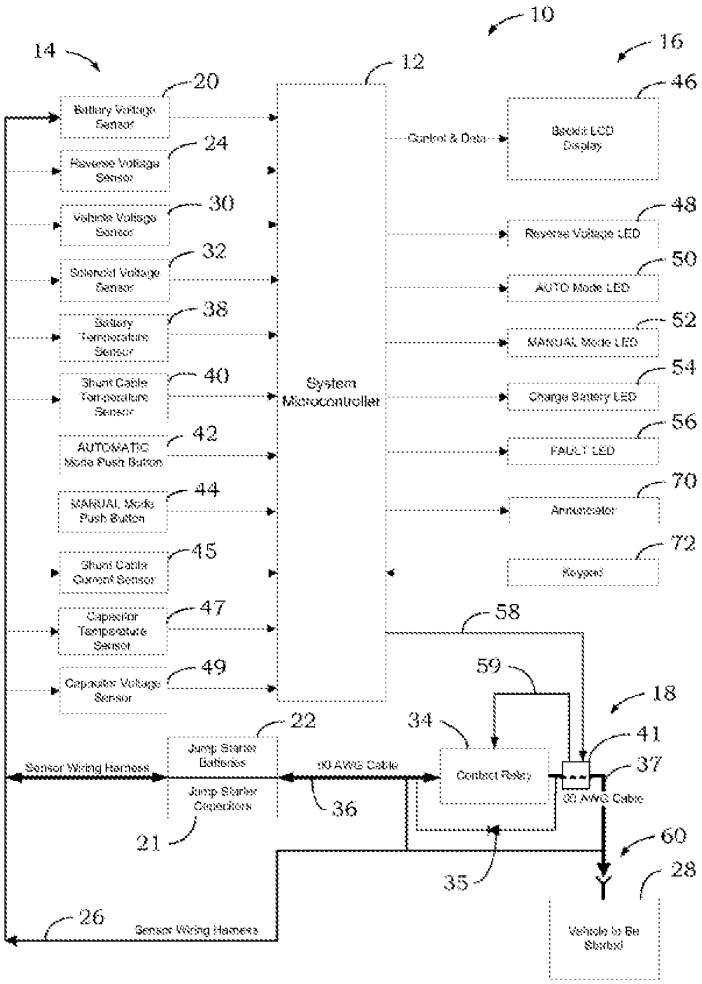


Fig. 1

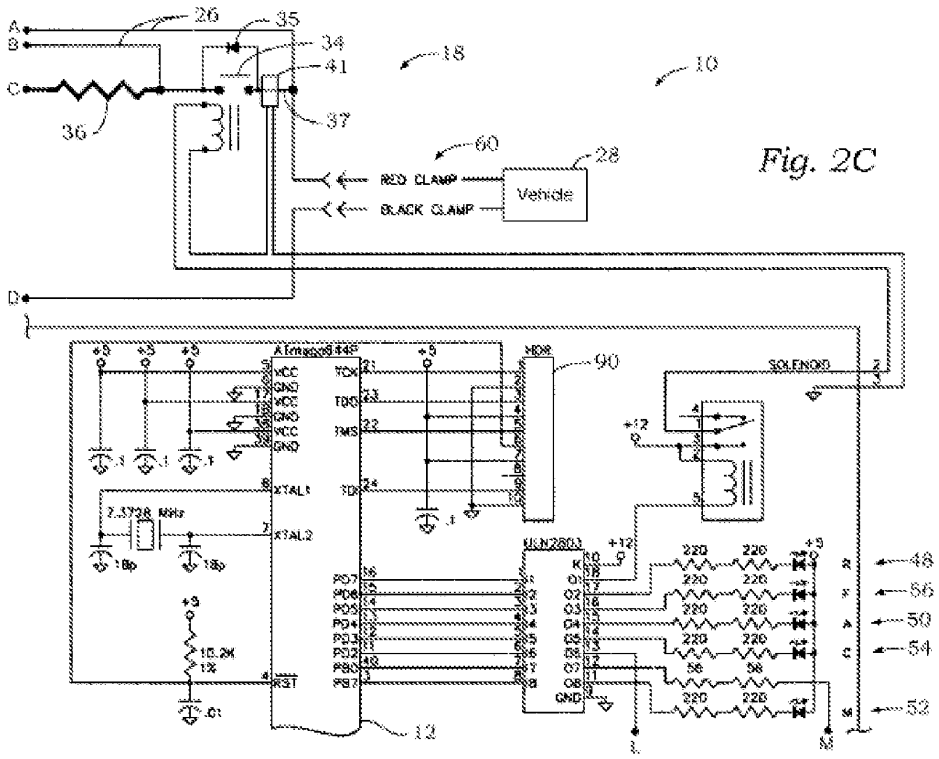
Ex. 1006, FIG. 1

(c) **"an output port having positive and negative polarity outputs**."

28. "Output port" was previously construed in the Shenzhen Dika Order to mean "a component through which power from an internal power

supply is transmitted." Ex. 1005 at 15. Consistent with this construction, Richardson discloses an output port having the positive and negative polarity outputs through which power from the internal power supply is transmitted. Specifically, Richardson discloses conductive leads connected to jumper cables having positive and negative polarity outputs through which power from the internal power supply is transmitted. "A method and apparatus provides supplemental power to an engine. The method and apparatus includes a pair of conductive leads for connecting the supplemental power to an engine electrical system, one or more batteries connected in parallel with one or more capacitors, a relay connected to the conductive leads, a shunt cable connecting the batteries and capacitors to the relay and a processor for controlling the relay to selectively apply electrical power to the engine electrical system." Ex. 1006, Abstract. In addition, claim 1 of Richardson specifies "temporarily manually connecting conductive leads from said portable jump starter to the electrical system of the engine." Ex. 1006, Claim 1. Also, a "battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22. A reverse voltage sensor 24 monitors the polarity of the jumper cables on line 26 which are connected to the vehicle's electrical system 28." Ex. 1006, ¶0016. FIG. 2C below shows jumper cables

60 with red (positive) and black (negative) clamps are connected to the output port (line 26) depicting positive and negative polarity outputs.

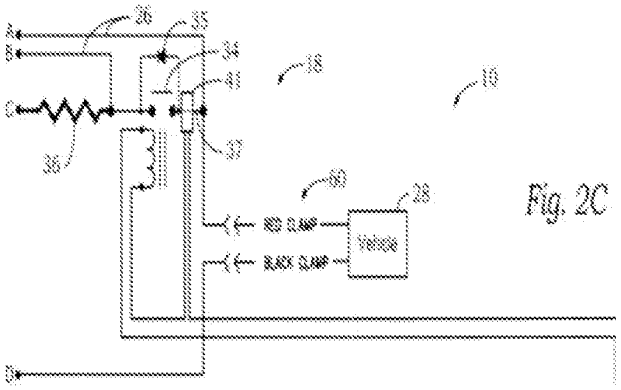


Ex. 1006, FIG. 2C.

(d) "a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs"

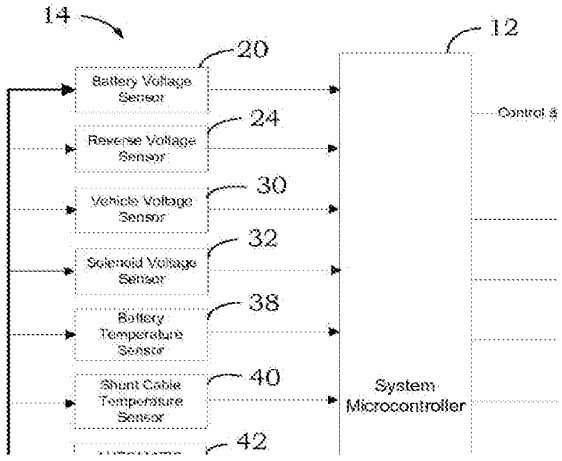
29. "Vehicle battery isolation sensor" was construed in the Shenzhen Dika Order to mean "a vehicle battery isolation sensor separate from the reverse polarity sensor." Ex. 1005 at 14. Richardson discloses a

vehicle battery isolation sensor consistent with this construction. Richardson discloses a "vehicle voltage sensor 30 monitors the voltage on line 37 (voltage of the vehicle)." Ex. 1006, ¶0016. Shown in FIG. 2C of Richardson below, the line 37 is connected in series with said positive and negative polarity outputs, such that the vehicle voltage sensor can detect presence of a vehicle battery connected between said positive and negative polarity outputs. Ex. 1002, ¶65.



Ex. 1006, FIG. 2C

30. Also as shown in FIG. 1 of Richardson below, the vehicle voltage sensor 30 is separate from a reverse voltage sensor 24 (a reverse polarity sensor).

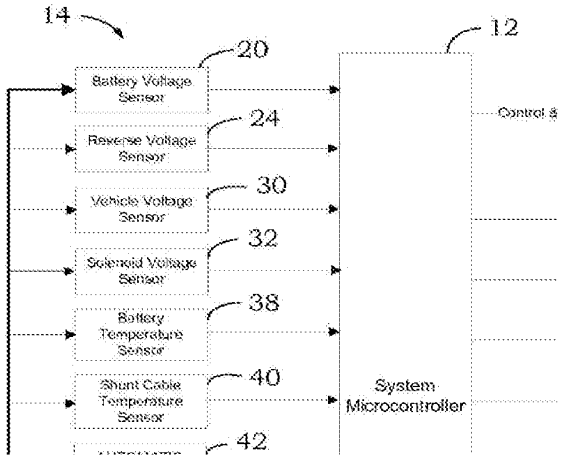


Ex. 1006, FIG. 1

(e) "a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port"

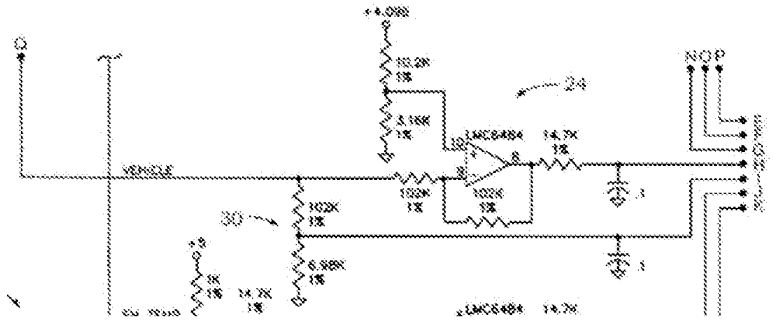
31. "Reverse polarity sensor" was construed in the Shenzhen Dika Order to mean a "reverse polarity sensor separate from the vehicle battery isolation sensor." Ex. 1005 at 14. Richardson discloses a reverse polarity sensor consistent with this construction.

32. As noted above, Richardson's FIG. 1 below shows a reverse polarity sensor, (reverse voltage sensor 24), which is separate from the vehicle battery isolation sensor (vehicle voltage sensor 30).



Ex. 1006, FIG. 1

33. More details on the vehicle sensing and reverse voltage sensing circuits are provided in Richardson's FIG. 2B below. The vehicle voltage sensor 30 places a signal on line 'I' using a voltage divider. The reverse voltage sensor 24 places a signal on line 'H' using an inverting operational amplifier (LM6484). Thus, the voltage sensor 30 and the reverse voltage sensor 24 comprise separate and distinct sensors. Ex. 1002, ¶68.



Ex. 1006, FIG. 2B

34. Richardson states the "reverse voltage sensor 24 monitors the polarity of the jumper cables on line 26 which are connected to the vehicle's electrical system 28." Ex. 1006, ¶0016. "A reverse voltage LED 48 is illuminated when the microprocessor 12 determines that a reverse voltage jumper cable voltage is detected by reverse voltage sensor 24." Ex. 1006, ¶0020. "If the system does not detect a battery charging voltage 212, once jumper cables 60 have been manually connected to the vehicle to be started 28, the voltage is measured by the reverse voltage sensor 24 to determine if the cables have been properly connected to the vehicle 214. If the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set and the event saved in non-volatile memory 216. A "Reverse Polarity" error message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216." Richardson Ex. 1006, ¶0027.

(f) "a power switch connected between said internal power supply and said output port"

35. Richardson discloses a power switch connected between the internal power supply and the output port. In FIG. 1, Richardson discloses a contact relay 34 (power switch) connected between jump starter batteries 22

(internal power supply) and the leads (output port) connected to the vehicle to be started 28.

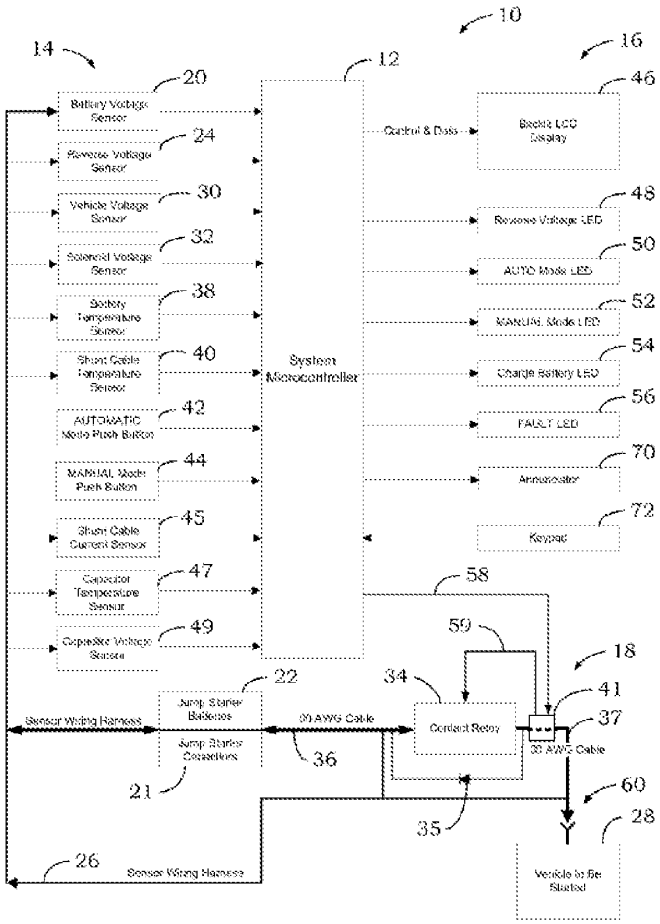
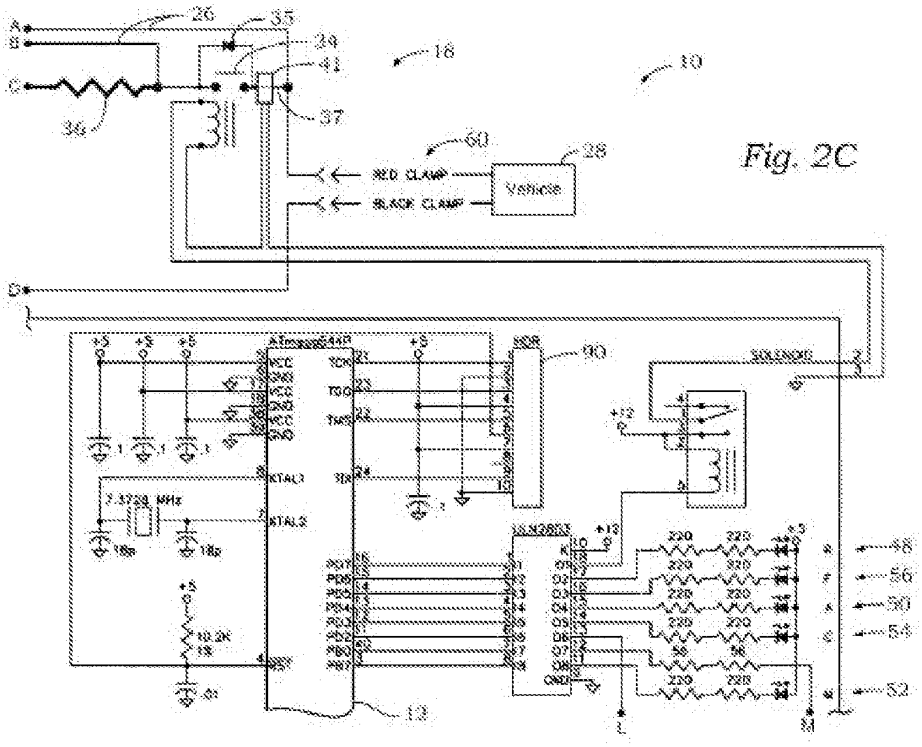


Fig. 1

Ex. 1006, FIG. 1

36. The power switch 34 is shown in more detail in FIG. 2C below.



Ex. 1006, FIG. 2C

37. "When the jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter capacitors 21 and batteries 22 are connected to the starter system or batteries of the vehicle to be started 28. The contact relay 34 is opened when a successful start cycle has been completed, a start fault has occurred or the operator interrupts the jump starter cycle." Ex. 1006, ¶0021.

(g) "a microcontroller configured to receive input signals from said vehicle isolation sensor and said

reverse polarity sensor, and to provide an output signal to said power switch"

38. Richardson discloses a microcontroller receiving input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. Richardson discloses a system microcontroller 12 in FIG. 1 below receiving input signals from the vehicle voltage sensor 30 (vehicle isolation sensor) and the reverse voltage sensor 24 (reverse polarity sensor) and providing output signals to the contact relay 34 (power switch). "Referring initially to FIG. 1, the portable supplemental power source (jump starter) of the present invention is generally indicated by reference numeral 10. Jump starter 10 includes a programmable microprocessor 12 which receives inputs 14 and produces informational outputs 16 and control outputs 18." Ex. 1006, ¶0014. (Richardson uses "microprocessor 12" interchangeably with "microcontroller 12".)

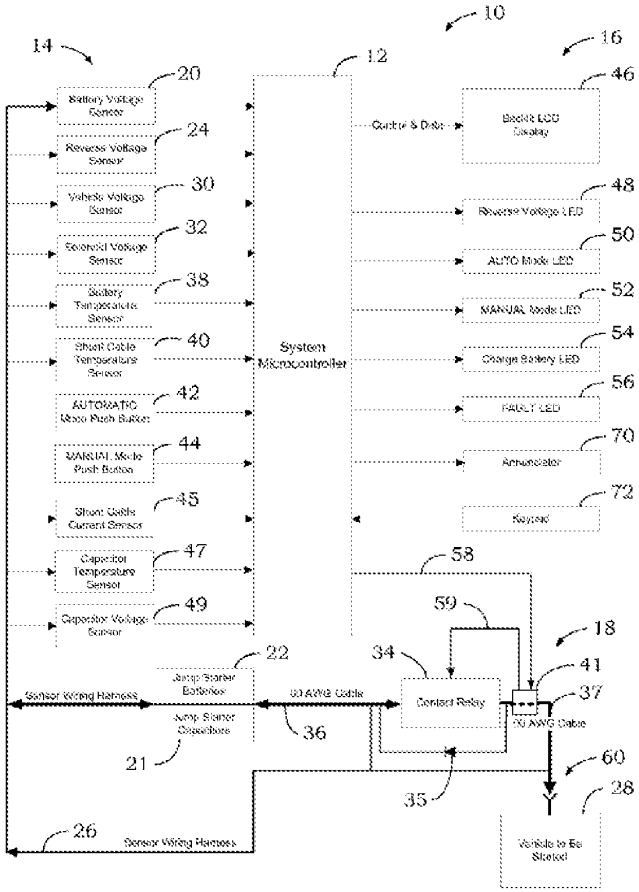


Fig. 1

Ex. 1006, FIG. 1

39. The phrase "input signals from said vehicle isolation sensor and said reverse polarity sensor" was construed in the Shenzhen Dika Order to mean "distinct input signals from said vehicle isolation sensor and said reverse polarity sensor, respectively." Ex. 1005 at 14. Richardson's FIG. 1 shows distinct input signals received by the microcontroller 12 from the

vehicle voltage sensor 30 and the reverse voltage sensor 24 consistent with this construction.

(h) "[a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs"

40. As discussed below, Richardson discloses turning on the power switch to cause the internal power supply to be connected to the output port in response to signals from the sensors indicating (1) the presence of a vehicle battery at the output port and (2) proper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs. Richardson also discloses the power switch is *not* turned on when signals from the sensors indicate either the absence of a

vehicle battery at the output port or an improper polarity connection of the vehicle battery.

41. Richardson discloses in FIGS. 3-8 "flow charts of the processing steps of the portable power source of the present invention." Ex. 1006, ¶0010. This sequence of steps involves several checks performed by the microcontroller before turning on the power switch to jump start the vehicle. As discussed below, these checks include detecting (1) the presence of a vehicle battery at said output port and (2) proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs. Ex. 1002, ¶76.

42. Richardson discloses the reverse voltage sensor 24 detecting whether jumper cables that have been manually connected to the vehicle battery have been properly connected or if there is a reverse connection. Richardson discloses that the power switch for charging the vehicle battery cannot be turned on unless there is a proper polarity connection of the cables. Referring to FIG. 3, Richardson states:

> If the system does not detect a battery charging voltage 212, once jumper cables 60 have been manually connected to the vehicle to be started 28, the voltage is measured by the reverse voltage sensor 24 to determine if

the cables have been properly connected to the vehicle 214. If the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set and the event saved in non-volatile memory 216. A "Reverse Polarity" error message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216. Any further jump starter action by the operator is ignored until the reverse polarity condition is corrected 220, at which point processing returns to the start of the main processing loop 210. Ex. 1006, ¶0027.

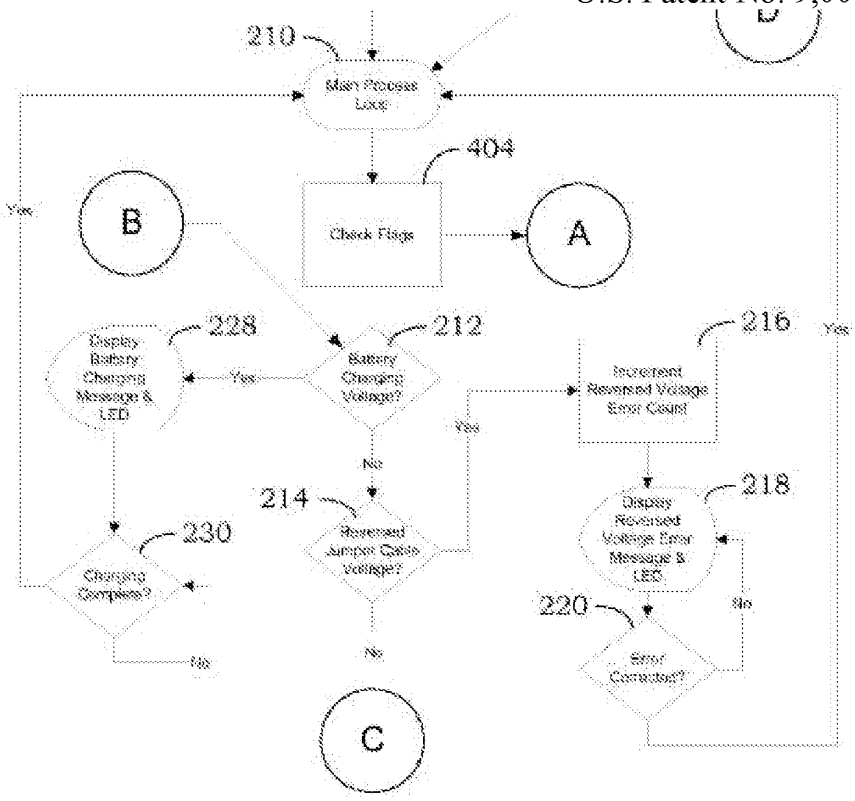


Fig. 3

Ex. 1006, FIG. 3

43. Additionally, as discussed below, in a separate sequence of steps, Richardson discloses detecting the presence of a vehicle battery at the output port before turning on the power switch to jump start the vehicle. Specifically, Richardson discloses detecting the presence of the vehicle battery by detecting the voltage of the battery to determine whether the

starter voltage of the jump starter apparatus configured by the operator is consistent with the voltage of the vehicle, depicted in FIG. 5 below.

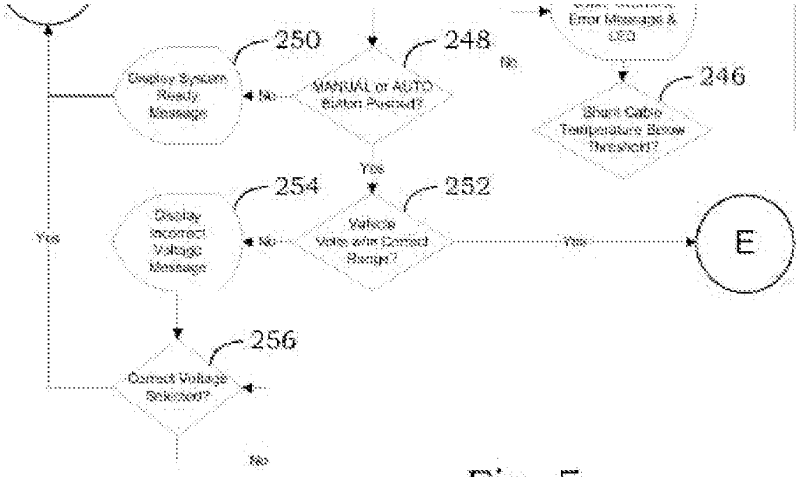


Fig. 5

Ex. 1006, FIG. 5

44. Richardson discloses that the starter voltage of the jump starter apparatus can be configured by the operator "for 12, 18, 24, 30, 36, 42 or 48 volts, for example." Ex. 1006, ¶0034. Richardson discloses a vehicle voltage sensor 30 that "monitors the voltage on line 37 (voltage of the vehicle)" for detecting the voltage of the vehicle to be started. Ex. 1006, ¶0016. "If one of the push buttons 42 or 44 has been selected, the system will compare the operator-configured starter voltage against the voltage of the vehicle to be started 28. ... If the difference between the voltage selected and the voltage measured is not within a predetermined range and tolerance 252, a "Wrong

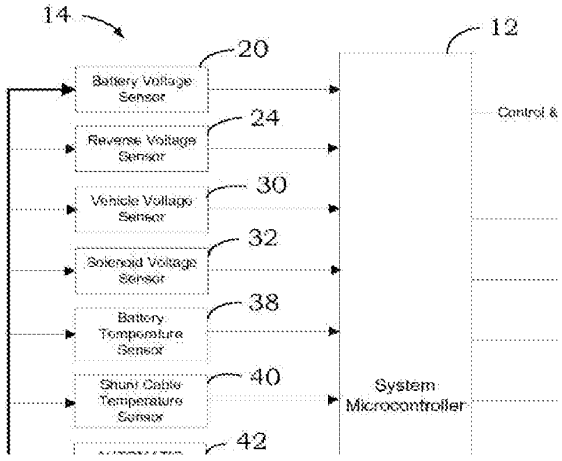
Selector Volts" message is displayed 254 on the LCD 46 and further operation is prohibited until the correct voltage is selected 256 at which point processing returns to the main processing loop 210." Ex. 1006, ¶0034. In other words, Richardson discloses that if a vehicle battery with a particular voltage that matches an operator-configured starter voltage is not detected by the vehicle voltage sensor 30, then the charging process cannot occur.

45. The process of sensing the voltage of the vehicle battery by the vehicle voltage sensor 30 necessarily involves detecting the presence or absence of the vehicle battery since a reading of zero volts would indicate the absence of a battery. The system microcontroller turns on the power switch only if the battery were present and furthermore within a particular range (which has to be greater than zero since the operator-configured starter voltage will always be some positive number greater than zero). Thus, the system microcontroller does not turn the power switch on in the absence of a battery. And the system microcontroller turns the power switch on only when a battery is present and the voltage measured is furthermore within a predetermined range and tolerance (which will be true at least some of the time). Ex. 1002, ¶80.

46. Thus, Richardson discloses that the power switch is turned on to cause the internal power supply to be connected to the output port in response to *distinct* signals from the sensors indicating (1) the presence of a vehicle battery at the output port and (2) proper polarity connection of positive and negative terminals of the vehicle battery with said positive and negative polarity outputs. Richardson also discloses that the power switch is *not* turned on when signals from said sensors indicate either the absence of a vehicle battery at the output port or an improper polarity connection of the vehicle battery.

3. Richardson anticipates Claim 7

47. Claim 7 depends from claim 1, and requires "a temperature sensor configured to detect temperature of said internal power supply and to provide a temperature signal to said microcontroller." Richardson meets this requirement. "A battery temperature sensor 38 monitors the temperature of the jump starter's batteries 22 to detect overheating due to excess current draw from the batteries during jump starting." Ex. 1006, ¶0017. The battery temperature sensor 38 provides a temperature signal to the microcontroller 12 depicted in FIG. 1 below.

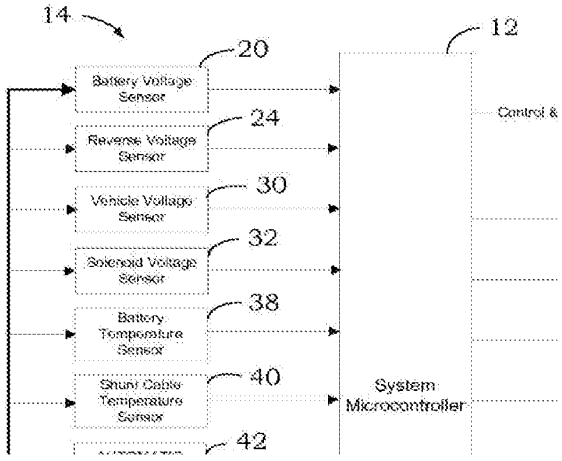


Ex. 1006, FIG. 1

4. Richardson anticipates Claim 8

48. Claim 8 depends from claim 1, and requires "a voltage measurement circuit configured to measure output voltage of said internal power supply and to provide a voltage measurement signal to said microcontroller." Richardson meets this limitation.

49. Richardson discloses "[a] battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22." Ex. 1006, ¶0016. The battery voltage sensor 20 provides a voltage measurement signal to the microcontroller 12 depicted in FIG. 1, a portion of which is reproduced below.



Ex. 1006, FIG. 1

5. Richardson anticipates Claim 9

50. Claim 9 depends from claim 1, and requires "a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus." Richardson meets this limitation.

51. As explained by Professor Kirtley in his declaration, voltage regulators have been essential components in practically every electronic device having electronic components like operational amplifiers or microcontrollers well before the July 3, 2014 priority date of the '015 patent. Ex. 1002, ¶90. A voltage regulator stabilizes the DC voltages used by processors and other elements in electronic devices. Without a voltage regulator, the voltage variation from drawing current from the internal

battery could impair operation of the electronics in the device. Hence, practically every electronic appliance includes a voltage regulator. A POSITA would have known to use a voltage regulator to stabilize the power supplied to the processor and other active components. Ex. 1002, ¶90.

52. Richardson has a voltage regulator. Although not specifically discussed in the specification, the voltage regulator is clearly shown in FIG. 2A below. Ex. 1002, ¶91. The voltage regulator is identified in the figure as "LM7805", which is a commonly used five-volt regulator that provides power to the internal components (microprocessor, operational amplifiers, etc.) of the charging apparatus. Shown in FIG. 2A below, the voltage regulator component LM7805 is connected with several other components and provides +5 volts to a terminal labeled "+5", a voltage level appropriate to provide operating power to internal components of the apparatus. As is customary in this sort of circuit diagram, power supply leads are often not shown, but other +5 connections appear in FIGS. 2C and 2D. These are supplied by the LM7805 of FIG. 2A. Ex. 1002, ¶91.

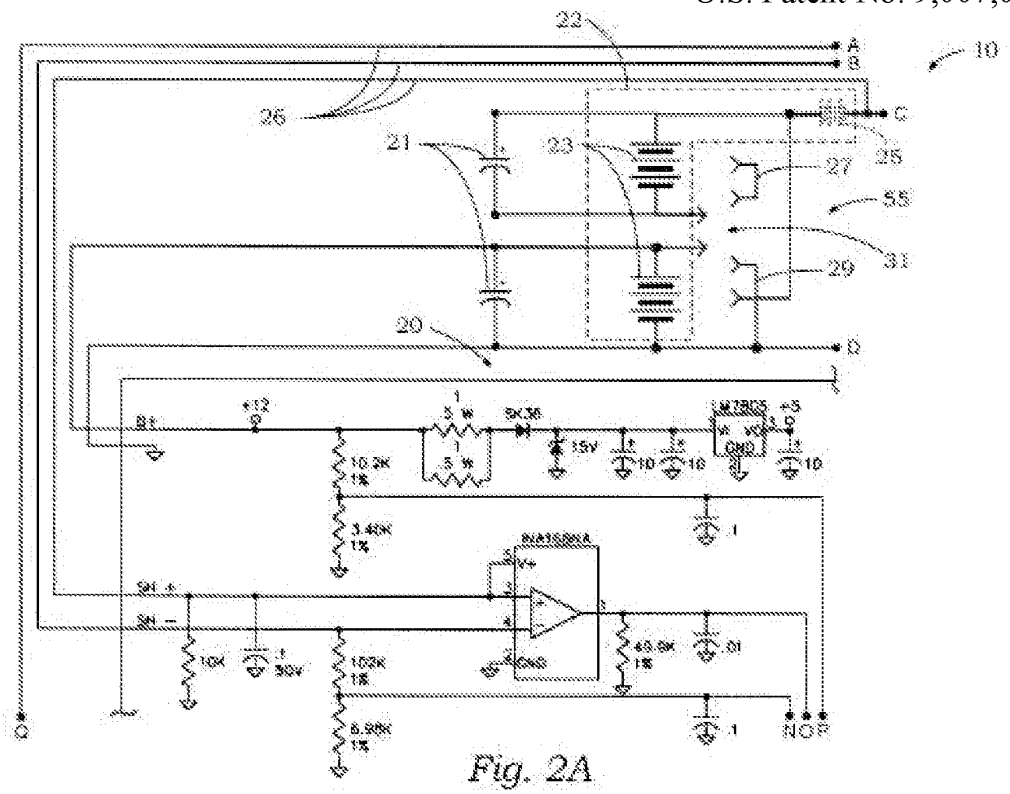


Fig. 2A

Ex. 1006, FIG. 2A

53. The LM7805 component is a well-known voltage regulator. An exemplary datasheet of an LM7805 voltage regulator from Fairchild Semiconductor Corporation (https://pdf1.alldatasheet.com/datasheet-pdf/view/82833/FAIRCHILD/LM7805.html) titled "MC78XX/LM78XX/MC78XXA 3-Terminal 1A Positive Voltage Regulator" (Ex. 1015) has a 2001 copyright date, which is before the priority date of the '015 patent. Ex. 1002, ¶92.

54. Voltage regulators like the LM7805 are also used in circuits of the other prior art references discussed herein. Lei discloses use of a voltage regulator identified as a component "7805" in the FIG. 2 circuit diagram of its smart battery detection system. Ex. 1008, FIG. 2. Ex. 1002, ¶93.

6. Richardson anticipates Claim 15

55. Claim 15 depends from claim 1, and requires "a plurality of visual indicators configured to display remaining capacity status of said internal power supply." Richardson meets this limitation.

56. Richardson discloses a plurality of visual indicators (LED 54 and LCD 46) to indicate to a user battery capacity. "If the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set and the event recorded in memory 224. The charge battery LED 54 is illuminated and the LCD 46 displays a "Charge Battery" message 225." Ex. 1006, ¶0028. Thus, the two visual indicators (LED 54 and LCD 46) in Richardson display remaining capacity status of the internal power supply (in this case, a charge of eighty percent or more below a fully charged voltage level).

7. Richardson anticipates Claim 17

57. Claim 17 depends from claim 1, and requires "a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity." Richardson meets the limitation.

58. Richardson discloses "[a] "Reverse Polarity" error message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216. Any further jump starter action by the operator is ignored until the reverse polarity condition is corrected 220, at which point processing returns to the start of the main processing loop 210." Ex. 1006, ¶0027. Thus, the "Reverse Polarity" error message on the LCD 46 and illuminated LED 48 warn a user when a vehicle battery is connected with reverse polarity, prompting the user to correct the connection.

8. Richardson anticipates Claim 18

59. Claim 18 depends from claim 1, and requires "separate visual indicators configured to display the power on status of the apparatus, and the jump start boost power status of power supplied to said output port." Richardson meets these limitations.

60. Richardson discloses a visual indicator to display the power on status of the apparatus, specifically an LCD 46 that shows a start message (the power on status) when the jump starter is powered on. "Referring to

FIGS. 2A, 2B, 2C, 2D and 3-8, when the jump starter 10 is initially powered on 200, the microcontroller 12 initializes the hardware, reads all system parameters and variables, and initializes the interrupt service routine 202 (See FIG. 8). All stored performance history is read from the onboard, non-volatile memory 204 and a start message is displayed 206 on the LCD display 46." Ex. 1006, ¶0022. The start message on the LCD is a visual indicator displaying the power on status.

61. Additionally, Richardson discloses a separate visual indicator displaying the jump start boost power status of power supplied to the output port. "If the voltage level of the jump starter batteries 22 drop below a value of twenty percent of the normal level, a charge battery LED 54 is illuminated." Ex. 1006, ¶0020.

9. Richardson anticipates Claim 19

62. Claim 19 depends from claim 1, and requires "a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery." Richardson meets these limitations.

63. Richardson discloses a manual override mode that can be used if the presence of the vehicle battery cannot be detected. "The unit 10 also

includes automatic 42 and manual 44 pushbutton inputs to accept user input to select either automatic or manual operation." Ex. 1006, ¶0017. "If in manual mode, the jump starter 10 may be used when the battery voltage of the vehicle is below 10 volts, or if the vehicle's battery is not connected." Ex. 1006, ¶0049.

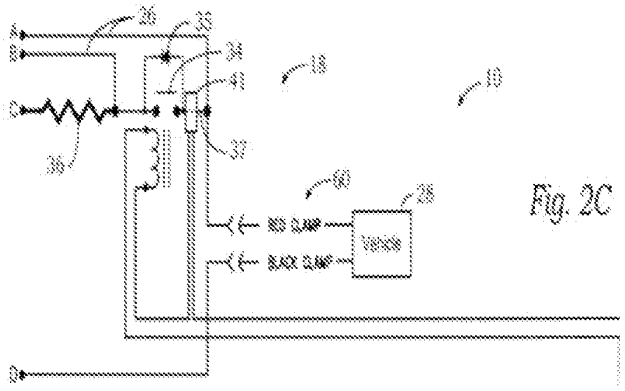
10. Richardson anticipates Claim 20

64. Claim 20 depends from claim 19, and requires that "the microcontroller is configured to detect actuation of said manual override switch for at least a predetermined period of time before activation of said manual override mode." Richardson meets all these limitations. "If manual mode is selected 258, "Manual" is displayed 332 on the LCD 46, the system will prompt the operator to press the manual button 44 again. If the manual button 44 is pressed a second time 334, then the system checks the number of start attempts 266. If the maximum number of start attempts has been exceeded 266, an over start attempt error count is incremented 336, a "Cool Down Unit" message is displayed 338 on the LCD 46, and the system waits for five minutes for the system to cool 340. Once the cool down time has expired, processing returns to the main processing loop 210. If the total start attempts have not exceeded the limit 266, the processing continues at block 268 as described above." Ex. 1006, ¶0047.

11. Richardson anticipates Claim 21

65. Claim 21 depends from claim 1, and requires that "further comprising a jumper cable device including a plug configured to plug into said output port, a pair of cables integrated with the plug at one respective end thereof and being configured to be connected to terminals of a battery at another respective end thereof." Richardson meets all these limitations.

66. FIG. 2C of Richardson shows jumper cables 60 having red and black clamps connected to a vehicle 28. The figure shows electrical symbols depicting a plug/socket connection of the jumper cables 60 to the output port.



Ex. 1006, FIG. 2C

B. Ground 2: Claims 2, 3, 12-14, and 23 would have been obvious from Richardson and Lei

67. Claims 2, 3, 12-14, and 23 would have been obvious from Richardson and Lei. Lei, which is assigned to Carku, was not cited in the '015 patent. Lei is prior art under 35 U.S.C. §102(a) because it has a PCT filing date of November 8, 2013.

68. Lei discloses an emergency power source for jump starting a vehicle engine. "The emergency power source is convenient for charging, can output a heavy current for starting an automobile." Ex. 1008, Abstract. Like Richardson, Lei discloses jump starter with a power switch, a vehicle battery isolation sensor, a reverse polarity sensor, and a microcontroller. Ex. 1008, 7:67–8:1, 2:42-45, 8:36-44, 6:30-40. Lei discloses certain features that would have been obvious for a POSITA to incorporate into the jump starter disclosed in Richardson. A POSITA would recognize that the improvements provided by these features in Lei would improve the device of Richardson in the same way given the similarity of the devices.

1. Claims 2 and 3 would have been obvious from Richardson and Lei

69. Claims 2 and 3 depend from claims 1 and 2, respectively. Claim 2 requires that "said internal power supply comprises a lithium ion battery."

Claim 3 requires "said lithium ion battery comprises a battery pack of multiple lithium ion batteries."

70. Lei meets all these limitations. Lei states the "emergency power source uses lithium-ion batteries as its battery pack." Ex. 1008, 6:50-51. "In certain embodiments, the battery pack consists of lithium-ion batteries connected in series or parallel." Ex. 1008, 2:22-23.

71. Richardson discloses "one or more batteries connected in parallel with one or more capacitors" in a jump starter. Ex. 1006, Abstract. While Richardson does not explicitly state that the batteries are *lithium-ion* batteries, use of such batteries would have been obvious. A POSITA would have been particularly motivated to use lithium-ion batteries because Lei disclosed several specific benefits of using lithium-ion batteries in jump starter devices: "The emergency power source uses lithium-ion batteries as its battery pack, which has the characteristics of light weight, small size, durability, high instantaneous discharge current and rechargeability, which is capable of supplying a high current for starting a vehicle." Ex. 1008, 5:15-21. This teaching would have provided motivation to a POSITA to use lithium-ion batteries in Richardson. Ex. 1002, ¶120.

2. Claims 12 and 13 would have been obvious from Richardson and Lei

72. Claims 12 and 13 depend from claims 1 and 12, respectively.

73. Claim 12 requires that "a flashlight circuit configured to provide a source of light to a user." Claim 13 requires "said source of light is at least one LED." Lei meets these limitations.

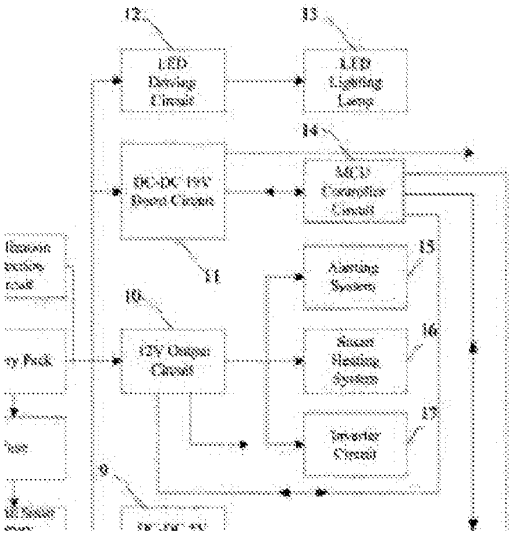
74. Lei discloses a flashlight circuit where the source of light is an LED. Referring to FIG. 1, Lei discloses "an output terminal of the LED driving circuit 12 is connected to a LED lighting lamp 13." Ex. 1008, 6:36-38. Lei explains that the "LED lighting lamp may provide outdoor lighting." Ex. 1008, 5:32-33.

75. A POSITA would have been motivated to incorporate a flashlight circuit having an LED light source in Richardson's jump starter to provide outdoor lighting for the user, as suggested by Lei.

3. Claim 14 would have been obvious from Richardson and Lei

76. Claim 14 depends from claim 13, and requires that "said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation." Lei meets this limitation. "An output terminal of the DC-DC 12V output circuit 10 is connected to an alerting system 15 for transmitting an alerting signal. .... A start button of the

alerting system 15 can be pressed by the user when he or she is lost or some condition occurs. The alerting system 15 may notice people around for help by lighting the indicator light or transmitting sounds with the alerting system 15." Ex. 1008, 7:3-13. Shown in FIG. 1 of Lei, the alerting system 15 is operably coupled to the MCU controller circuit 14.



Ex. 1008, FIG. 1

77. A POSITA would have been motivated to incorporate a visual alarm feature indicating an emergency situation controlled by the microcontroller in Richardson's jump starter as a safety feature for the user, as suggested by Lei. Ex. 1002, ¶128.

4. Claim 23 would have been obvious from Richardson and Lei

78. Claim 23 depends from claim 21, and requires that "said output port and said plug are dimensioned so that the plug will fit into the output port only in one specific orientation." Lei meets this limitation.

79. Lei discloses a jumper cable device having a plug that fits into the output port only in one specific orientation. "The external smart battery detection system 6 includes a red power source clip and a black power source clip for connecting with an external battery, ..., the red and black power source clips are connected to the battery pack through an anti-reverse connector connected to the positive and negative electrodes of the battery pack 4 or conducting wires welded to the positive and negative electrodes of the battery pack 4. If the red and black power source clips are connected to an insertable anti-reverse connector such that the voltage identifying system is connected to the red and black power source clips." Ex. 1008, 7:65–8:35. The insertable anti-reverse connector disclosed by Lei comprises a plug that can fit into the output port only in the correct orientation, not a reversed connection.

80. A POSITA would have been motivated to incorporate the insertable anti-reverse connector disclosed by Lei in Richardson's jump

starter to avoid a reverse connection, as suggested by Lei, for safe operation and convenience. Ex. 1002, ¶132.

C. Ground 3: Claims 4 and 5 would have been obvious from Richardson and Krieger

81. Claims 4 and 5 would have been obvious from the combination of Richardson and Krieger.

82. Krieger, (prior art under 35 U.S.C. §102(a)), discloses a jump starter including a battery, a semiconductor switch, a polarity sensing circuit, and a microprocessor for activating the semiconductor switch to enable a current flow between the boosting battery and the depleted battery. Ex. 1009, ¶0016.

83. Krieger was cited during prosecution of the '938 application, but was not the basis of any rejections by Examiner.

84. Krieger was considered by the PTAB in the Dongguan IPR (Ex. 1004). There, the PTAB denied institution of the IPR stating that the petitioner did not show that Krieger activated a power switch based on two distinct signals from the sensors in connection with claim 1. Without addressing whether this conclusion is correct, this Petition relies on Krieger for teaching the limitations of claims 4 and 5, not claim 1. Further, as to claim 5, the PTAB stated that the Dongguan Petition failed to explain

Krieger teaching "a vehicle isolation sensor comprising an optically coupled isolator phototransistor." Ex. 1004 at 16. The analysis below explains how Krieger suggests both the vehicle isolation sensor and the reverse polarity sensor comprise optically coupled isolator phototransistors.

85. Richardson and Krieger both disclose portable jump starters for vehicle engines. Their devices are similar in function and include the same basic components. A POSITA would recognize that the improvements provided by these features in Krieger would improve the device of Richardson in the same way given the similarity of the devices.

1. Claim 4 would have been obvious from Richardson and Krieger

86. Claim 4 depends from claim 1, and requires that "said power switch comprises a plurality of FETs in parallel."

87. Krieger discloses a power switch comprising a plurality of FETs in parallel. "The switch 12 is preferable a solid state device, such as a transistor, diode, field effect transistor (FET), etc. FIG. 1 represents the switch 12 as a number FETs 12a-12d connected in parallel with each other." Ex. 1009, ¶0030.

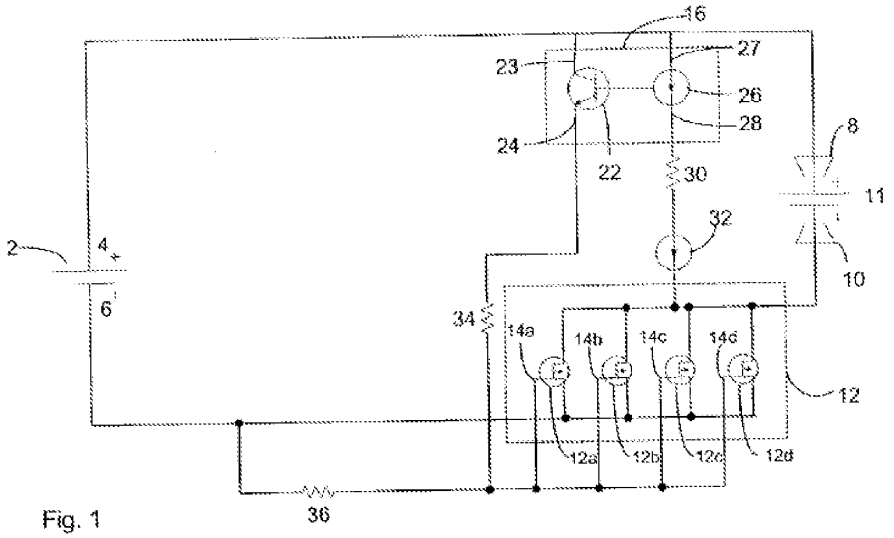


Fig. 1

Ex. 1009, FIG. 1

88. Krieger says by using a solid state switch comprising FETs, "[t]here is no need for any mechanical or electro-mechanical devices, as the FETs are the current handling devices." Ex. 1009, ¶0033. Substituting a relay switch in Richardson's jump starter with a solid state switch comprising a plurality of FETs would have been obvious to a POSITA to avoid or reduce electro-mechanical components, as suggested by Krieger. Ex. 1002, ¶144.

2. Claim 5 would have been obvious from Richardson and Krieger

89. Claim 5 depends from claim 1, and requires "said vehicle isolation sensor and reverse polarity sensor comprise optically coupled isolator phototransistors."

90. Krieger discloses a vehicle isolation sensor and reverse polarity sensor comprising of an optically coupled isolator phototransistor. "In the embodiment shown in FIG. 1, the polarity sensing circuit comprises an opto-isolator 16. The opto-isolator 16 comprises a phototransistor 22 and a light emitting diode (LED) 26." Ex. 1009, ¶0032.

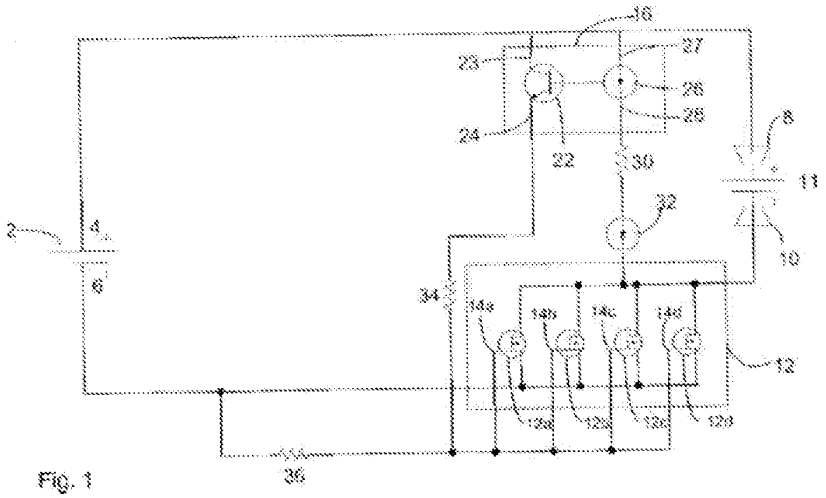


FIG. 1

Ex. 1009, FIG. 1

91. Krieger uses the opto-isolator 16 to perform the functions of both the vehicle isolation sensor and reverse polarity sensor. Krieger explains operation of the opto-isolator as follows:

> During operation of the battery booster device depicted in FIG. 1, the FETs 12 a-12 d are initially held in a non-conducting state via resistor 36. The opto-isolator 16 only turns on when it is properly biased as a result of a correct polarity connection being made between the boosting battery 2 and the depleted battery 11. When the LED 26 is properly biased, phototransistor 22 in the opto-isolator 16 turns on. Current flow through phototransistor 22 biases the control electrodes of the FETs 12 a-12 d into a conducting state, enabling current flow through the FETs 12 a-12 d to the depleted battery 11. Ex. 1009, ¶0033.

92. Krieger's opto-isolator 16 only turns on when it is properly biased "as a result of a correct polarity connection being made between the boosting battery 2 and the depleted battery 11." Ex. 1009, ¶0033. By detecting the correct connection of the depleted battery 11, Krieger also necessarily detects that the depleted battery 11 is present. Thus, Krieger discloses that an opto-isolator can perform the functions of both the vehicle isolation sensor and reverse polarity sensor. It would therefore be obvious to a POSITA to use one opto-isolator to sense the presence of a vehicle battery

and a correct polarity connection, or two opto-isolators if a POSITA wanted to use one for battery detection and another for correct polarity connection, e.g., for redundancy.

93. A POSITA would be particularly motivated to use opto-couplers of the type discloses by Krieger for sensing the presence of a vehicle battery and a correct polarity connection because the opto-coupler used in Krieger is an inherently digital device that can be preferable over using analog inputs to the system microcontroller, which may be subject to tests to determine if the vehicle battery is present or reversed. A POSITA would be motivated to simplify the system by using an optical coupler for one or both sensing functions, e.g., to provide a compact, packaged jump starter. Ex. 1002, ¶150.

D. Ground 4: Claim 6 would have been obvious from Richardson and Wanzong

94. Claim 6 depends from claim 1, and requires that "a plurality of power diodes coupled between said output port and said internal power supply to prevent back-charging of said internal power supply from an electrical system connected to said output port." Claim 6 would have been obvious from Richardson and Wanzong.

95. Wanzong (prior art under 35 U.S.C. §102(a)) was not cited in the '015 patent.

96. Richardson and Wanzong both relate to vehicle batteries. Richardson discloses monitoring the voltage of the vehicle battery and providing supplemental power to the battery. Ex. 1006, ¶0007. Wanzong discloses a battery maintainer and charger apparatus for batteries for vehicles, including "automobile or motorized vehicle not driven on a regular basis." Ex. 1010, 2:59-67. Like Richardson, Wanzong discloses safety features to protect the vehicle batteries and the operators of the charging devices, including a reverse polarity sensor. Ex. 1010, Abstract.

97. Wanzong discloses an "isolation diode 160", which acts as the power diodes to prevent back-charging of said internal power supply from an electrical system connected to said output port. Shown in FIG. 1 below, the isolation sensor 160 is between the output port (output terminals 170 and 180) of the charger apparatus and the internal power supply (transformer 20/ full wave bridge rectifier 30/ main capacitor 40). Ex. 1010, 4:10-20; 4:45-53. While the storage battery 150 is being charged, "[c]harging current for the battery will pass through the isolation transistor 110 and out through the final isolating diode 160 to the storage battery 150 under charge." Ex. 1010,

12:15-18. The isolation sensor 160 acts as the power diodes to prevent back-charging of said internal power supply from the storage battery 150.

> When a storage battery 150 containing more than 6 cells is connected to the terminals 170 and 180, the voltage regulator integrated circuit 70 will modulate off the main power transistor 90, current will cease to flow from the voltage regulator integrated circuit to the storage battery 150 and the final isolating diode 160 will be reverse biased and block current flow from the storage battery 150 to the present invention. Ex. 1010, 13:1-10.

98. While Wanzong shows a single isolating diode 160 in the schematic diagram of FIG. 1. It would be understood by a POSITA that a plurality of isolating diodes could be arranged in parallel to handle higher current flow. Ex. 1002, ¶160.

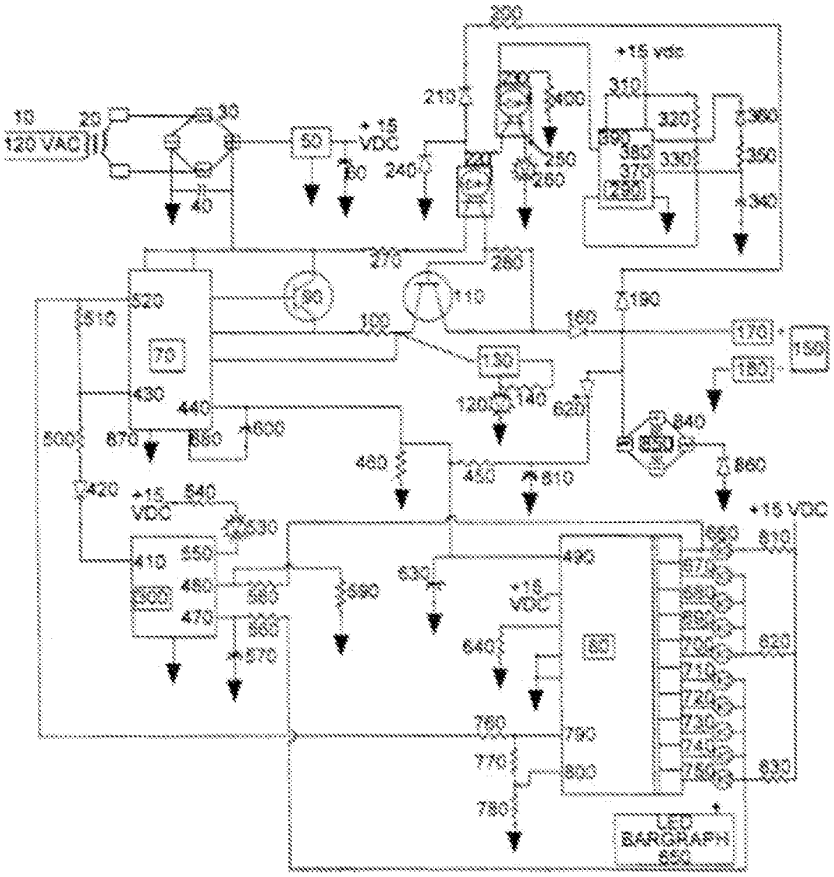


Fig. 1

Ex. 1010, FIG. 1

99. Incorporating Wanzong's isolating diode 160 in Richardson would have been obvious to of a POSITA to prevent back-charging of the charging circuit during or after the charging process. A POSITA would have been motivated to use an isolating diode 160 to prevent damage to the charging circuit. Ex. 1002, ¶161.

E. Ground 5: Claim 16 would have been obvious from Richardson and Baxter

100. Claim 16 depends from claim 15, and requires that "said plurality of visual indicators comprises a plurality of LEDs providing output light of different colors."

101. Claim 16 would have been obvious from the combination of Richardson and Baxter.

102. Baxter (prior art under 35 U.S.C. §102(a)) is not cited in the '015 patent. A related patent (US8199024) was cited during prosecution of the '938 application, but was not used in any claim rejection.

103. Baxter was before the PTAB in the Dongguan IPR. Ex. 1004. In that case, the petitioner relied on Baxter in combination with two other references for challenging claims 7 and 16. The PTAB did not substantively address the obviousness of claim 16 based on Baxter.

104. Richardson and Baxter are both directed to portable jump starters for vehicle engines. Baxter discloses a safety circuit for battery charging systems that can be incorporated into batteries and jumper cables. Ex. 1011, 1:4-5.

105. Using LEDs providing output light of different colors to indicate different conditions is plainly obvious by itself. Baxter states the

"microcontroller 26 can activate a green LED as a signal of proper connection .... Alternatively, a red LED might be activated if an improper connection is detected." Ex. 1011, 10:24-31. Different color LEDs are also used to indicate other conditions, e.g., if the cable clamps accidentally are touching. Ex. 1011, 12:18-29.

106. It would be obvious to a POSITA to incorporate LEDs providing output light of different colors in the Richardson device to indicate various conditions, including the capacity status of the internal power supply, since using lights of different colors enables users to readily view particular conditions clearly and easily. Ex. 1002, ¶170.

F. Ground 6: Claims 10-13 would have been obvious from Richardson and the Epower-20 brochure or the Epower-21 brochure

107. Claims 10-13 would have been obvious from Richardson and the Epower-20 brochure (Ex. 1012) or the Epower-21 brochure (Ex.1013).

108. The Epower-20 brochure provides technical details of Carku's EPower-20 Multifunction Jump Starter. The Epower-21 brochure similarly provides technical details of Carku's EPower-21 Multifunction Jump Starter. Both brochures were distributed to attendees of the 115th China Import and Export Fair 2014 in Guangzhou, China ("2014 Canton Fair"), one of the

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largest trade shows in the world, on April 15 - May 5, 2014. Ex. 1018 at 2. The Epower-20 and Epower-21 jump starters and their brochures were on display and publically accessible to all attendees during the entire period of the 2014 Canton Fair at Carku's booth at the fair. *Id.* The booth was easily accessible to all attendees. *Id.* Carku's staff handed out the brochures and encouraged visitors to take the brochures. *Id.* The brochures are therefore printed publications available to the public before the July 3, 2014 effective filing date of the '015 patent, and thus prior art under 35 U.S.C. §102(a).

109. The brochures were not cited in the '015 patent.

110. Richardson and the brochures all disclose portable jump starters for vehicle engines. For instance, the Epower-20 brochure shows packaging below specifying "Carku Multifunction Jump Starter E-Power-20B." The Epower-20 brochure similarly specifies "Carku Multi-Function Jump Starter."



Ex. 1012 at 1

1. Claim 10 would have been obvious from Richardson and the Epower-20 brochure or the Epower-21 brochure

111. Claim 10 depends from claim 1, and requires that "a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device."

112. The Epower-20 brochure shows two USB output ports at the front of the device below.

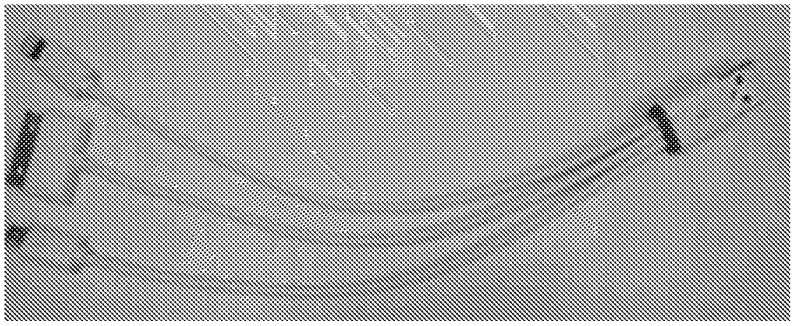


Ex. 1012 at 1.

113. The "Specification" of the Epower-20 brochure states the "Output" includes "5V/2A, 5V/1A ---mobile phone, tablet PC, other digital devices." A POSITA would understand that the 5V/2A and 5V/1A outputs described and shown are USB outputs for charging mobile phones and other devices. Ex. 1002, ¶78.

114. Additionally, the Epower-20 brochure discloses a "3-in-1 Mobile Phone Cable" accessory below with "Micro USB, iPhone4, iPhone5" outputs. The right end of the cable is a USB plug, which a POSITA would understand is plugged into a USB port shown above. Ex. 1012, ¶184. The

other end of the cable includes the "Micro USB, iPhone4, iPhone5" outputs described in the brochure.



Ex. 1012 at 1.

115. The Epower-21 brochure similarly discloses USB output ports.

116. The USB output ports allow users to charge USB-chargeable devices like cell phones. It would have been obvious to a POSITA to incorporate USB output ports in Richardson as a convenience feature allowing users to also charge electronic devices.

2. Claim 11 would have been obvious from Richardson and the Epower-20 brochure or the Epower-21 brochure

117. Claim 11 depends from claim 1, and requires that "a USB charging port configured to provide charging power from an external power source to said internal power supply."

118. As discussed above, the Epower-20 and Epower-21 brochures disclose jump starters with USB output ports to charge other devices. Ex. 1012 at 1 and Ex. 1013 at 1.

119. Neither reference explicitly discloses a USB charging port providing charging power from an external power source to an internal power supply. The Epower-20 brochure shows below a "14V 1A" "Input" port for charging the jump starter with a "Home charger" ("Input: AC/100V-240V, Output: DC/14V1A").



Specification		
Description of goods	Fast car charger	
Battery Capacity	37Wh(7500mAh)	
Dimension	155*74*21.5mm	
Weight	330g	
Output	5V/2A、5V/1A —mobile phone, tablet PC, other digital devices 15V/10A —car fast charge	
Input	14V/1A	
Operation Temp.	-20℃~60℃/-4℉~140℉	
Time to charge car battery	About 8minutes in fully discharge	
Standard Accessories		
1pc Home charger	Input: AC/100V-240V 、Output: DC/14V1A	
1pc Car charger	Input / Output: DC 15V10A	
1pc User Manual		

Ex. 1012 at 1

120. The Epower-21 brochure makes a similar disclosure.

121. Thus, the Epower-20 and Epower-21 brochures disclose a "charging port configured to provide charging power from an external power source to said internal power supply." Ex. 1012 at 1. Ex. 1013 at 1. Further, the brochures disclose a USB port incorporated in the devices to provide charging power to other electronic devices like cell phones as explained above. Ex. 1012 at 1. It would be readily apparent from the references that a USB port, which is simply a different physical plug and socket combination from the round plug and socket used in the Epower-20 and 21 products, could also be incorporated into portable jump starters in place of or in addition to the 14V 1 A input port to charge the internal batteries of jump starter devices. A POSITA would be motivated to provide such a USB charging port to provide the added convenience to users of using another commonly used power input for charging the jump starter device. Ex. 1002, ¶190.

3. Claims 12-13 would have been obvious from Richardson and the Epower-20 brochure or the Epower-21 brochure

122. Claims 12 and 13 depend from claims 1 and 12, respectively.

123. Claim 12 requires "a flashlight circuit configured to provide a source of light to a user." Claim 13 specifies "said source of light is at least one LED."

124. The Epower-20 and Epower-21 brochures show a flashlight at the front of the devices in the pictures below.



Ex. 1012 at 1



Ex. 1013 at 1

125. The Epower-20 brochure also shows the flashlight in operation.



Ex. 1012 at 1

126. It would be obvious for a POSITA to use an LED lamp in the flashlight as LED lamps have high energy efficiency. Ex. 1002, ¶195.

127. A POSITA would have been motivated to incorporate a flashlight circuit having an LED light source in Richardson to provide lighting for the user, as suggested by the brochures.

G. Ground 7: Claim 22 would have been obvious from Richardson and Richardet

128. Claim 22 depends from claim 21, and requires that "said jumper cable device further comprises a pair of ring terminals configured to respectively connect said pair of cables at said another end thereof with one

of a battery terminal and a battery terminal clamp." Richardet meets this limitation.

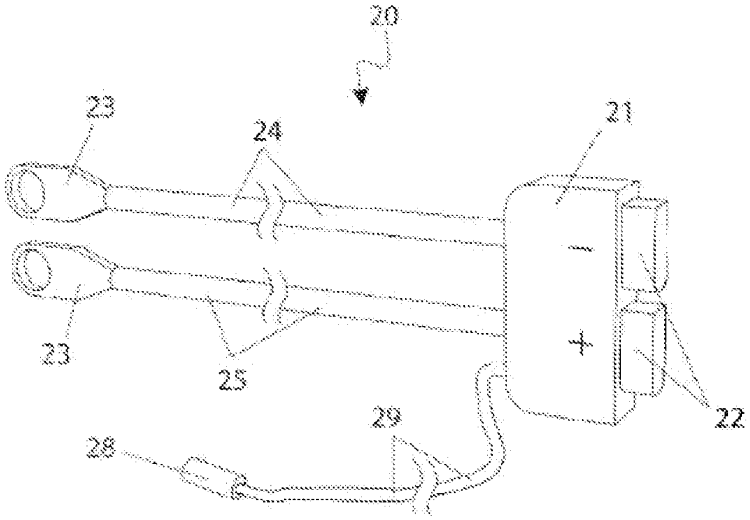
129. Richardet (prior art under 35 U.S.C. §102(a)) generally relates to electrical connectors for car batteries. Ex. 1014, 1:60-65.

130. Richardet was cited during prosecution of the '938 application. The Examiner rejected claims 24-26 as anticipated by Richardet. Instead of disputing the rejection, the applicant simply canceled claims 24-26.

131. Richardson and Richardet both relate to jump starting vehicle engines. Ex. 1014, 2:33-36. Richardet discloses "means to provide a battery terminal connection which provides secure and stable connection to a motor vehicle battery or the like adaptable to a variety of common scenarios and which is simple and quick for an average user." Ex. 1014, 1:60-65. As discussed below, Richardet discloses certain features that would have been obvious for a POSITA to incorporate into the jump starter disclosed in Richardson.

132. FIG. 2a of Richardet below discloses a "battery connector assembly 20 comprises a first fastener 21, a pair of battery ring terminals 23, a negative battery cable 24, a positive battery cable 25, and an accessory connector 28. The battery ring terminals 23 provide an attachment means

thereto a positive battery terminal 120 and a negative battery terminal 130 thereon a primary battery 100 (see FIG. 3)." Ex. 1014, 4:57-63. Thus, Richardet discloses a pair of ring terminals 23 to connect a pair of cables 24, 25 with battery terminals 120 and 130.



Ex. 1014, FIG. 2a

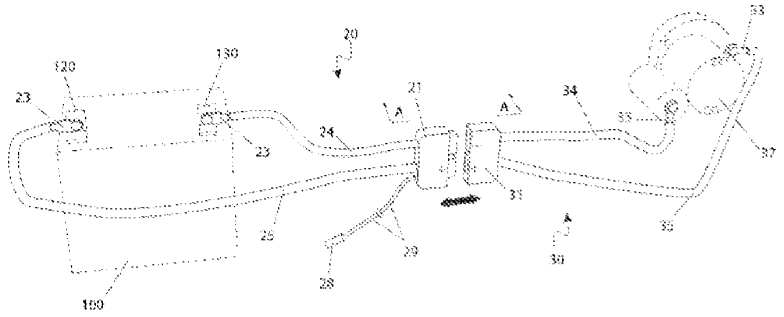


Fig. 3

Ex. 1013, FIG. 3

133. Richardet discloses that its cable systems "provide a battery terminal connection which provides secure and stable connection to a motor vehicle battery or the like adaptable to a variety of common scenarios and which is simple and quick for an average user." Ex. 1014, 1:59-65. Combining Richardet's cable system with ring terminals in Richardson would have been obvious to a POSITA as another advantageous way of connecting cabling to a battery. A POSITA would have been particularly motivated to use Richardet's cabling system to provide a secure and stable connection to a vehicle battery in a simple and quick way for an average user, as suggested by Richardet. Ex. 1002, ¶204.

H. Ground 8: Claims 1, 17, and 21 are anticipated by Klang

134. Klang (issued July 23, 2002) is prior art under 35 U.S.C. §102(a). Klang is not cited in the '015 patent.

135. Klang is "directed to a battery charging system and method that rapidly recharges batteries based on an interactive charging procedure." Ex. 1007, 4:67-5:2. It includes "safety features which minimize, if not eliminate, safety issues as regards both users and as to the test units themselves." Ex. 1007, 2:61-63. In particular, the system includes a voltage sensor that detects the presence of a battery and a reverse polarity sensor that detects whether the battery is connected with reverse polarity. Ex. 1007, 8:55-65.

1. Klang anticipates Claim 1

(a) "Apparatus for jump starting a vehicle engine"

136. The preamble of claim 1 does not limit the claim because (1) the preamble only describes an intended use (jump starting a vehicle engine) for the structure recited in the claim's body, (2) the preamble does not impose any structural requirements beyond those provided in the claim's body, (3) no arguments relying on "jump starting a vehicle engine" were made during prosecution to overcome prior art, and (4) "jump starting a vehicle engine" does not supply antecedent basis for any term in any claim.

See, e.g., *ArcticCat Inc. v. GE Power Products, Inc.*, No. 18-1520 (Fed. Cir. 2019.

137. To the extent the preamble is limiting, Klang discloses systems for rapidly charging vehicle batteries. "A more specific object of this invention lies in the provision of a diagnostic test unit which includes an interactive charging unit capable of rapidly and reliably recharging lead-acid batteries." Ex. 1007, 2:64-67. Klang discloses charging stand-alone batteries and in-vehicle batteries. Ex. 1007, 7:31-37.

138. While Klang does not explicitly state jump starting a vehicle engine, a POSITA would recognize that jump starter devices and devices for rapidly charging batteries like Klang function in a similar way and would both involve similar components and safety features. Ex. 1002, ¶210.

(b) "an internal power supply"

139. Klang discloses an internal power supply in FIGS. 1 and 4. "Turning to the drawings and referring first to FIG. 1, a diagnostic tester and charging system 10 according to the invention comprises a system controller 12, a variable programmable DC power supply and load 14, DC sensors 24, conducting cables 18 and a battery 16. The system controller 12 is coupled

to the power supply 14 and includes control circuitry for regulating the output of the power supply 14." Ex. 1007, 5:9-17.

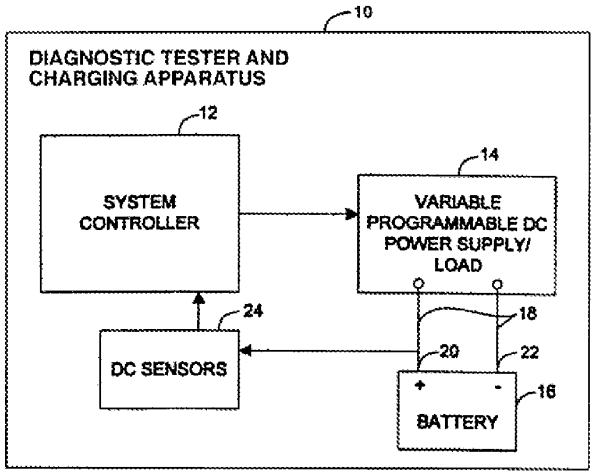


FIG._1

Ex. 1007, FIG. 1

140. Klang also states "[a]s shown in FIG. 4, the variable programmable DC power supply and load 14 includes a DC power supply 52 and a variable load 54. According to the invention, the power supply 14 is capable of providing an electrical charge output at either a variable voltage level or a variable current level (or both)." Ex. 1007, 6:48-53.

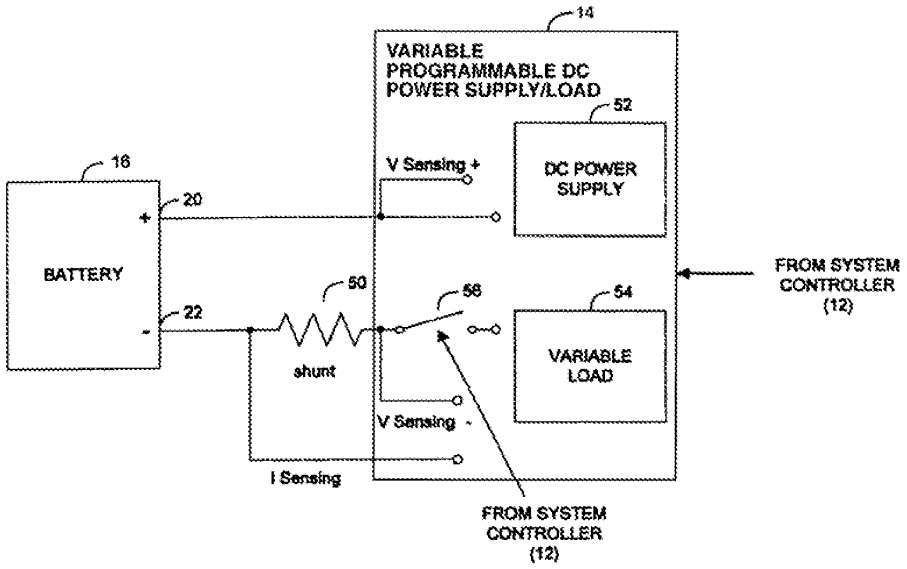


FIG._4

Ex. 1007, FIG. 4

(c) "an output port having positive and negative polarity outputs"

141. "Output port" means "a component through which power from an internal power supply is transmitted." Ex. 1005 at 15. Consistent with this construction, Klang discloses an output port having the positive and negative polarity outputs through which power from the internal power supply is transmitted. Specifically, referring to FIG. 1, Klang states "[t]he power supply and load 14 are coupled in a conventional manner to a battery 16 using conducting cables 18 which link the power supply and load 14 to the charging terminals 20, 22 of the battery 16." Ex. 1007, 5:17-19.

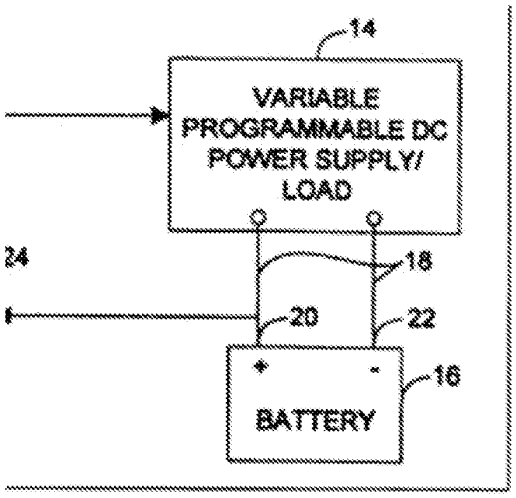


FIG._1

Ex. 1007, FIG. 1

(d) "a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs"

142. "Vehicle battery isolation sensor" means "a vehicle battery isolation sensor separate from the reverse polarity sensor." Ex. 1005 at 14. Consistent with this construction, Klang discloses a vehicle battery isolation sensor that is separate from a reverse polarity sensor and connected in circuit with the positive and negative polarity outputs, and detects presence of a vehicle battery connected between the positive and negative polarity outputs. Klang discloses a voltage sensor 46 shown in FIG. 3 connected in circuit with

the positive and negative polarity outputs of the output port (the leads 18 connected to the charging terminals 20, 22 of the battery 16). "As represented in FIG. 3, the exemplary diagnostic tester and charger is comprised of four DC sensors: a charging current sensor 42, a discharging current sensor 44, a voltage sensor 46, and a reverse polarity sensor 48. As illustrated, the voltage sensor 46 is connected in a conventional manner to measure the voltage across the terminals 20, 22 of the battery 16. The voltage across the battery terminals is read and attenuated by a voltage attenuator in order to match the input range of the analog-to-digital converters 38 residing in the system controller 12. The voltage sensor 46 is selected so as to be sensitive enough to reflect critical voltage changes with 0.01V accuracy." Ex. 1007, 6:8-19.

143. The voltage sensor 46 detects the presence of the battery 16 by detecting whether it is connected. "If the OCV is greater than −0.5V, at step 148, the OCV is compared to an extremely low voltage to determine whether a battery is connected." Ex. 1007, 8:55-58.

144. FIG. 3 of Klang shows the vehicle voltage sensor 46 as separate from a reverse polarity sensor 48.

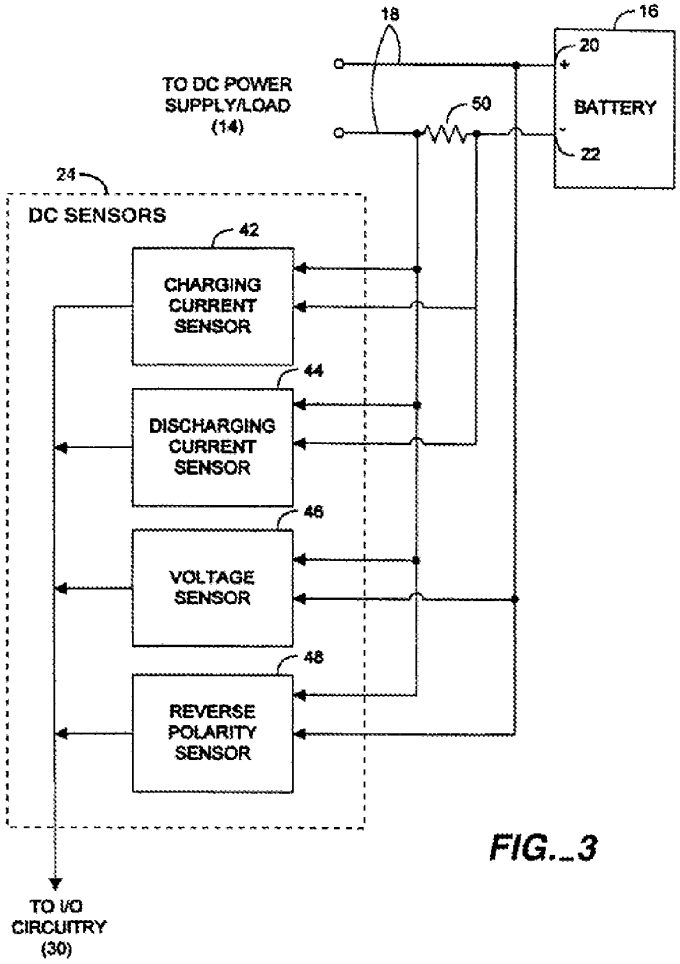


FIG._3

Ex. 1007, FIG. 3

(e) "a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port"

145. "Reverse polarity sensor" means a "reverse polarity sensor separate from the vehicle battery isolation sensor." Ex. 1005 at 14. Consistent with this construction, Klang discloses a reverse polarity sensor that is separate from a vehicle battery isolation sensor and is connected in circuit with the positive and negative polarity outputs, and detects polarity of a vehicle battery connected between the positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with the positive and negative polarity outputs of the output port.

146. Referring to FIG. 3, Klang states: "[t]he reverse polarity sensor 48, connected in a like manner across the battery terminals 20, 22, senses negative voltage indicating that the battery leads are connected backwards." Ex. 1007, 6:20-23. Klang's reverse polarity sensor provides an output signal (sensed negative voltage) indicating whether the battery has a proper polarity connection. Klang states: "[i]f the start button has not been pressed, at step 144, the OCV [battery open circuit voltage] is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery 16. If the OCV is less than −0.5V, the method

proceeds at step 146 to notify the operator that the leads are reversed." Ex. 1007, 8:55-60.

147. FIG. 3 shows the reverse polarity sensor 48 of Klang as separate from the vehicle battery isolation sensor (the voltage sensor 46).

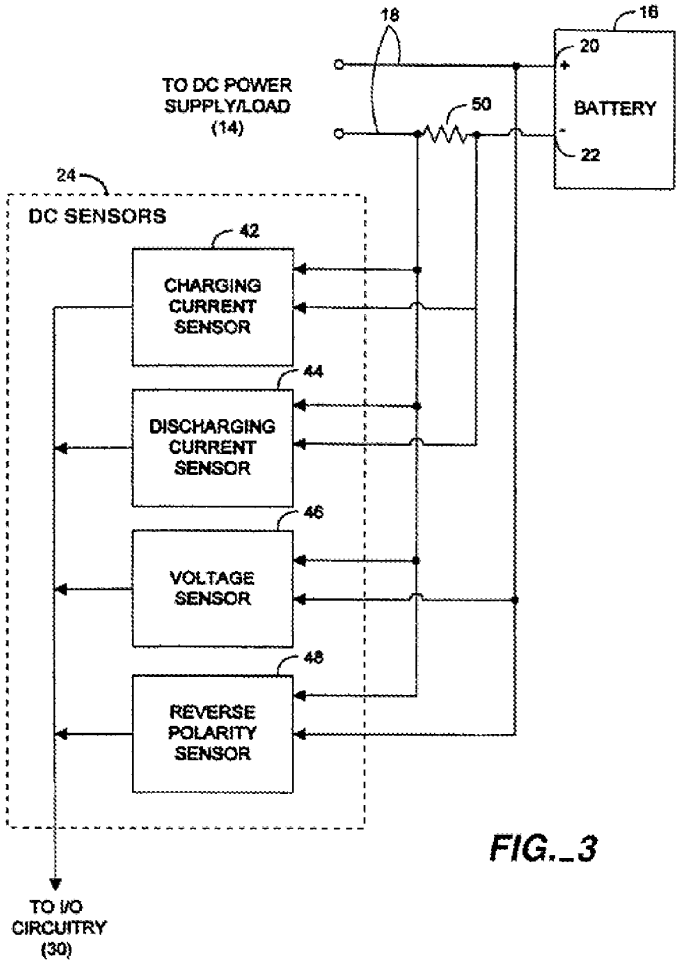


FIG._3

Ex. 1007, FIG. 3

(f) "a power switch connected between said internal power supply and said output port"

148. Klang discloses a power switch connected between the internal power supply and the output port. In FIG. 4 below, Klang discloses a switch 56 connected between the power supply 52 and the leads (output port) connected to the battery 16.

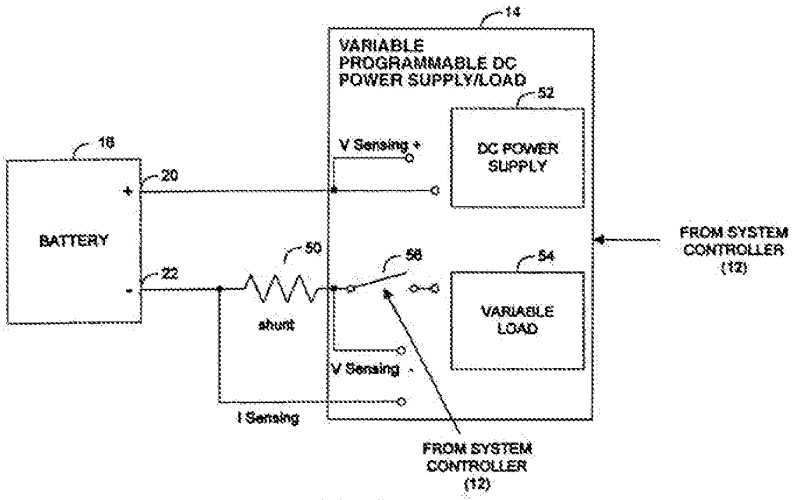


FIG._4

Ex. 1007, FIG. 4

149. Klang explains: "[d]uring the diagnostic test or charge, the system controller 12 may control means 56 such as a relay, a switch or the like to automatically connect the battery 16 to the circuit. For example, the switch 56 is open while measuring the open circuit voltage of the system. Conversely, the switch 56 is closed allowing current to flow across a shunt resistor 50 to

enable charging, discharging and current measurements to be taken." Ex. 1007, 7:7-14.

(g) "a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch"

150. Klang discloses a microcontroller receiving input signals from the vehicle isolation sensor and the reverse polarity sensor, and to provide an output signal to the power switch. Klang discloses a controller 12 in FIG. 1 receiving input signals from DC sensors 24 (which includes the voltage sensor 46 (a vehicle isolation sensor) and the reverse polarity sensor 48) and providing output signals to the variable programmable DC power supply/load 14 (containing the switch 56 in FIG. 4).

> Turning to the drawings and referring first to FIG. 1, a diagnostic tester and charging system 10 according to the invention comprises a system controller 12, a variable programmable DC power supply and load 14, DC sensors 24, conducting cables 18 and a battery 16. The system controller 12 is coupled to the power supply 14 and includes control circuitry for regulating the output of the power supply 14. The power supply and load 14 are coupled in a conventional manner to a battery 16 using conducting cables 18 which link the power supply and load 14 to the charging terminals 20, 22

of the battery 16. Depending on the amount of charge to be conveyed, the conducting cables 18 may comprise heavy-gauge copper wires or cabling compliant with National Electrical Code requirements. The DC sensors, which sense current and voltage across the battery terminals 20, 22, return the values thereof to the system controller 12 to which they are coupled. Ex. 1007, 5:10-25.

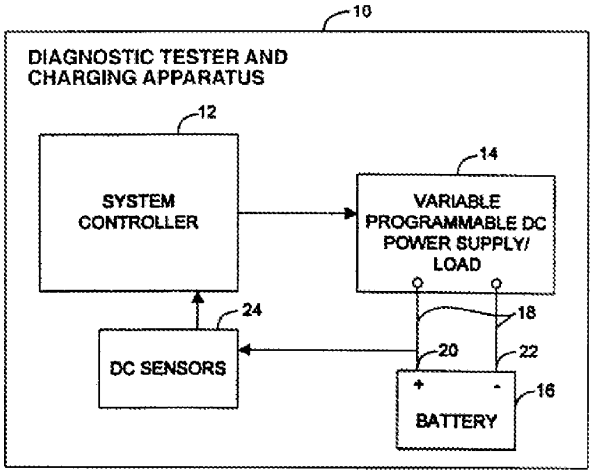


FIG._1

Ex. 1007, FIG. 1

151. Referring to FIG. 2, Klang states:

Shown in FIG. 2, the system controller 12 comprises a microprocessor 26, a memory 28, and input/output (I/O) circuitry 30 connected in a conventional manner. The memory 28 is comprised of random access memory (RAM), read-only memory (ROM) and the like. The I/O circuitry 30 is coupled to an operator input 32 that comprises the means

to input relevant operator commands and data, such as the rated CCA (Cold Cranking Amps) of the battery. The I/O circuitry 30 is also coupled to a display 34 that comprises the means to display relevant output messages, such as messages informing the operator on the status of diagnostic testing or charging, or messages prompting the operator to enter commands or data. The I/O circuitry 30 is further coupled to the power supply and load 14 and comprises the means to send commands originating in the microprocessor 26 to the power supply and load 14 and to send messages originating in the power supply and load 14 to the microprocessor 26. Ex. 1007, 5:27-44.

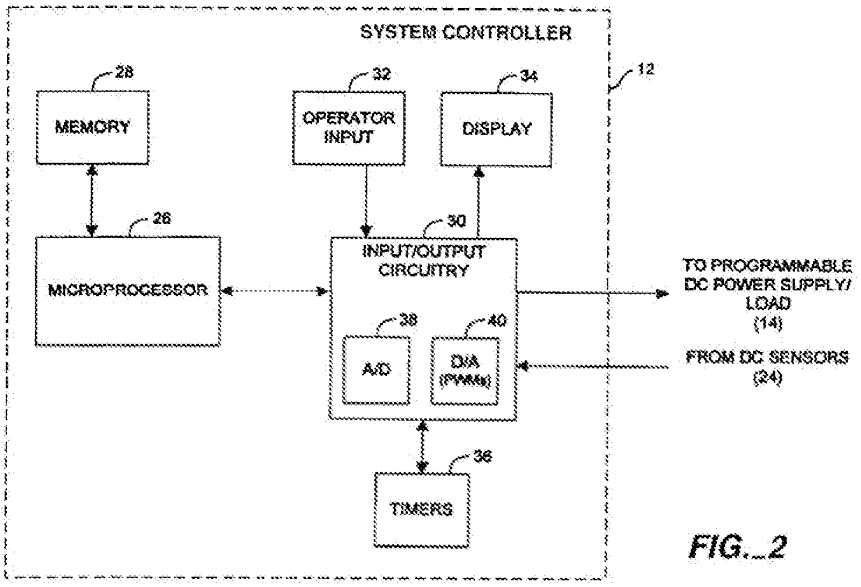


FIG._2

Ex. 1007, FIG. 2

152. "Input signals from said vehicle isolation sensor and said reverse polarity sensor" means "distinct input signals from said vehicle isolation sensor and said reverse polarity sensor, respectively." Ex. 1004 at 14. Consistent with this construction, FIG. 3 of Klang shows distinct input signals sent to I/O circuitry 30 of the controller 12 from the voltage sensor 46 and the reverse polarity sensor 48.

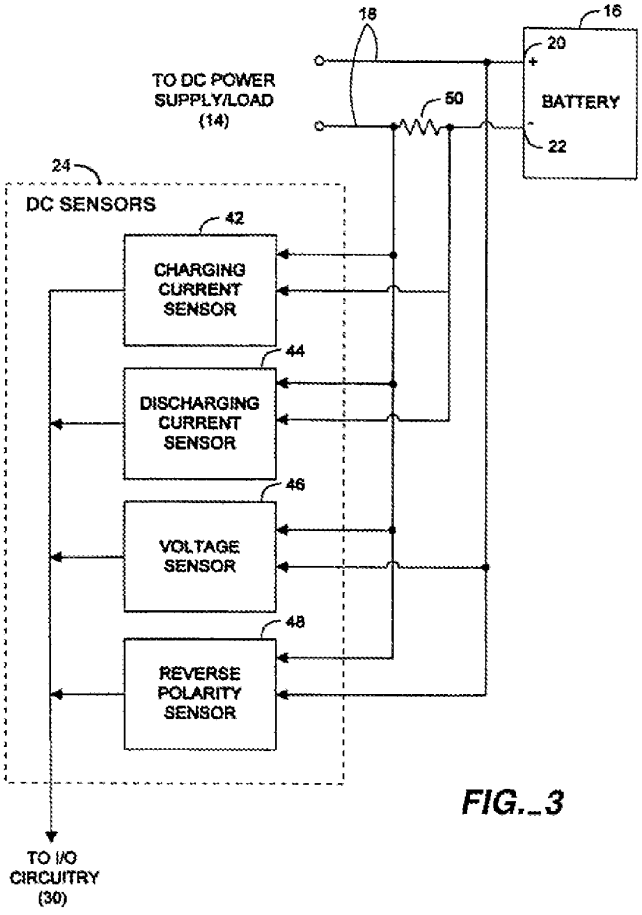


FIG._3

Ex. 1007, FIG. 3

(h) "[a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs"

153. Klang discloses the power switch being turned on to cause the internal power supply to be connected to the output port in response to signals from the sensors indicating (1) the presence of a vehicle battery at said output port and (2) proper polarity connection of positive and negative terminals of said vehicle battery with the positive and negative polarity outputs. Klang also discloses that the power switch is *not* turned on when signals from the sensors indicate either the absence of a vehicle battery at the output port or improper polarity connection of positive and negative terminals of the vehicle battery.

154. Klang discloses in FIG. 5 "a logic flow diagram illustrating the steps involved in performing the diagnostic battery test and battery charge

procedures according to the present invention." Ex. 1007, 4:10-13. Klang states "FIG. 6 is a logic flow diagram illustrating the particular steps involved in starting up the diagnostic tester and charging system." Ex. 1007, 4:14-16.

155. Klang states: "FIG. 5 illustrates the overall procedure used to implement the current invention. The exemplary testing/charging procedure begins in step 100 by connecting, in a conventional manner, the lead-acid battery to the diagnostic unit as illustrated in FIGS. 1-4. In step 102, the start-up procedure is invoked wherein proper connection of the battery to the diagnostic unit is verified, critical data is input by the operator via appropriate buttons and keys, and the voltage is measured." Ex. 1007, 7:49-57. (This "start-up" process is further described in FIG. 6 as discussed below.) Once the start-up process has been successfully completed and other steps such as checking if the battery is bad have been performed, the battery is charged. "If the battery is not judged "bad," however, at step 114 the charger will be turned on and the battery will be charged and checked in accordance with the rapid interactive stepping procedure at step 116." Ex. 1007, 8:5-8.

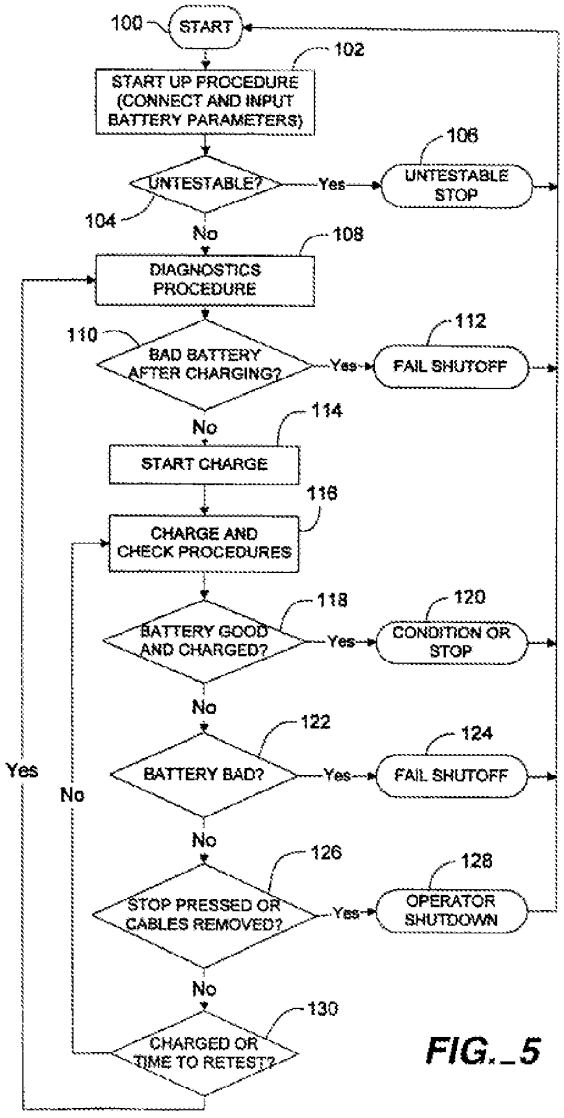
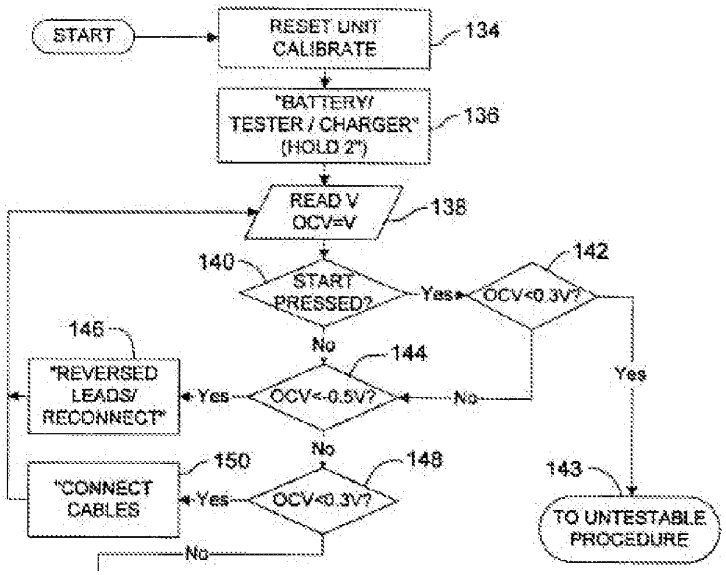


FIG._5

Ex. 1007, FIG. 5

156. FIG. 6 depicts the start-up process, which includes detecting (1) the presence of a vehicle battery at the output port and (2) proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.



Ex. 1007, FIG. 6

157. Klang states:

After the short delay, at step 138 the diagnostic tester measures the battery open circuit voltage (OCV) with a switch 56 such that the voltage sensor 46 and reverse polarity sensor 48 read the voltage across the battery terminals 20, 22 without any load or charge. In all, steps 138 through 150 determine whether the battery to be tested is properly connected to the diagnostic unit. For example, at step 140, the diagnostic unit determines if the operator has pressed the start button. If the start button has been pressed, at step 142, the OCV is compared to an extremely low voltage to determine whether the battery is testable. If the battery's OCV is

> less than 0.3V, the method proceeds at step 143 to run the untestable procedure which notifies the operator that the battery is untestable. (See FIG. 17). If the start button has not been pressed, at step 144, the OCV is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery 16. If the OCV is less than −0.5V, the method proceeds at step 146 to notify the operator that the leads are reversed. If the OCV is greater than −0.5V, at step 148, the OCV is compared to an extremely low voltage to determine whether a battery is connected. If the OCV is less than 0.3V, indicating that a battery is not connected, the method proceeds at step 150 to display a message instructing the operator to connect the cables. Ex. 1007, 8:41-65.

158. Thus, Klang discloses unless the voltage measurement made by the voltage sensor 46 at step 148 indicates the presence of the battery (i.e., it is connected) and the voltage measurement made by the reverse polarity sensor 48 at step 144 indicates that the battery is connected with proper polarity, the charging process cannot occur, i.e., the power switch cannot be turned on. Ex. 1002, ¶230.

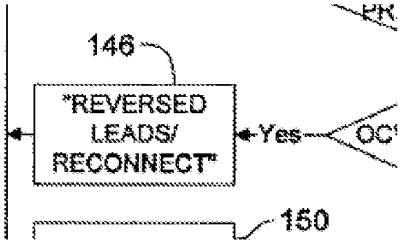
2. Klang anticipates Claim 17

159. Claim 17 depends from claim 1, and requires "a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity."

160. Klang states "[i]f the start button has not been pressed, at step 144, the OCV is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery 16. If the OCV is less than −0.5V, the method proceeds at step 146 to notify the operator that the leads are reversed." Ex. 1007, 8:55-60. Thus, Klang warns a user when a vehicle battery is connected with reverse polarity. A visual indicator provides this warning. Klang discloses outputting messages on a display 34. "The I/O circuitry 30 is also coupled to a display 34 that comprises the means to display relevant output messages, such as messages informing the operator on the status of diagnostic testing or charging, or messages prompting the operator to enter commands or data." Ex. 1007, 5:34-39.

161. Regarding FIG. 6, Klang states: "the method proceeds at step 146 to notify the operator that the leads are reversed." Ex. 1007, 8:59-60. Step 146 in the figure identifies text ("REVERSED LEADS / RECONNECT") in quotations, which indicates that the text is displayed to

the operator. Thus, Klang discloses a visual indicator warning a user when a vehicle battery is connected with reverse polarity, as recited in claim 17.

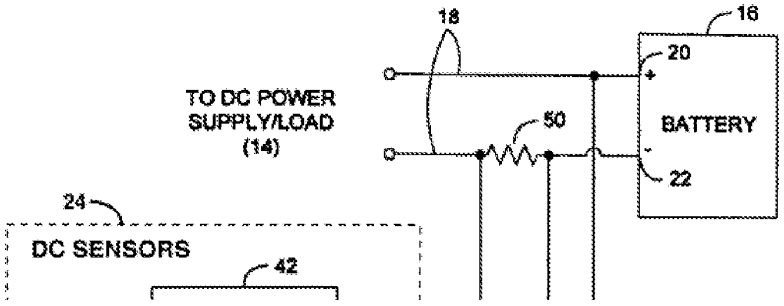


Ex. 1007, FIG. 6

3. Klang anticipates Claim 21

162. Claim 21 depends from claim 1, and requires "a jumper cable device including a plug configured to plug into said output port, a pair of cables integrated with the plug at one respective end thereof and being configured to be connected to terminals of a battery at another respective end thereof." Klang meets this limitation.

163. Klang's FIG. 3 shows a cable 18 connected between DC power supply/load 14 and battery 16. "The power supply and load 14 are coupled in a conventional manner to a battery 16 using conducting cables 18 which link the power supply and load 14 to the charging terminals 20, 22 of the battery 16. Depending on the amount of charge to be conveyed, the conducting cables 18 may comprise heavy-gauge copper wires or cabling compliant with National Electrical Code requirements." Ex. 1007, 5:17-23.



Ex. 1007, FIG. 3

I. Ground 9: Claims 4 and 5 would have been obvious from Klang and Krieger

164. Claims 4 and 5 would have been obvious from Klang and Krieger.

165. Klang and Krieger both relate to depleted vehicle batteries. Krieger discloses a portable jump starter for a vehicle with a depleted battery. Klang discloses rapidly charging depleted vehicle batteries. Klang and Krieger are similar in function and both include a power source, cable clamps for connecting the output ports to a vehicle battery, sensors for detecting the presence of a vehicle battery and reverse polarity connections, a power switch, and a microcontroller for actuating the power switch in response to signals from the sensors. A POSITA would recognize that the improvements provided by features in Krieger would improve Klang's device. Ex. 1002, ¶240.

1. Claim 4 would have been obvious from Klang and Krieger

166. Claim 4 depends from claim 1, and requires "said power switch comprises a plurality of FETs in parallel."

167. Please refer to the discussion of Krieger and claim 4 in ¶¶87-88 of Ground 3.

168. Substituting the switch in Klang's battery charger with Krieger's solid state switch comprising a plurality of FETs in parallel would have been obvious. A POSITA would have been particularly motivated to use the solid state switch comprising a plurality of FETs in Klang's apparatus to avoid or reduce electro-mechanical components, as suggested by Krieger.

2. Claim 5 would have been obvious from Klang and Krieger

169. Claim 5 depends from claim 1, and requires "said vehicle isolation sensor and reverse polarity sensor comprise optically coupled isolator phototransistors." Please refer to the discussion of Krieger and claim 5 in ¶¶90-93 of Ground 3 above.

170. A POSITA would be particularly motivated to use opto-couplers of the type discloses by Krieger for sensing the presence of a vehicle battery and a correct polarity connection because Krieger's opto-

coupler is an inherently digital device, giving a '1' or a '0' output. This can be preferable over analog inputs to the microcontroller, which may be subject to tests to determine if the vehicle battery is present or reversed. A POSITA would be motivated to simplify Klang by using an optical coupler for one or both sensing functions to, e.g., provide a more compact battery charger.

J. Ground 10: Claim 22 would have been obvious from Klang and Richardet

171. Klang and Richardet both disclose charging vehicle batteries. Ex. 1014, 2:33-36. Richardet discloses "means to provide a battery terminal connection which provides secure and stable connection to a motor vehicle battery or the like adaptable to a variety of common scenarios and which is simple and quick for an average user." Ex. 1014, 1:60-65.

172. Claim 22 depends from claim 21, and requires that "said jumper cable device further comprises a pair of ring terminals configured to respectively connect said pair of cables at said another end thereof with one of a battery terminal and a battery terminal clamp."

173. Please refer to the discussion of the teachings of Richardet and claim 22 in ¶¶ 128-133 of Ground 7 above.

174. Combining Richardet's cable system with ring terminals in Klang's battery charger would have been obvious to a POSITA to provide a secure and stable connection to a motor vehicle battery in a way that is simple and quick for an average user, as suggested by Richardet.

K. Ground 11: Claim 23 would have been obvious from Klang and Lei

175. Claim 23 depends from claim 21, and requires "said output port and said plug are dimensioned so that the plug will fit into the output port only in one specific orientation." Claims 23 would have been obvious from Klang and Lei.

176. Klang relates to rapidly charging vehicle batteries. Ex. 1007, Abstract. Klang and Lei both disclose conducting cables for connecting the output ports of the devices to a vehicle battery. Ex. 1007, 5:15-19.

177. Please refer to the discussion of Lei and claim 23 in ¶¶79-80 of Ground 7 above.

178. A POSITA would have been motivated to incorporate the insertable anti-reverse connector disclosed by Lei in Klang's battery charging system for safety or convenience for the user.

VII. CONCLUSION

179. Claims 1-23 of the '015 patent are therefore unpatentable. Petitioner requests institution of an IPR to cancel those claims.

VIII. CERTIFICATION OF GROUND FOR STANDING

180. Petitioner certifies pursuant to 37 C.F.R. §42.104(a) that the patent for which review is sought is available for IPR and that Petitioner is not barred or estopped from requesting an IPR challenging the patent claims on the grounds identified in this Petition. *See also* 37 C.F.R. §42.122(b) ("The time period set forth in § 42.101(b) shall not apply when the petition is accompanied by a request for joinder").

IX. MANDATORY NOTICES

A. Real Party in Interest

181. Guangdong Boltpower Energy Co., Ltd, a company based in China, is the real party-in-interest ("RPI") and is the only party currently directing, controlling, and funding this IPR.

B. Related Matters

182. The '015 patent (Ex. 1001) has been asserted by the NOCO Company in the following litigations:

- Shenzhen Anband Technology Co., Ltd., No. 1:17-cv-02205

(N.D. Ohio), filed on October 19, 2017 (default judgment entered August 6, 2018; motion to enforce default judgment filed March 16, 2020)

- SZ Jingxinghui Electronics Technology Co., Ltd., No. 1:17-cv-02208 (N.D. Ohio), filed on October 19, 2017 (default judgment entered July 27, 2018)
- Shenzhen ChangXinYang Technology Co. Ltd., No. 1-17-cv-02209 (N.D. Ohio), filed on October 19, 2017 (pending)
- Shenzhen Valuelink ECommerce Co., Ltd., No. 1-17-cv-02210 (N.D. Ohio), filed October 19, 2017 (pending)
- Shenzhen Dika Na'er E-Commerce Co., Ltd., No. 1-17-cv-02282 (N.D. Ohio) filed on October 30, 2017 (stipulation for dismissal with prejudice, pursuant to Rule 41(a)(1)(A)(ii) of the Federal Rules of Civil Procedure, filed January 9, 2020)
- Halo2Cloud, LLC, and QVC, Inc., No. 1:18-cv-01423 (D. Del.), filed on September 9, 2018 (notice of voluntary dismissal with prejudice, filed December 3, 2018)
- SmarTech Products, Inc., No. 1:18-cv-2789 (N.D. Ohio), filed November 30, 2018 (pending)
- Shenzhen Lianfa Tong Technology Co., Ltd.; Shenzhen Bi Te Yi Technology Co., LTD; and Shenzhen Mediatek Tong Technology Co.,

Ltd., No. 1:19-cv-01855 (N.D. Ohio), filed August 14, 2019 (pending)

- Sictec Instruments Company Limited, No. 1:19-cv-01856 (N.D. Ohio), filed August 14, 2019 (notice of dismissal under FRCP 41(a)(1) without prejudice, file March 13, 2020)
- TII Trading Inc., et al., No., 2:19-cv-07127 (C.D. Cal.) filed August 15, 2019 (pending)
- Sunvalleytek International, Inc., No. 5:19-cv-04907 (N.D. Cal.), filed August 15, 2019 (pending)
- Deltona Transformer Corporation, No. 6:20-cv-00050 (M.D. Fla.), filed January 9, 2020 (pending)
- Medcursor, Inc., No. 2:20-cv-01358 (S.D. Ohio), filed March 13, 2020 (pending)
- Nekteck, Inc., No. 2:20-cv-01356 (S.D. Ohio), filed March 13, 2020 (pending)
- Shenzhen Yike Electronics Co., Ltd., No. 2:20-cv-01166 (N.D. Ohio), filed May 28, 2020 (pending)
- Guangzhou Unique Electronics Co., Ltd., No. 2:20-cv-01169 (N.D. Ohio), filed May 28, 2020 (pending)
- Zhejiang Quingyou Electronic Commerce Co., Ltd., No. 2:20-cv-01170 (N.D. Ohio), filed May 28, 2020 (pending)
- Shenzhen Gooloo E-Commerce Co., Ltd., No. 2:20-cv-01171

(N.D. Ohio), filed May 28, 2020 (pending)

- Nice Team Enterprise Limited, No. 2:20-cv-01173 (N.D. Ohio), filed May 28, 2020 (pending)
- Aukey Technology Co., Ltd., No. 2:20-cv-01174 (N.D. Ohio), filed May 28, 2020 (pending)

183. Petitioner may have manufactured some of the accused products allegedly sold by the defendants named in at least the following cases, but Petitioner was not served in any manner (via the Hague Convention or otherwise) with a complaint alleging infringement of the '015 patent: the Shenzhen ChangXinYang Technology Co. Ltd. case, No. 1-17-cv-02209 (N.D. Ohio); the Shenzhen Valuelink Commerce Co., Ltd. case, No. 1-17-cv-02210 (N.D. Ohio); the Shenzhen Dika Na'er E-Commerce Co., Ltd. case; the Shenzhen Mediatek Tong Technology Co., Ltd. case, No. 1:19-cv-01855 (N.D. Ohio); the TII Trading Inc. case, et al., No., 2:19-cv-07127 (C.D. Cal.); and Shenzhen Yike Electronics Co., Ltd., No. 2:20-cv-01166 (N.D. Ohio).

184. Additionally, the claims 1-21 and 23 of the '015 patent were previously challenged by Dongguan Juxing Power Co., Ltd. on different grounds, in Dongguan Juxing Power Co., Ltd. v. the NOCO Company, IPR2018-00503 (P.T.A.B.), filed January 15, 2018, with a Decision Denying

Institution issued on July 11, 2018. Dongguan Juxing Power Co., Ltd. is the former name of the Petitioner Guangdong Boltpower Energy Co., Ltd.

185. Claims 1-3, 5, 8-17, 19-21, and 23 of the '015 patent were previously challenged by Shenzhen Mediatek Tong Technology Co., Ltd. in Shenzhen Mediatek Tong Technology Co., Ltd. v. the NOCO Company, IPR2020-01387 (P.T.A.B.), filed July 29, 2020. The petition is currently pending.

C. Lead and Back-up Counsel

Lead Counsel: Timothy T. Wang, Reg. No. 61,554
Back-up Counsel: Neal Massand, Reg. No. 54,296

D. Service Information

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DELTRAN EX1002
IPR2024-01219

E. Fee for *Inter Parties* Review (37 C.F.R. §42.103)

185. The petition fee set in 37 C.F.R. § 42.15(a) is submitted with the petition.

Respectfully submitted,

Dated: December 11, 2020

/Timothy T. Wang/
Timothy T. Wang, Reg. No. 61,554

Attorney for Petitioner

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations of 37 C.F.R. §42.24(a)(1)(i) because, according to the "word count" function of Microsoft Word 2016, the Petition contains 13,582 words, excluding the parts of the Petition exempted from the word count by 37 C.F.R. §42.24(a)(1).

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Ni, Wang & Massand, PLLC
8140 Walnut Hill Lane, Suite 500
Dallas, Texas 75231
(972) 331-4603
Attorney for Petitioner Guangdong Boltpower Energy Co.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e)(4) and 42.105, the undersigned certifies that on December 11, 2020, a true and correct copy of this document (Petition for IPR), and every Exhibit filed with this document, were served on the following parties either electronically upon parties' agreement or Express Mail.

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(972) 331-4603

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

GROUNDS OF INVALIDITY

---

1. The following are the Grounds of Invalidity of GB Patent 2,527,858 ("GB '858") referred to in the Particulars of Claim.

Lack of novelty

2. The invention so far as claimed in at least claim 1 of GB'858 is not a patentable invention in that it was not new having regard to the matter forming the state of the art at the priority date thereof.

PARTICULARS

Hereunder the Claimant relies on the following as forming part of the state of the art:

(a) CN 103066662 A, published on 24 April 2013 ("**Carku CN**");

(b) U.S. Patent Application Publication No. US 2004/0130298, published on 8 July 2004 ("**Krieger**"); and

(c) U.S. Patent Application Publication No. 2013/0154543, published on 20 June 2013 ("**Richardson**").

Lack of inventive step

3. The invention so far as claimed in each and every claim of GB'858 is not a patentable invention in that it was obvious and did not involve an inventive step having regard to the matter forming the state of the art at the priority date thereof.

PARTICULARS

Hereunder the Claimant relies on the following as forming part of the state of the art:

(a) Carku CN;

(b) Krieger;

(c) Richardson; and

(d) Prior use of the Carku E-Power 21 device ("**Carku E-Power 21**").

PARTICULARS

a. The matter made available to the public through this prior use included:

i. the information evident from the use or inspection of the Carku E-Power 21 (a sample Carku E-Power 21 device is available for inspection at the offices of the Claimant's solicitors),

ii. the information set out in the user manual for the Carku E-Power 21 (a copy is provided at Annex 1 hereto),

iii. the information set out in the specification sheet for the Carku E-Power 21 (a copy is provided at Annex 2 hereto), and

iv. the information set out in the Claimant's E-catalogue dated 22 April 2014, which included the Carku E-Power 21 (a copy is provided at Annex 3 hereto).

b. The matter was made available at least:

i. to attendees of the 115th 2014 Canton Import and Export Fair in Guangzhou, China taking place from 15 to 5 May 2014 (the "**Canton Fair**"), each of whom had an opportunity to inspect the Carku E-Power 21 and the manuals for that device (photographs of the Claimant's booth at the 115th 2014 Canton Fair are provided at Annex 4),

ii. to Edelbert Lenz GmbH & Co. KG (an Austrian distributor for Carku Products), who received photographs and a quotation sheet by email in respect of Carku's E-Power 21 (Annex 5 hereto) on 7 March 2014,

iii. to Kaz Corp of Japan (kaz-corp.com), which ordered [101] Carku E-Power 21 units after the Canton Fair and received copies of the user manuals and specification sheet for the device by email from the Claimant on 21 April 2014 (Annex 6 hereto), and

iv. to Krautli (Schweiz) AG, a representative of which visited the Claimant's exhibition at the Canton Fair, and which received the E-Catalogue by email from the Claimant on 24 April 2014 (Annex 7 hereto).

c. The use occurred from April 2014 to July 2014.

(e) U.S. Patent No. 6,424,158 ("**Klang**");

(d) U.S. Patent No. 8,172,603 ("**Richardet**"); and

(e) common general knowledge.

POWELL GILBERT LLP

STATEMENT OF TRUTH

The Claimant believes that the facts stated in these Grounds of Invalidity are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

I am authorised by the Claimant to sign this Statement.

Signed

Full Name **Ari Pekka Laakkonen**
Position Partner, Powell Gilbert LLP, Claimant's solicitors

Served this 20th 21st day of May 2020 by Powell Gilbert LLP of 85 Fleet Street, London, EC4Y 1AE, Solicitors for the Claimant.

Ref: SHE3.1/APL/CKW

DELTRAN EX1002
IPR2024-01219

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
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BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

ANNEX 1 to GROUNDS OF INVALIDITY

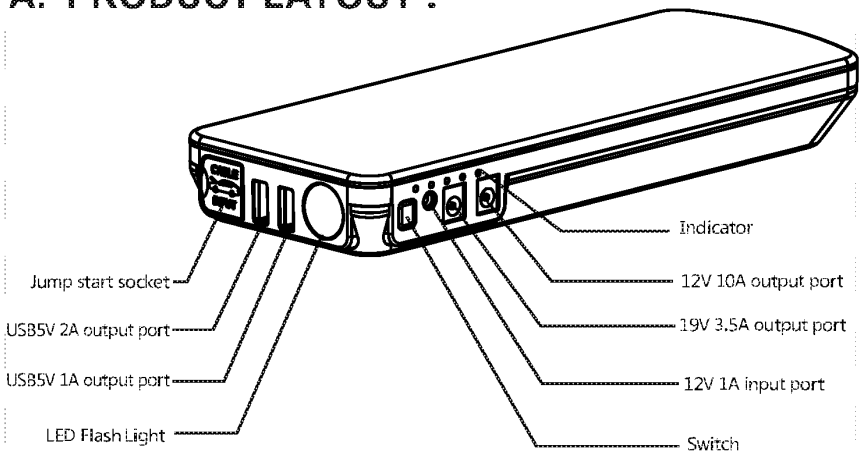
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IPR2024-01219

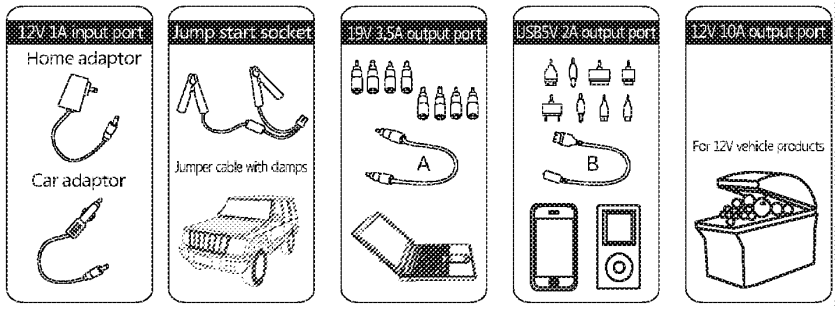
CARKU卡儿酷®

USER MANUAL

Thank you for choosing the E-Power! Always follow basic safety precautions when using electrical appliances. Read all instructions carefully, Please keep this instruction manual for easy reference

A. PRODUCT LAYOUT :





①

B. OPERATION GUIDANCE

Indicator

Press the switch to check the storage level of E-Power

Indicator	Unlit	5 Flashing	1 solid	2 solid	3 solid	4 solid	5 solid
Storage level	0%	10%	20%	40%	60%	80%	100%

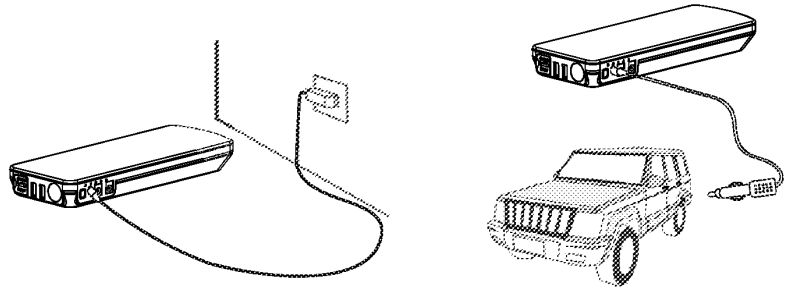
The indicator will flash one by one during the period of charging. Different number of solid indicators show different storage level of E-Power. All indicators light off when the charging is paused or completed.

E-Power Charging Instruction :

1. Plug the home adaptor into the universal socket.
2. Connect 12V 1A input port of E-Power to the other end of home adaptor .

Or

1. Plug the car adaptor into the socket of cigarette lighter.
2. Connect 12V 1A input port of E-Power to the other end of car adaptor.



Jump start 12V gasoline vehicle Instruction:

1. Make sure that the number of indicators is not less than 3 ones.
2. Connect the RED clamp to the vehicle's battery positive (+) terminal and connect the BALCK clamp to the vehicle's battery negative (-) terminal.
3. Plug the cord of jumper cable into the jump start socket.

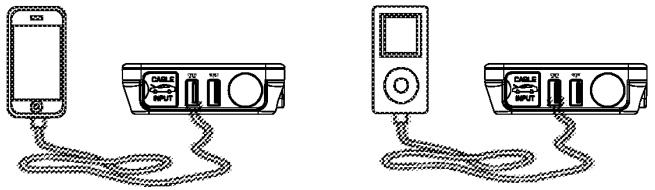
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DELTRAN EX1002
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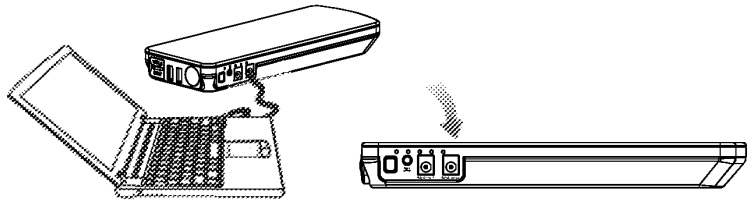
4. Start the vehicle
5. When the vehicle is started, remove jumper cable from E-Power and disconnect red and black clamps to the vehicle battery terminals.
6. Leave the vehicle's engine running



Charging Cell Phone or Tablet Instruction:
1. Plug the switch cable B to USB 5V 2A output port.
2. Select appropriate connector and connect it to your mobile phones or tablet.
3. Press the switch button to charge.
4. If doesn't work, please try another USB Output port.



Only for charging/power supply to 19V Notebook
1. Plug the switch cable A to USB 19V 3.5A output port.
2. Select appropriate connector for your Notebook and connect it to the switch cable A and your Notebook.
3. Press the switch button to charge/power supply.



For power supply to 12V vehicle products or 12V electronics
1. Plug the optional switch cable to 12V 10A output port.
2. Connect the optional switch cable and 12V vehicle product or 12V electronics.
3. Press the switch button to power supply.

LED flash light
Press the switch 3 seconds to start the LED flash light.
There are 4 modes of LED light appear in order (normal. strobe. SOS. off) if you press slightly.

C. PARTS LIST :

#	Parts Name	Quantity	#	Parts Name	Quantity
1	Host	1	6	Home adaptor	1
2	Switch cable A	1	7	Car adaptor	1
3	Switch cable B	1	8	Jumper cable with clamps	1
4	Cell phone /tablet connectors	8	9	User Manual	1
5	Notebook connector	8			

D. TECHNICAL SPECIFICATIONS :

Size :	230*87*27mm
Weight :	615g
Battery Capacity:	66.6Wh
Output:	5V⎓1A;5V⎓2A; 12V⎓10A; 19V⎓3.5A;
Input :	12V⎓1A
Full charging time :	8 hours
Starting current :	500A
Peak current :	1000A
Operating temperature :	-20℃ ~ 60℃

E. FAQ :

Q. How to turn off this appliance?
A. This appliance will power off automatically when no load or charging is complete

Q. Need how long time to full charge the E-Power?
A. Approx. 8 hours through the 12V1A input.

Q. How many times can this appliance charge for my cell phone?
A. Depend on the battery capacity of your cell phone. Take iPhone4 as an example, can full charging 14 times.

Q. How long will this appliance take to charge my cell phone full?
A. Approx. 1 hour

Q. How long will this appliance on a full charge take to supply the Notebook?
A. 4-6 hours

Q. How many times can this appliance jump start the vehicle if it is in full battery?
A. Approx. 40 times.

Q. What's the lifetime of E-Power?
A. Usually 3-5years in normal condition.

Q. How long does the battery last after fully charged?
A. 6-12 months, however, we suggest to recharge it every 3 months.

Q. How long does the battery last still can jump start the car after fully charged?
A. 6-12 months

F. TROUBLE SHOOTING:

Finding	Cause	Remedies
No response when pressing the switch button.	Low voltage protection of E-Power is started.	Plug the adaptor into the 12V 1A input port to activate.
E-Power is a bit hot when charging for Notebook.	The charging current is a bit high (3.5A)	Remove the battery of your Notebook and use this appliance to supply power directly, or disconnect E-Power with your Notebook and connect them when it is cool.

G. TOXIC AND HARMFUL SUBSTANCES:

Composition and amount of toxic and harmful substances in E-Power					
Pb	Hg	Cd	Cr(Vi)	PBB	PBDE
O	O	O	O	O	O

O : Indicate all homogeneous materials' hazardous substances content are below the MCV limit specified in the Standard 2002/95/EC(RoHs).

H. Warning:

1. Always make sure the blue plug of jumper cable connect with the jump start socket tight in E-Power before jumping start the vehicle. Otherwise, it will affect the results, even causing the melt of the blue plug.
2. Always check if the jumper clamps are well connected, check if the vehicle battery connector is rusted or dirty, clean it before jumping start the vehicle. DO NOT jump start again after 3 attempts. Otherwise, it will damage the host. And Check your vehicle if it has other trouble.
3. DO NOT connect the two clamps. Otherwise, it may be dangerous!
4. DO NOT disassemble the host. Otherwise, it may be dangerous!

- Always take care when using the appliance
- This appliance is not intended for use by young or infirm persons without supervision
- Do not use as a toy
- Do not allow the appliance to become wet
- Do not immerse the appliance in water
- Do not operate the appliance in explosive atmospheres, such as in the presence of flammable liquids, gases or dust
- Do not modify or disassemble E-Power. Only a repair technician may repair this unit
- Do not expose the appliance to heat
- Do not store in locations where the temperature may exceed 70 °C
- Charge only at ambient temperatures between -20 °C and 60 °C
- Charge only using the charger provided with the appliance
- Under extreme conditions, battery leakage may occur. Carefully wipe the liquid off using a cloth and avoid skin contact when you notice liquid on the batteries. In case of skin or eye contact, rinse immediately with clean water and seek medical attention
- At the end of their useful life, discard the appliance with due care for our environment

I. WARRANTY INFORMATION:

1.We offer a limited warranty for this product against any defects in material and workmanship for a period of 6 months from the date of purchase by the end user/consumer. The conditions of the warranty are as follows:

2.The warranty is only valid upon presentation of the original receipt (from dealer/retailer) by the original purchaser with the product to be repaired or replaced

3.The warranty is void if the serial number, date of purchase and label has been removed

4.The warranty does not cover damage or product failure resulting from normal wear and tear, physical abuse, improper installation, misuse, modification or repairs by unauthorized third parties

5.We do not assume responsibility for any loss or damage incurred during shipment or as a result of a force majeure

6.We are not liable for any incidental or consequential damages arising from the use or misuse of this product

7.All warranty claims are limited to repair or replacement of the defective product and at the sole discretion of us

8.If we repair or replace the product, the product will be covered for the remaining time of the original warranty period. Repair or replacement may involve the use of reconditioned units which are equivalent in function. Replaced part or product becomes the property of us

9.Consumable components such as batteries are not covered by the warranty



Overcharge and Overdischarge Protection



Fuse Protection



Against-reverse Plug

Applied Standard : GB/T 18287-2000



⑦

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

ANNEX 2 to GROUNDS OF INVALIDITY

DELTRAN EX1002
IPR2024-01219

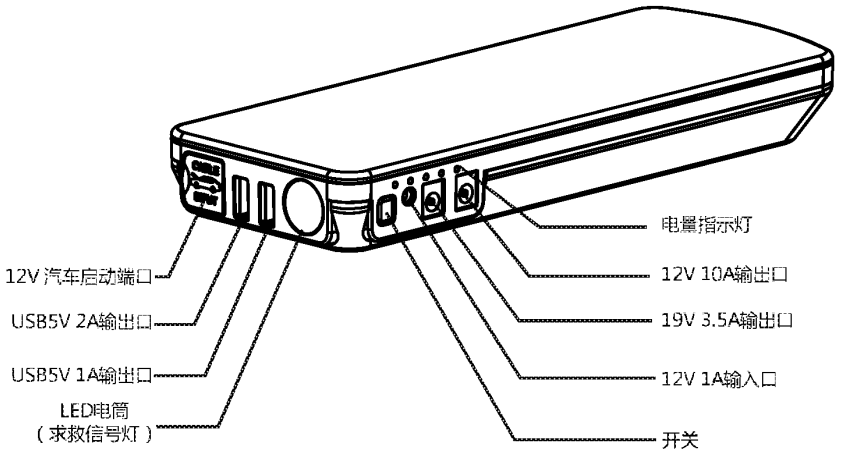
CARKU卡儿酷®

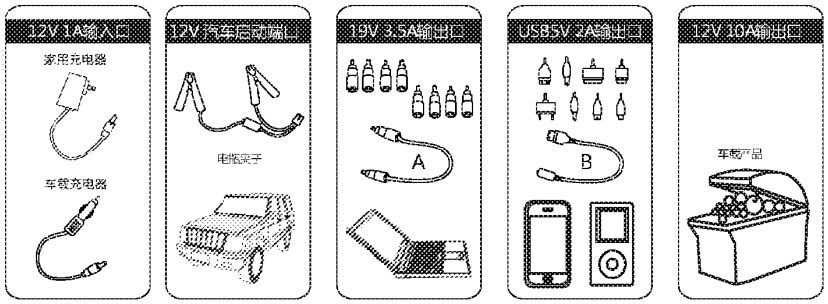
CARKU卡儿酷多功能汽车应急启动电源说明书

型号：E-Power-21

感谢您使用CARKU卡儿酷多功能汽车应急启动电源

A. 部件及功能说明：





B. 指示灯说明:

轻触开关按键，电量指示灯指示如下：

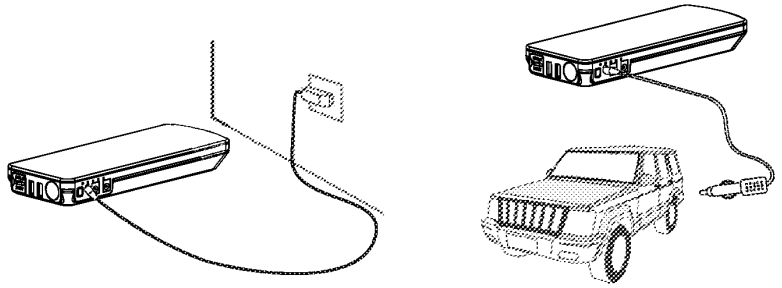
电量指示灯	不亮	全闪	亮1个	亮2个	亮3个	亮4个	亮5个
EPOWER电量	0%	10%	20%	40%	60%	80%	100%

给E-Power主机充电过程中，电量指示灯循环闪亮。长亮的指示灯数量代表产品主机的实际电量。五颗指示灯全灭，表示充电暂停/结束

C. 操作说明：

给产品主机充电

1、将配备的家用充电器插入充电插座
2、将家用充电器的插头插入E-Power主机12V输入口
或者:
1、将车载充电器的一端插入烟插
2、将车载充电器的另一端插入E-Power主机12V输入口



给12V汽油车启动

1、确认主机电量指示灯在3颗以及3颗以上
2、将红色夹子夹紧电瓶的正（+）极，黑色夹子夹紧电瓶的负（-）极
3、将电瓶线接头插入E-Power的汽车接口

DELTRAN EX1002
IPR2024-01219

4、汽车点火开关旋至启动(START)位置
5、汽车启动后，立即拔掉插头
6、取下电瓶夹夹子

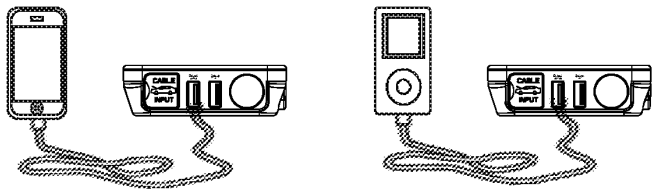


1 2 3 4 5

给手机/平板电脑等电子产品充电

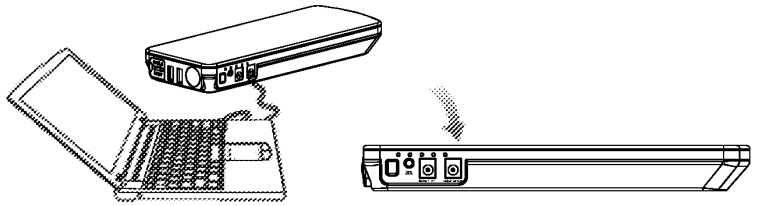
1、选择合适的充电接头连接B转接线的接口
2、将把B转接线的USB插头接入主机USB5V输出口
3、将充电接头连接手机/平板电脑等电子产品
4、轻触开关按键，开始对手机/平板电脑等电子产品充电
5、如无反应，可试着换另一USB输出口，再重试。

以给iphone\ipod充电为例



仅给19V笔记本电脑充/供电

1、选择合适的充电接头连接A转接线的任一端接口
2、将A转接线的另一端接口插入主机19V输出口
3、将充电接头连接笔记本电脑
4、轻触开关按键，开始对笔记本充电



给12v电子产品/车载产品供电

1、将选配的转接头一端接口插入主机12V输出口
2、将12V电子产品/车载产品连接到选配的转接线的另一端接口
3、轻触开关按键，开始对车载产品充电

开关使用说明

插上充电接口后，需启动开关，在电量指示灯亮的状态下，才可以给电子产品充电

LED灯不同模式切换

长按开关按键3秒启动LED灯照明功能。随后短按开关按键，依次为：强光、爆闪、SOS、关闭

D. 配件清单：

序号	配件名称	数量	序号	配件名称	数量
1	主机	1	6	家用充电器	1
2	笔记本转接线 A	1	7	车载充电器	1
3	手机转接线 B	1	8	电瓶夹	1
4	手机接口	8	9	说明书	1
5	笔记本接口	8			

E. 技术规格：

技术规格：
尺寸： 230*87*27mm
重量： 615g
容量： 66.6Wh
输出： 5V⎓1A,5V⎓2A; 12V⎓10A; 19V⎓3.5A;12V 汽车启动端口
输入： 12V⎓1A
完全充满时间： 8小时左右
启动电流： 500A
峰值电流： 1000A
使用温度范围： -20℃ ~ 60℃

F. 常见问题：

1、问：如何关闭移动电源？
答：产品有智能检测功能，一旦没有负载，或者电子产品充电结束，移动电源会自动休眠，保存电量，以免流失。

2、问：给E-Power主机充电需要多长时间？
答：用家充或车充通过12V1A Input需要8个小时左右就可以完全充满。

3、问：E-Power能给手机充几次电？
答：取决你的手机电池的容量大小，以Iphone4为例，可以充满14次.

4、问：E-Power给手机充电需要多长时间？
答：由于采用美国进口芯片，产品输出电流能够达到2A，比手机原装充电器的充电速度快的多，大概需要一个小时左右就能将手机充饱。

5、问：E-Power能给笔记本延长使用时间几个小时？
答：根据笔记本的不同，通常4-6个小时。

6、问：E-Power能启动汽车多少次？
答：可以连续启动汽车40次左右。

7、问：E-Power的寿命是多长时间？
答：正常使用情况下可以用3-5年。

8、问：E-Power能存放多久？
答：E-Power电路设计很科学，不使用存放6-12个月都没问题，但为了延长使用寿命，建议每三个月充电一次。

9、问：E-Power充满电不用，存放多久还能启动汽车？
答：6-12个月。

更多常见问题请登录我司网站查询www.car-ku.com

G. 故障排除

如果以下“操作”无法排除您的故障，请停止使用EPOWER并联系购买产品的商店或者拨打全国统一售后电话：4000-222-942(爱爱爱，就是爱）

现象	原因	操作
轻触开关按键，E-Power没有任何反应	由于E-Power电压过低，低压保护功能启动，切断电路	将充电插头插入12V输入口激活
给笔记本供电时E-Power发热	当E-Power连接笔记本的时候，以19V3.5A持续对笔记本电池充电，本身会发热	取下笔记本电池用E-Power直接供电或者暂时断开E-Power与笔记本的连接，稍后再连接继续充电

H. 产品中有毒有害物质或元素的名称及含量

产品名称	有毒有害物质或元素					
	铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(Vi)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
多功能汽车应急启动电源	O	O	O	O	O	O

O：表示该有害物质在该部件所有均质材料中的含量均在2002/95/EC(RoHs)标准规定的限量要求以下。

I. 警告：

1、启动汽车时要把电瓶夹蓝色插头插紧、插到位，否则会影响启动效果，甚至造成接头塑胶的熔毁。
2、若给汽车无法启动，请检查电瓶夹是否夹好，电池接头是否生锈、有脏物，待清理后继续启动。若尝试3次始终无法启动，切勿强行继续启动，否则会造成对产品的损坏，应进一步检查车辆是否有其它故障。
3、请勿对夹两端电瓶夹，否则可能引起安全事故。
4、请勿自行拆解机器，否则可能引起安全事故。如果自行拆机，将不予保修。

不可在浴室等潮湿或可能接触到水的地方使用

请勿改造或拆卸电池

请注意不要让幼儿接触设备

请不要反向连接输出或输入

请勿将产品投入火中

请勿以高过等级之方式将产品充电

在充电时温度范围保持在指定的-20℃-60℃之间

请勿重击或投扔产品

充电时如有异常或故障，请联络您的经销商

如产品的液体溅入眼睛，不可搓揉眼睛，马上用清水冲洗并请示医生

在充电或存储期间，如果产品发热、变色，请马上停止使用，这可能导致液体溢漏、冒烟或燃烧

在充电时，请勿将产品放在易燃物质上（床或毛毯）




过充过放电路保护


保险丝保护


防反接插头

执行标准：GB/T 18287-2000



本产品由中国平安财产保险股份有限公司承保

⑦

保修卡

本产品为客户提供自购买之日起____个月内的保修服务

保障条件： 需要保修服务时，请出示本保修卡，并请详尽填写相关内容。本公司向产品用户提供从产品购买之日起____个月的保质期。

保修范围：
1、在正常使用的状态下出现产品质量问题。
2、如因操作失误造成对产品的损害，不在保修范围。
3、自行拆机后，不予保修。
4、标贴撕毁的机器，不予保修。

不在保修范围内的产品，我司可提供维修服务，维修费用需由客户承担。

产品型号		出厂编号	
购买日期		维修日期	
客户姓名		联系电话	
客户地址			
销售单位			
产品异常现象描述			

⑧

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

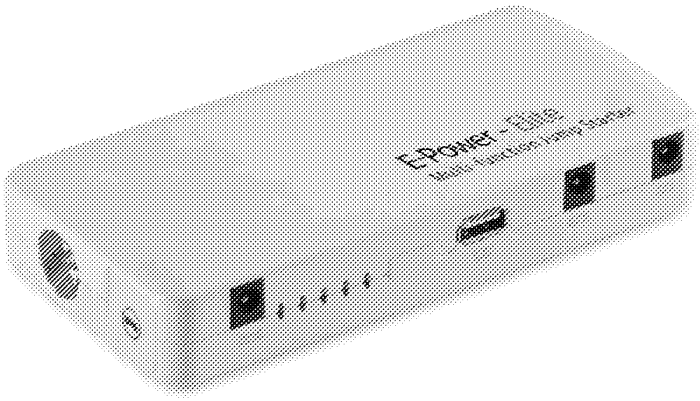
Defendant

ANNEX 3 to GROUNDS OF INVALIDITY

DELTRAN EX1002
IPR2024-01219

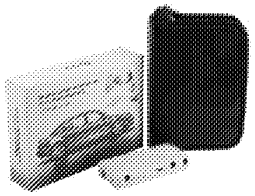
CARKU卡儿酷®

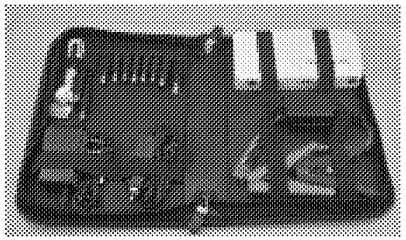
Model : EPOWER-Elite



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 12V/10A ; 5V/2A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 160*75*28mm
Weight : 420g Battery capacity:12000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 Mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	





Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. Supply power for car refrigerator, blast pump, and other 12V devices.
5. LED light (light, burst flashing, SOS)

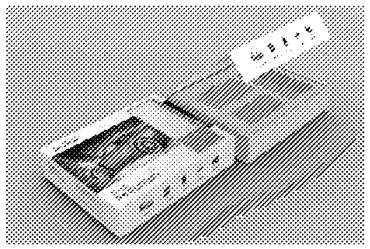
CARKU卡儿酷®

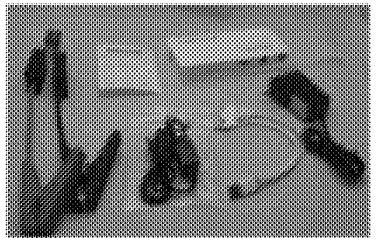
Model : EPOWER-Standard



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 12V/10A ; 5V/2A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 160*75*28mm
Weight : 350g Battery capacity:10000mAh
Operating Temp. : -20℃ ~ 60℃/-4℉ ~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1





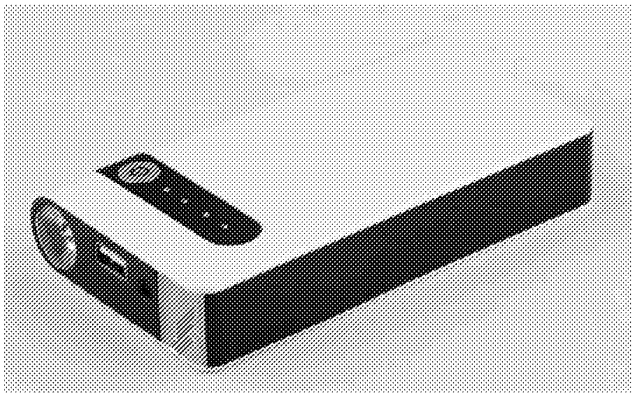
Packing: Color Box + PE tray

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
3. Supply power for car refrigerator, blast pump, and other 12V devices.
4. LED light (light, burst flashing, SOS)

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Model : EPOWER-3



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 131*75*24mm
Weight : 300g,Battery capacity:8000mAh
Operating Temp. : -20℃ ~ 60℃/-4℉ ~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1





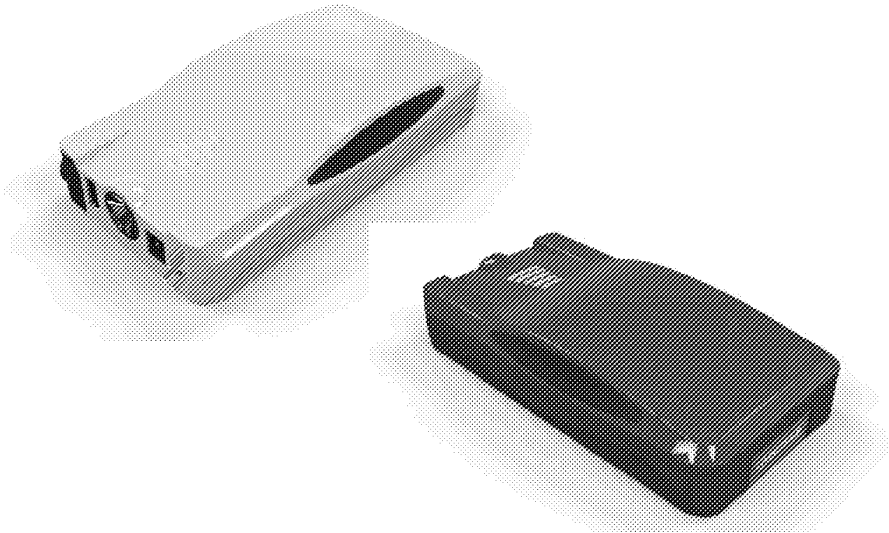
Packing: Color Box + PE tray

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
3. LED light(light, burst flashing, SOS)

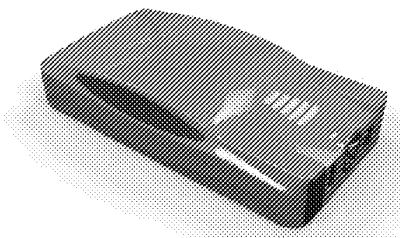
CARKU卡儿酷®

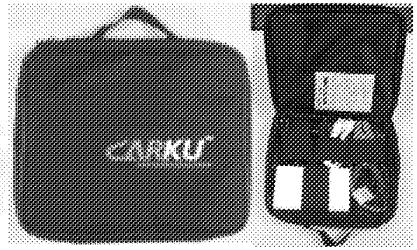
Model : EPOWER-05



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 150*80*33mm
Weight : 450g,Battery capacity:12000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	





Packing: Color Box + bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. LED light (light, burst flashing, SOS)

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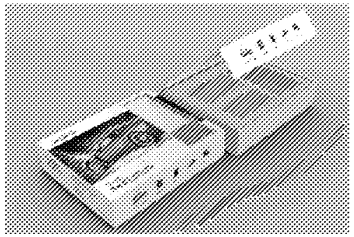
Model : EPOWER-10

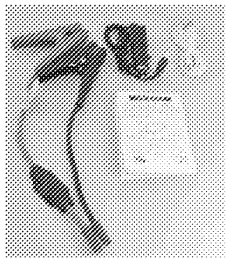
The slimmest jump starter



TECHNICAL SPECIFICATION :
Input : 14V1A; Micro USB5V/2A
Output : 5V/2A; 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 150A
Peak Current : 300A
Size : 139*75*15mm
Weight : 200g,Battery capacity:6000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1





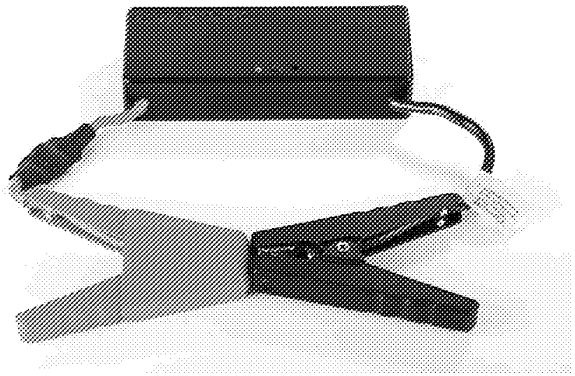
Packing: Color Box + EVA tray

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
3. LED light(light, burst flashing, SOS)

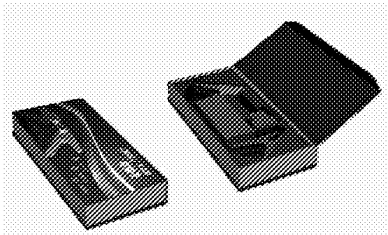
CARKU卡儿酷®

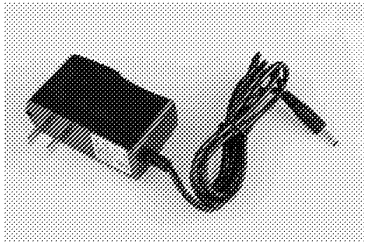
Model : Electronic Scorpion



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 12V Jump start
Start Current : 300A
Peak Current : 600A
Size : 180*70*35mm
Weight : 690g,Battery capacity:13000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :
Home charger*1





Packing: Color Box + PE tray

FEATURES :
Powerful capability for jump Start 12V vehicle

CARKU卡儿酷®

Model : 12V/24V Jump Starter



TECHNICAL SPECIFICATION :

Input： 14V1A

Output： 12V Jump start; 24V Jump start

Start Current： 500A(12V)/300A(24V)

Peak Current： 1000A(12V)/500A(24V)

Size： 247*216*64mm

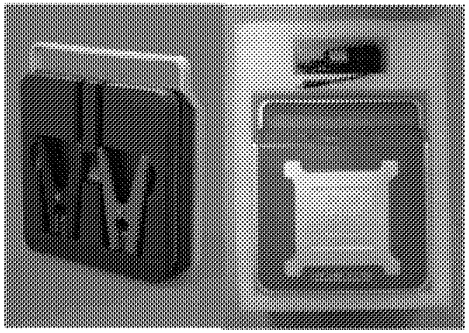
Weight： 1500g,Battery capacity:24000mAh

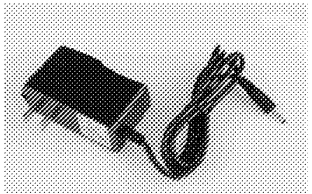
Operating Temp.：-20℃~60℃/-4℉~140℉

Lifetime： >1000 cycles

ACCESSORIES :

Home charger*1





Packing: Color Box + PE tray

FEATURES :

Powerful capability for jump Start 12V vehicle and 24V vehicle
Recognize the positive and negative poles intelligently
Anti-recharge protection.
Short circuit protection.

CARKU卡儿酷®

Model : E-Power-20

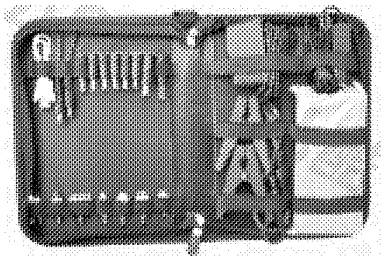


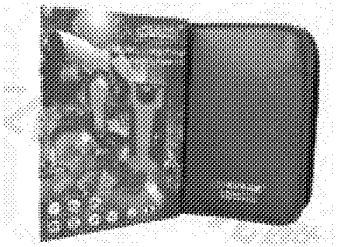
TECHNICAL SPECIFICATION :

Input :	14V1A
Output :	5V/2A; 5V/1A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current :	200A
Peak Current :	400A
Size :	155*74*31.5mm
Weight :	400g,Battery capacity:10000mAh
Operating Temp. :	-20℃~60℃
Lifetime :	>1000 cycles

ACCESSORIES :

Home charger*1	Intelligent Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	





Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. LED light (light, burst flashing, SOS)

CARKU卡儿酷®

Model : E-Power-20B



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 5V/1A; 15V10A (Car fast charge) LED light (light, burst flashing, SOS)
Size : 155*75*31mm
Weight : 325g,Battery capacity:7500mAh
Operating Temp. : 0℃~60℃
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Car charger*1



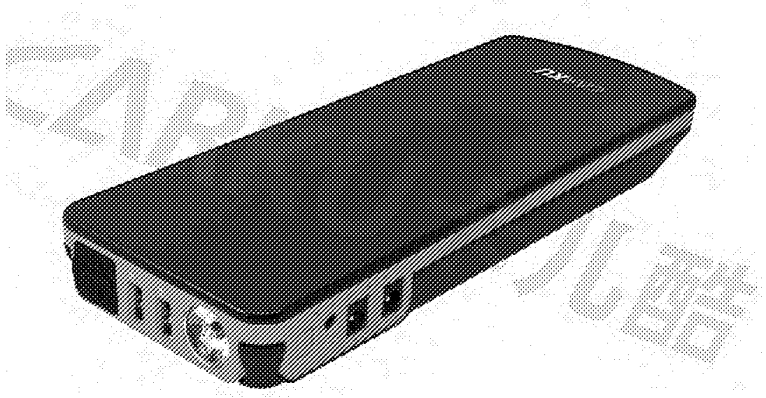
Packing: Color Box + PE tray

FEATURES :

1. Emergency start the vehicle, fast charge vehicle battery from Cigar socket.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices
3. LED light (light, burst flashing, SOS)

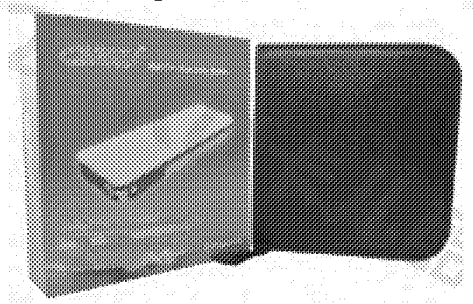
CARKU卡儿酷®

Model : E-Power-21



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 5V/1A; 12V10A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 300A
Peak Current : 600A
Size : 230*87*28mm
Weight : 615g,Battery capacity:18000mAh
Operating Temp. : -20℃~60℃
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Intelligent Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	



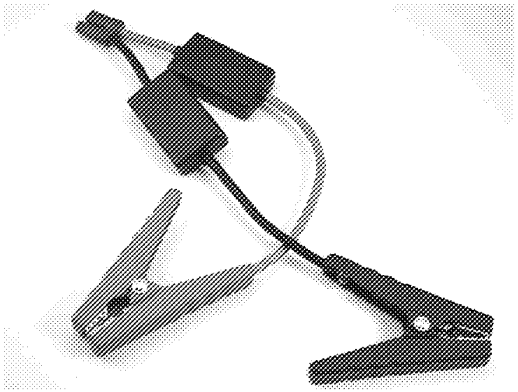
Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. Supply power for car refrigerator, blast pump, and other 12V devices.
5. LED light (light, burst flashing, SOS)

CARKU卡儿酷®

Jumper Cable

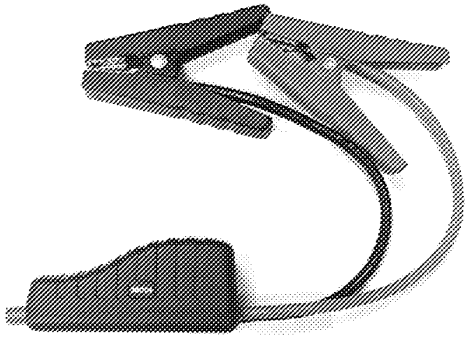


FEATURES :

1.Reverse Charge Protection.

2.Short-Circuit Protection.

Intelligent Jumper Cable



FEATURES :

1.Reverse Polarity Protection: No short-circuit damage is possible even when the clamps are connected incorrectly between positive (+) and negative (-) terminals.

2.Reverse Charge Protection: No reverse charge back to our products after the vehicle starts.

3.Short-Circuit Protection: No short circuit occurs in the product when the two Clamps are connected.

4.Overload Protection: Stop the product from over discharging, protecting the battery when it reaches a low level.

5.Starting override: While the vehicle battery is completely dead or no battery is present, Push “Test” button to force- start the vehicle.

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

ANNEX 4 to GROUNDS OF INVALIDITY

DELTRAN EX1002
IPR2024-01219


1:50
2014年4月15日 22:40
Carku jump starter 广交会第一天，趁人少的时候拍照留念，1.1 B09 欢迎您的光临
赞
评论
2
6

B5126015.3


10:44
2014年4月15日 22:40
Carku jump starter 广交会第一天，趁人少的时候拍照留念，1.1 B09 欢迎您的光临
赞
评论
2
6

B5126015.3

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

ANNEX 5 to GROUNDS OF INVALIDITY

DELTRAN EX1002
IPR2024-01219

From: wanny <sales10@car-ku.com>

Sent: Friday, March 7, 2014 9:28 AM

To: Thomas Lenz

Subject: Re:AW: Fw: Jump Starter

Attachments: Quotation from Carku.pdf; Epower-21-1.jpg; Epower-21-2.jpg; Epower-21-3.jpg

Dear Thomas,

We have 18Ah multi-function jump starter Epower-21.Enclosed pls find the quotation as well as the picture.The price is FOB SHENZHEN,MOQ is 500pcs.

Tomorrow I will send you a detailed document to introduce the Epower-21.

Best wishes
Wanny

From: "Thomas Lenz "
To: "sales10 "
CC:
Sent: 2014-03-07 21:25
Subject:A W: Fw: Jump Starter

Dear Wanny,

do you also have jump Starters with **REAL 17 AH**Battery?

I need about 5.000 pieces per order.

I like to place 5-7 orders every yera.

Thank you and BR

Thomas

Von: wanny [mailto:sales10@car-ku.com]
Gesendet: Dienstag, 04. März 2014 04:47
An: Thomas Lenz
Betreff: Re: Fw: Jump Starter

Dear Thomas,

Thank you for your inquiry.

Shenzhen Carku Technology Co.,Ltd is a professional manufacturer of Mini multi-function jump starter, with patent design certificate. And the products has got CE, ROHS, FCC certificate for exportation. We have exported to America, Russia, Japan, Austrialia and lots of countries.

Our jump starter is Lithium Ion battery, not lead acid battery. It's 12Ah capacity. The small size is very popular in the market.With LED lamp, too.The start current is 200AMP, peak current is 400AMP. It can start the car from 1000CC to 3000CC.

Enclosed pls check our hot models of jump starter, pls advise if you are interested in them?

Looking foward to your reply.

Best wishes

Wanny

Foreign Sales Department Manager

Shenzhen Carku Technology Co.,Ltd

ADD: 2 Floor, Block A, Tongsheng Technology Building,Huahui Road,Dalang, Longhua New District, Shenzhen China 518109

Tel: 86-0755-85298289-877

Fax: 86-0755-61673510

Mobile: 0086-13076965851

0086-13714962190

QQ: 2769424685

Skype: carku15

Skype: yifengwan

Mail: sales10@car-ku.com

Website: http://www.car-ku.com

From: Thomas Lenz

Date: 2014-03-04 00:25

To: infocarku@car-ku.com

Subject: Jump Starter

Dear All,

I am looking for a Jump Starter:

Real 17 AH Battery (Lead Acid)

600 AMP Power

LED Lamp

I need about 10.000 pieces.

Please send me some informations and prices.

Best regards

Thomas Lenz

Mit freundlichen Grüßen / with best regards

Thomas Lenz

LenzTrade

Produktion & Vertrieb

Edelbert Lenz GmbH & Co. KG

Wiesenweg 2

6858 Schwarzach

Austria

Tel.: + 43 699 15824455

e-Mail:thomas.lenz@lenz-trade.com

SHENZHEN CARKU TECHNOLOGY CO.,LTD

2nd Floor A, Block A, Tongsheng Building, Huahui Road, Dalang, Longhua New District, Shenzhen China

CARKU 卡儿酷 Tel:0086 0755 85298289-877 Fax:0086 0755 61673510

Web site: http://www.car-ku.com E-mail: sales10@car-ku.com

Quotation

To:Thomas

No.:HSXF-140307

Date: 2014-03-07

NO	Model	Description of goods	Function	Technique data	Price($)/ 5,000pcs
1	Epower-21	Multi-function jump starter	1. Jump Start 12V vehicle 2. Supply for laptop 3. Charge/supply for mobile phone 4. Supply for automotive equipment 5. LED lighting Battery capacity:18Ah	Weight: 650g Output: 19V/3.5A, 12V/10A, 5V/2A, 5V/1A, 1W LED, 12V jump start Input: 12V/1A	65.6

1.Price term: USD, FOB SHENZHEN

2. Delivery time: within 20-25days after receiving deposit.

3.Payment term: 30% prepaid as deposit, pay the balance within 7days before shipping date.

4.Quotation valid time: 90days.

5. MOQ: 500pcs, OEM MOQ: 1000pcs

Bank information:

Benificial: SHENZHEN CARKU TECHNOLOGY CO.,LTD

Bank name:Agricultural Bank of China Shenzhen Baoan Sub-Branch

Bank address: NO.50 1st Jian an Road Baoan District Shenzhen China

Account No.: 410 217 000 400 585 47

SWIFT CODE: ABOCCNBJ410

SHENZHEN CARKU TECHNOLOGY CO.,LTD

Wanny

2014/3/7

CARKU
Multi-Function Jump Starter
E-Power+21
CARKU

CARKU

CARKU

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

ANNEX 6 to GROUNDS OF INVALIDITY

DELTRAN EX1002
IPR2024-01219

From: wanny <sales10@car-ku.com>
Sent: Monday, April 21, 2014 2:28 AM
To: ? ??
Cc: ?????
Subject: 产品信息Epower-21
Attachments: 产品信息.pdf; 21说明书.pdf; 家用充电器.jpg

hi sophia,
非常感谢您的回复！附件是我司Epower-21产品的配件详细说明，请查收。
说明书为中英文说明书，说明书里的输入为12V/1A,我司已经做了更改，正确的输入为14V/1A，请在翻译的时候更改过来。充电器的标贴内容请查收。
请问贵司何时支付货款，以便我安排订单生产？谢谢！
有何问题，随时与我联系。或请加我的skype:carku15.

wanny

From: 孫　暁飛
Date: 2014-04-21 09:38
To: 'wanny'
CC: 今井デスク
Subject: RE: Proforma Invoice from Carku

Dear Wanny,

您好，我是KAZ公司的涉外担当sophia，很高兴能够认识您。

本次的订单我们会尽快确认，并将信息整理好后一并发给贵司。

贵司的这款产品以后将由我负责，有任何问题欢迎随时联系。

非常感谢！

㈱和コーポレーション（KAZ CO.,LTD.）

〒673-0433

Address:2-11-41,FUKUI MIKI-CITY HYOGO,JAPAN

TEL:0794-82-6588

FAX:0794-86-7288

E-mail:sun@kaz-corp.com

HP:http://www.kaz-corp.com/

孫　暁飛

From: wanny [mailto:sales10@car-ku.com]
Sent: Saturday, April 19, 2014 7:54 AM
To: sun
Cc: t-imai; kaz
Subject: Proforma Invoice from Carku

孙小姐,

您好！很高兴在广交会上与贵司认识，非常感谢贵司的订单。
附件是我司的P/I,请查收。
我司在客户下单时会提供1%的备品以作售后使用。总发货数量为101台。

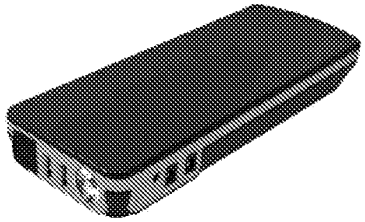
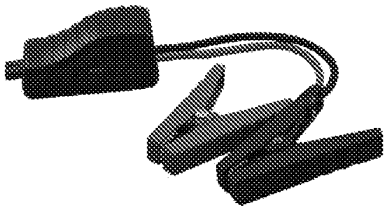
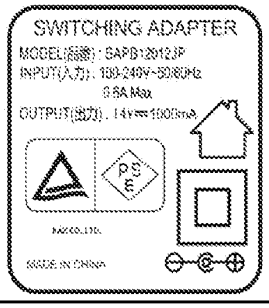
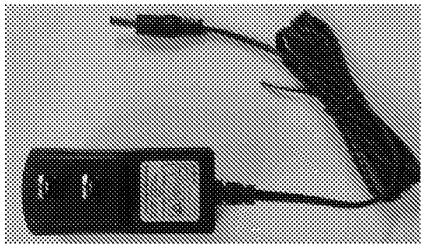
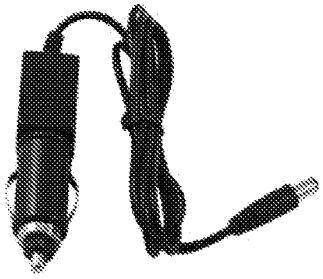
因本次货款金额不大，请一次性支付，分两次支付，我司要承担两次银行手续费，请谅解。因五一放假，我司交货期为5月15-20号左右。

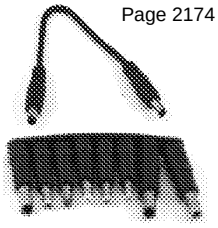
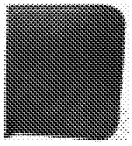
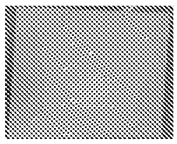
付完款后请提供将水单传至我司。请提供贵司的货代。谢谢！有何问题，随时与我联系。谢谢！

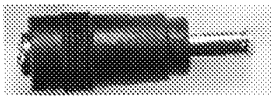
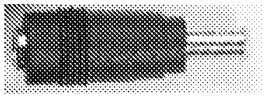
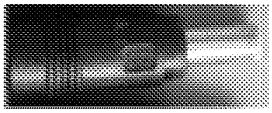
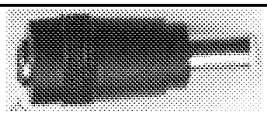
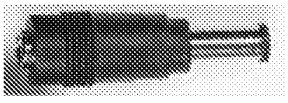
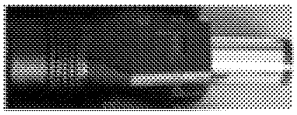
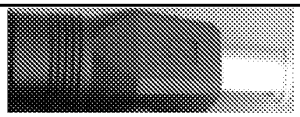
深圳市华思旭科技有限公司
wanny
手机;0086 130 7696 5851

SHENZHEN CARKU TECHNOLOGY CO.,LTD
2nd Floor A, Block A, Tongsheng Building, Huahui Road, Dalang, Longhua New District, Shenzhen China
CARKU卡儿酷 Tel:0086 0755 85298289-877 Fax:0086 0755 61673510
Web site: http://www.car-ku.com E-mail: sales10@car-ku.com

产品信息 Epower-21

No.	Part Name	Qty	Technique Data	Picture
1	主机	1	输入： 14V1A 输出： 5V/2A; 5V/1A; 12V10A; 19V/3.5A,12V 启动汽车,1W LED(照明,爆闪, SOS) 启动电流： 300A 峰值电流： 600A 尺寸： 230*87*28mm 重量： 615g,电池容量:18000mAh 工作温度：-20℃～60℃ 使用寿命： >1000 cycles	
2	智能电瓶夹	1	智能识别，多重防护 1. 反接保护：当接错电瓶正负极，指示灯提示连接不正确，且不会造成任何短路损坏。 2. 反充保护：当汽车启动后，可阻止汽车发电机对产品反充电。 3. 短路保护：当红黑夹对接时，不会造成产品短路 4. 过放电保护：当产品电量不足时，可停止放电，防止电池过放。 5. 强行启动：当电瓶坏死，或完全无电，可选择强行启动（按TEST键）!	
3	家用充电器	1		
4	车用充电器	1		
5	手机接头	1	IPH4，IPH5，MICRO USB	

6	笔记本接头及转接线	8+1		
7	PU包	1		
8	白盒	1	250*267*62MM	
9	纸箱	10pcs/CTN	515*340*295MM	

Item	Parameter	Picture	Laptop Brand
1	4.8*1.7mm		ASUS /HP /NEC /Delta /Compaq
2	5.0*3.0mm(with 1.0mm pin)		Samsung
3	5.5*1.7mm		Acer
4	5.5*2.1mm		IMB /HP /NEC /Toshiba
5	5.5*2.5mm		HP /IBM /DELL /Acer /Toshiba /ASUS /Compaq /Delta /LITE-ON /Fujitsu
6	6.0*4.4*4.1mm(black/yellow)		SONY /Fujitsu /Samsung
7	7.4*5.0*0.6mm		HP /DELL
8	7.9*5.5*0.9mm		IBM /Lenovo

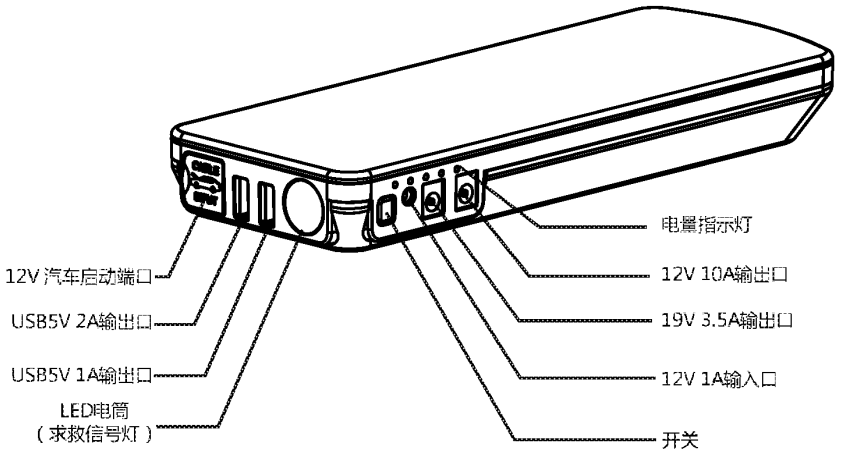
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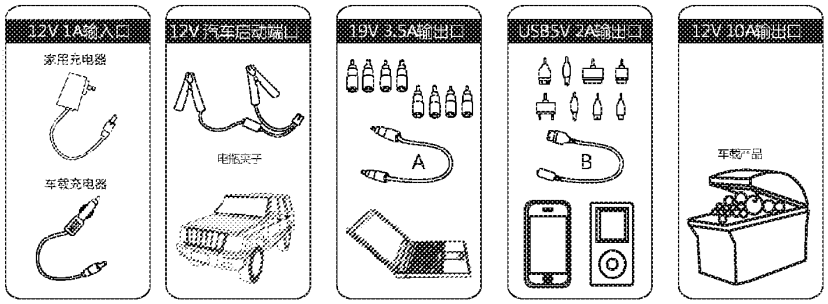
CARKU卡儿酷多功能汽车应急启动电源说明书

型号：E-Power-21

感谢您使用CARKU卡儿酷多功能汽车应急启动电源

A. 部件及功能说明：





B. 指示灯说明:

轻触开关按键，电量指示灯指示如下：

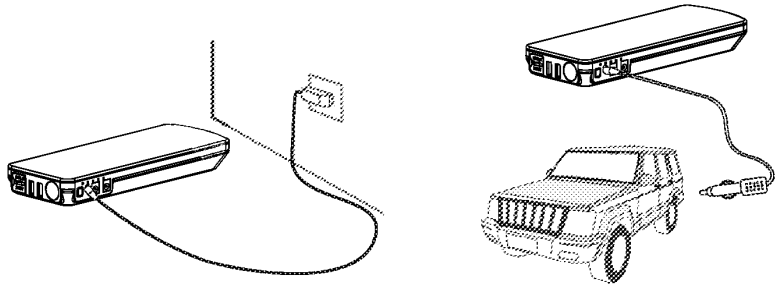
电量指示灯	不亮	全闪	亮1个	亮2个	亮3个	亮4个	亮5个
EPOWER电量	0%	10%	20%	40%	60%	80%	100%

给E-Power主机充电过程中，电量指示灯循环闪亮。长亮的指示灯数量代表产品主机的实际电量。五颗指示灯全灭，表示充电暂停/结束

C. 操作说明：

给产品主机充电

1、将配备的家用充电器插入充电插座
2、将家用充电器的插头插入E-Power主机12V输入口
或者:
1、将车载充电器的一端插入烟插
2、将车载充电器的另一端插入E-Power主机12V输入口



给12V汽油车启动

1、确认主机电量指示灯在3颗以及3颗以上
2、将红色夹子夹紧电瓶的正（+）极，黑色夹子夹紧电瓶的负（-）极
3、将电瓶线接头插入E-Power的汽车接口

DELTRAN EX1002
IPR2024-01219

4、汽车点火开关旋至启动(START)位置
5、汽车启动后，立即拔掉插头
6、取下电瓶夹夹子

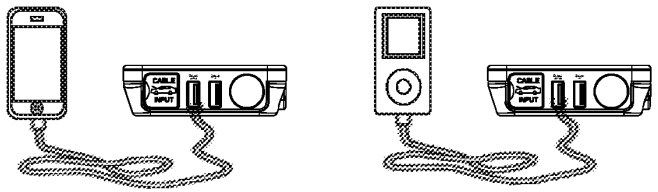


1 2 3 4 5

给手机/平板电脑等电子产品充电

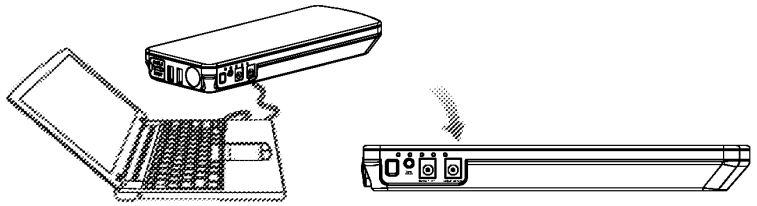
1、选择合适的充电接头连接B转接线的接口
2、将把B转接线的USB插头接入主机USB5V输出口
3、将充电接头连接手机/平板电脑等电子产品
4、轻触开关按键，开始对手机/平板电脑等电子产品充电
5、如无反应，可试着换另一USB输出口，再重试。

以给iphone\ipod充电为例



仅给19V笔记本电脑充/供电

1、选择合适的充电接头连接A转接线的任一端接口
2、将A转接线的另一端接口插入主机19V输出口
3、将充电接头连接笔记本电脑
4、轻触开关按键，开始对笔记本充电



给12v电子产品/车载产品供电

1、将选配的转接头一端接口插入主机12V输出口
2、将12V电子产品/车载产品连接到选配的转接线的另一端接口
3、轻触开关按键，开始对车载产品充电

开关使用说明

插上充电接口后，需启动开关，在电量指示灯亮的状态下，才可以给电子产品充电

LED灯不同模式切换

长按开关按键3秒启动LED灯照明功能。随后短按开关按键，依次为：强光、爆闪、SOS、关闭

D. 配件清单：

序号	配件名称	数量	序号	配件名称	数量
1	主机	1	6	家用充电器	1
2	笔记本转接线 A	1	7	车载充电器	1
3	手机转接线 B	1	8	电瓶夹	1
4	手机接口	8	9	说明书	1
5	笔记本接口	8			

E. 技术规格：

技术规格：
尺寸： 230*87*27mm
重量： 615g
容量： 66.6Wh
输出： 5V⎓1A,5V⎓2A; 12V⎓10A; 19V⎓3.5A;12V 汽车启动端口
输入： 12V⎓1A
完全充满时间： 8小时左右
启动电流： 500A
峰值电流： 1000A
使用温度范围： -20℃ ~ 60℃

DELTRAN EX1002
IPR2024-01219
Page 2176 of 6315

F. 常见问题：

1、问：如何关闭移动电源？
答：产品有智能检测功能，一旦没有负载，或者电子产品充电结束，移动电源会自动休眠，保存电量，以免流失。

2、问：给E-Power主机充电需要多长时间？
答：用家充或车充通过12V1A Input需要8个小时左右就可以完全充满。

3、问：E-Power能给手机充几次电？
答：取决你的手机电池的容量大小，以Iphone4为例，可以充满14次.

4、问：E-Power给手机充电需要多长时间？
答：由于采用美国进口芯片，产品输出电流能够达到2A，比手机原装充电器的充电速度快的多，大概需要一个小时左右就能将手机充饱。

5、问：E-Power能给笔记本延长使用时间几个小时？
答：根据笔记本的不同，通常4-6个小时。

6、问：E-Power能启动汽车多少次？
答：可以连续启动汽车40次左右。

7、问：E-Power的寿命是多长时间？
答：正常使用情况下可以用3-5年。

8、问：E-Power能存放多久？
答：E-Power电路设计很科学，不使用存放6-12个月都没问题，但为了延长使用寿命，建议每三个月充电一次。

9、问：E-Power充满电不用，存放多久还能启动汽车？
答：6-12个月。

更多常见问题请登录我司网站查询www.car-ku.com

G. 故障排除

如果以下“操作”无法排除您的故障，请停止使用EPOWER并联系购买产品的商店或者拨打全国统一售后电话：4000-222-942(爱爱爱，就是爱）

现象	原因	操作
轻触开关按键，E-Power没有任何反应	由于E-Power电压过低，低压保护功能启动，切断电路	将充电插头插入12V输入口激活
给笔记本供电时E-Power发热	当E-Power连接笔记本的时候，以19V3.5A持续对笔记本电池充电，本身会发热	取下笔记本电池用E-Power直接供电或者暂时断开E-Power与笔记本的连接，稍后再连接继续充电

H. 产品中有毒有害物质或元素的名称及含量

产品名称	有毒有害物质或元素					
	铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(Vi)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
多功能汽车应急启动电源	O	O	O	O	O	O

O：表示该有害物质在该部件所有均质材料中的含量均在2002/95/EC(RoHs)标准规定的限量要求以下。

I. 警告：

1、启动汽车时要把电瓶夹蓝色插头插紧、插到位，否则会影响启动效果，甚至造成接头塑胶的熔毁。
2、若给汽车无法启动，请检查电瓶夹是否夹好，电池接头是否生锈、有脏物，待清理后继续启动。若尝试3次始终无法启动，切勿强行继续启动，否则会造成对产品的损坏，应进一步检查车辆是否有其它故障。
3、请勿对夹两端电瓶夹，否则可能引起安全事故。
4、请勿自行拆解机器，否则可能引起安全事故。如果自行拆机，将不予保修。

不可在浴室等潮湿或可能接触到水的地方使用

请勿改造或拆卸电池

请注意不要让幼儿接触设备

请不要反向连接输出或输入

请勿将产品投入火中

请勿以高过等级之方式将产品充电

在充电时温度范围保持在指定的-20℃-60℃之间

请勿重击或投扔产品

充电时如有异常或故障，请联络您的经销商

如产品的液体溅入眼睛，不可搓揉眼睛，马上用清水冲洗并请示医生

在充电或存储期间，如果产品发热、变色，请马上停止使用，这可能导致液体溢漏、冒烟或燃烧

在充电时，请勿将产品放在易燃物质上（床或毛毯）




过充过放电路保护


保险丝保护


防反接插头

执行标准：GB/T 18287-2000



本产品由中国平安财产保险股份有限公司承保

⑦

保修卡

本产品为客户提供自购买之日起____个月内的保修服务

保障条件： 需要保修服务时，请出示本保修卡，并请详尽填写相关内容。本公司向产品用户提供从产品购买之日起____个月的保质期。

保修范围：

1、在正常使用的状态下出现产品质量问题。
2、如因操作失误造成对产品的损害，不在保修范围。
3、自行拆机后，不予保修。
4、标贴撕毁的机器，不予保修。

不在保修范围内的产品，我司可提供维修服务，维修费用需由客户承担。

产品型号		出厂编号	
购买日期		维修日期	
客户姓名		联系电话	
客户地址			
销售单位			
产品异常现象描述			

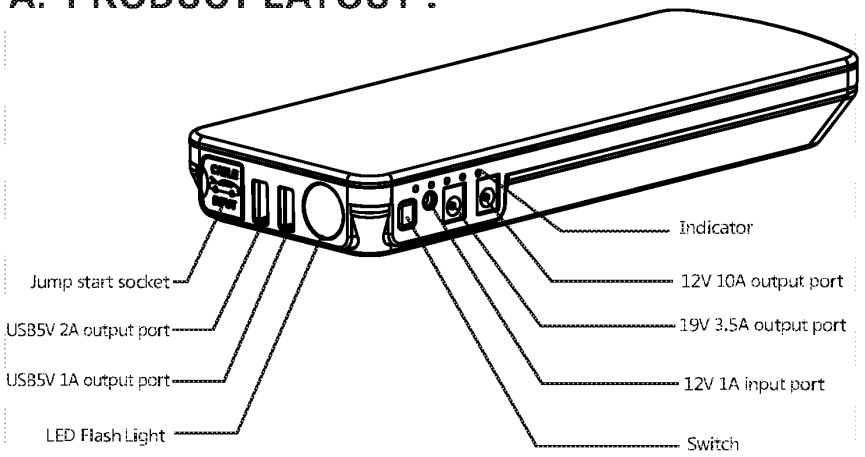
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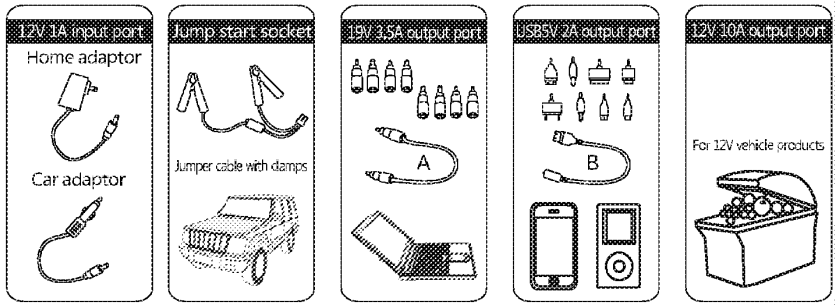
CARKU卡儿酷®

USER MANUAL

Thank you for choosing the E-Power! Always follow basic safety precautions when using electrical appliances. Read all instructions carefully, Please keep this instruction manual for easy reference

A. PRODUCT LAYOUT :





①

B. OPERATION GUIDANCE

Indicator

Press the switch to check the storage level of E-Power

Indicator	Unlit	5 Flashing	1 solid	2 solid	3 solid	4 solid	5 solid
Storage level	0%	10%	20%	40%	60%	80%	100%

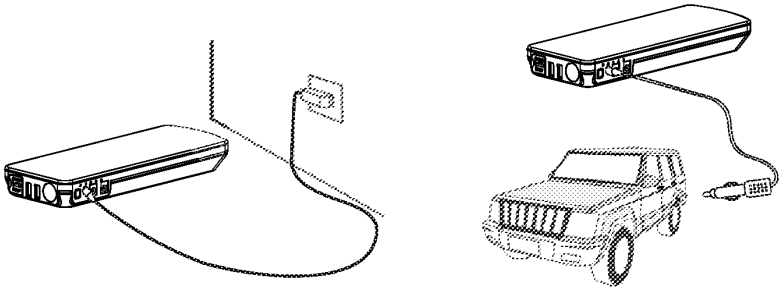
The indicator will flash one by one during the period of charging. Different number of solid indicators show different storage level of E-Power. All indicators light off when the charging is paused or completed.

E-Power Charging Instruction :

1. Plug the home adaptor into the universal socket.
2. Connect 12V 1A input port of E-Power to the other end of home adaptor .

Or

1. Plug the car adaptor into the socket of cigarette lighter.
2. Connect 12V 1A input port of E-Power to the other end of car adaptor.



Jump start 12V gasoline vehicle Instruction:

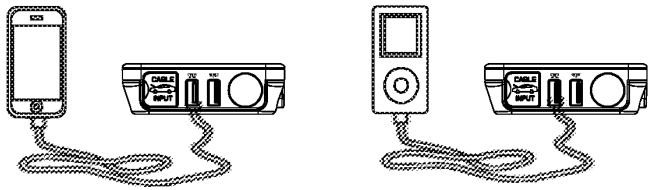
1. Make sure that the number of indicators is not less than 3 ones.
2. Connect the RED clamp to the vehicle's battery positive (+) terminal and connect the BALCK clamp to the vehicle's battery negative (-) terminal.
3. Plug the cord of jumper cable into the jump start socket.

②

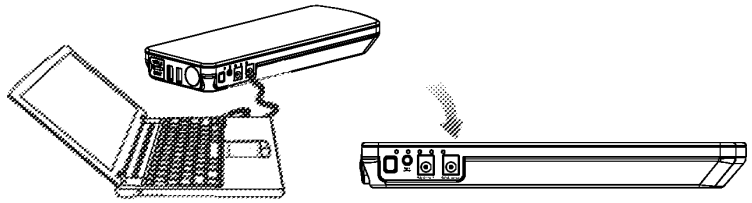
4. Start the vehicle
5. When the vehicle is started, remove jumper cable from E-Power and disconnect red and black clamps to the vehicle battery terminals.
6. Leave the vehicle's engine running



Charging Cell Phone or Tablet Instruction:
1. Plug the switch cable B to USB 5V 2A output port.
2. Select appropriate connector and connect it to your mobile phones or tablet.
3. Press the switch button to charge.
4. If doesn't work, please try another USB Output port.



Only for charging/power supply to 19V Notebook
1. Plug the switch cable A to USB 19V 3.5A output port.
2. Select appropriate connector for your Notebook and connect it to the switch cable A and your Notebook.
3. Press the switch button to charge/power supply.



For power supply to 12V vehicle products or 12V electronics
1. Plug the optional switch cable to 12V 10A output port.
2. Connect the optional switch cable and 12V vehicle product or 12V electronics.
3. Press the switch button to power supply.

LED flash light
Press the switch 3 seconds to start the LED flash light.
There are 4 modes of LED light appear in order (normal. strobe. SOS. off) if you press slightly.

C. PARTS LIST :

#	Parts Name	Quantity	#	Parts Name	Quantity
1	Host	1	6	Home adaptor	1
2	Switch cable A	1	7	Car adaptor	1
3	Switch cable B	1	8	Jumper cable with clamps	1
4	Cell phone /tablet connectors	8	9	User Manual	1
5	Notebook connector	8			

D. TECHNICAL SPECIFICATIONS :

Size :	230*87*27mm
Weight :	615g
Battery Capacity:	66.6Wh
Output:	5V⎓1A;5V⎓2A; 12V⎓10A; 19V⎓3.5A;
Input :	12V⎓1A
Full charging time :	8 hours
Starting current :	500A
Peak current :	1000A
Operating temperature :	-20℃ ~ 60℃

E. FAQ :

Q. How to turn off this appliance?
A. This appliance will power off automatically when no load or charging is complete

Q. Need how long time to full charge the E-Power?
A. Approx. 8 hours through the 12V1A input.

Q. How many times can this appliance charge for my cell phone?
A. Depend on the battery capacity of your cell phone. Take iPhone4 as an example, can full charging 14 times.

Q. How long will this appliance take to charge my cell phone full?
A. Approx. 1 hour

Q. How long will this appliance on a full charge take to supply the Notebook?
A. 4-6 hours

Q. How many times can this appliance jump start the vehicle if it is in full battery?
A. Approx. 40 times.

Q. What's the lifetime of E-Power?
A. Usually 3-5years in normal condition.

Q. How long does the battery last after fully charged?
A. 6-12 months, however, we suggest to recharge it every 3 months.

Q. How long does the battery last still can jump start the car after fully charged?
A. 6-12 months

F. TROUBLE SHOOTING:

Finding	Cause	Remedies
No response when pressing the switch button.	Low voltage protection of E-Power is started.	Plug the adaptor into the 12V 1A input port to activate.
E-Power is a bit hot when charging for Notebook.	The charging current is a bit high (3.5A)	Remove the battery of your Notebook and use this appliance to supply power directly, or disconnect E-Power with your Notebook and connect them when it is cool.

G. TOXIC AND HARMFUL SUBSTANCES:

Composition and amount of toxic and harmful substances in E-Power					
Pb	Hg	Cd	Cr(Vi)	PBB	PBDE
O	O	O	O	O	O

O : Indicate all homogeneous materials' hazardous substances content are below the MCV limit specified in the Standard 2002/95/EC(RoHs).

H. Warning:

1. Always make sure the blue plug of jumper cable connect with the jump start socket tight in E-Power before jumping start the vehicle. Otherwise, it will affect the results, even causing the melt of the blue plug.
2. Always check if the jumper clamps are well connected, check if the vehicle battery connector is rusted or dirty, clean it before jumping start the vehicle. DO NOT jump start again after 3 attempts. Otherwise, it will damage the host. And Check your vehicle if it has other trouble.
3. DO NOT connect the two clamps. Otherwise, it may be dangerous!
4. DO NOT disassemble the host. Otherwise, it may be dangerous!

- Always take care when using the appliance
- This appliance is not intended for use by young or infirm persons without supervision
- Do not use as a toy
- Do not allow the appliance to become wet
- Do not immerse the appliance in water
- Do not operate the appliance in explosive atmospheres, such as in the presence of flammable liquids, gases or dust
- Do not modify or disassemble E-Power. Only a repair technician may repair this unit
- Do not expose the appliance to heat
- Do not store in locations where the temperature may exceed 70 °C
- Charge only at ambient temperatures between -20 °C and 60 °C
- Charge only using the charger provided with the appliance
- Under extreme conditions, battery leakage may occur. Carefully wipe the liquid off using a cloth and avoid skin contact when you notice liquid on the batteries. In case of skin or eye contact, rinse immediately with clear water and seek medical attention
- At the end of their useful life, discard the appliance with due care for our environment

I. WARRANTY INFORMATION:

1.We offer a limited warranty for this product against any defects in material and workmanship for a period of 6 months from the date of purchase by the end user/consumer. The conditions of the warranty are as follows:

2.The warranty is only valid upon presentation of the original receipt (from dealer/retailer) by the original purchaser with the product to be repaired or replaced

3.The warranty is void if the serial number, date of purchase and label has been removed

4.The warranty does not cover damage or product failure resulting from normal wear and tear, physical abuse, improper installation, misuse, modification or repairs by unauthorized third parties

5.We do not assume responsibility for any loss or damage incurred during shipment or as a result of a force majeure

6.We are not liable for any incidental or consequential damages arising from the use or misuse of this product

7.All warranty claims are limited to repair or replacement of the defective product and at the sole discretion of us

8.If we repair or replace the product, the product will be covered for the remaining time of the original warranty period. Repair or replacement may involve the use of reconditioned units which are equivalent in function. Replaced part or product becomes the property of us

9.Consumable components such as batteries are not covered by the warranty



Overcharge and Overdischarge Protection



Fuse Protection



Against-reverse Plug

Applied Standard : GB/T 18287-2000



⑦

Claim No. HP-2020-000018

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

BETWEEN:

SHENZHEN CARKU TECHNOLOGY CO., LTD

(a company incorporated under the laws of the People's Republic of China)

Claimant

- and -

THE NOCO COMPANY

(a company incorporated under the laws of Ohio, United States of America)

Defendant

ANNEX 7 to GROUNDS OF INVALIDITY

DELTRAN EX1002
IPR2024-01219

From: wanny <sales10@car-ku.com>
Sent: Wednesday, April 23, 2014 11:24 PM
To: Giuseppe Orfanò
Subject: E-catalogue from Carku
Attachments: Carku catalogue.ppt

Dear Giuseppe,
Enclosed pls check our E-catalogue for you.Pls review all of the models, Carku jump starters are with best quality, the designs are followed by other factories.We hope to get more inquiry from you.
Any question about the product, pls send me reply.
Best wishes

Wanny
Foreign Sales Department Manager
CARKU™ 卡儿酷
Shenzhen Carku Technology Co.,Ltd
ADD: 2 Floor, Block A, Tongsheng Technology Building,Huahui Road,Dalang, Longhua New District, Shenzhen China 518109
Tel: 86-0755-85298289-877
Fax: 86-0755-61673510
Mobile: 0086-13076965851
0086-13714962190
QQ: 2769424685
Skype: carku15
Skype: yifengwan
Mail: sales10@car-ku.com
Website: http://www.car-ku.com

From: Giuseppe Orfanò
Date: 2014-04-23 23:07
To: sales10@car-ku.com
Subject: request sample E-POWER-21

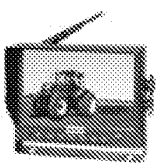
Dear Wanny,

it was a pleasure to meet you at the show. We would like to study better your slim jump starter (E-Power-21) and order a sample for our testing. Cause high transport costs out of Switzerland would it be possible that you make local the request (Fedex/UPS or whatever) and include in the PI also the cost for the transport?

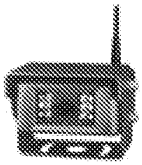
I remain at your fully disposal for every question

Giuseppe Orfanò
Leiter Market-Management

KRAUTLI (Schweiz) AG
Badenerstrasse 41 ● PF 160 ● 8104 Weiningen ZH
Tel. +41 (0)44 439 66 25 ● Fax +41 (0)44 439 66 30
g.orfano@krautli.ch ● www.krautli.ch
MSN: giuseppe80@hotmail.ch ● Skype: giuseppe.orf-1

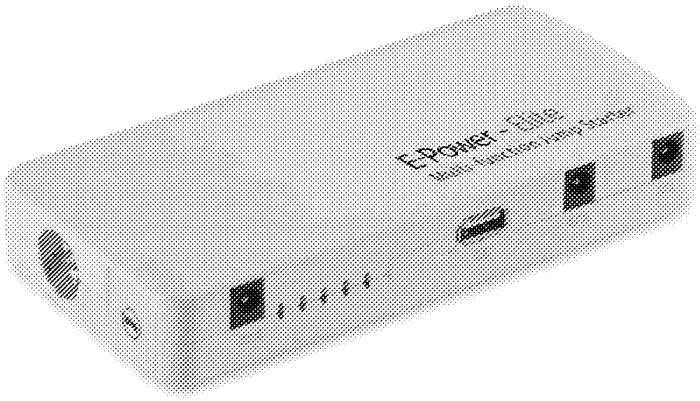


EyeSystem



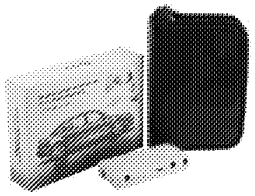
CARKU卡儿酷®

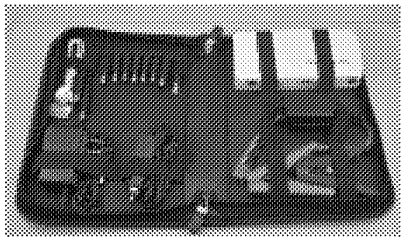
Model : EPOWER-Elite



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 12V/10A ; 5V/2A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 160*75*28mm
Weight : 420g Battery capacity:12000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 Mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	





Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. Supply power for car refrigerator, blast pump, and other 12V devices.
5. LED light (light, burst flashing, SOS)

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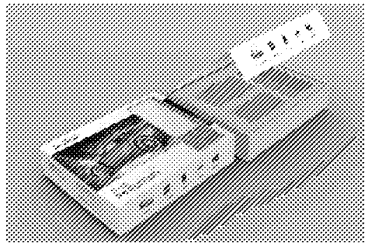
CARKU卡儿酷®

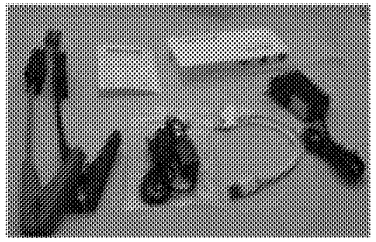
Model : EPOWER-Standard



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 12V/10A ; 5V/2A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 160*75*28mm
Weight : 350g Battery capacity:10000mAh
Operating Temp. : -20℃ ~ 60℃/-4℉ ~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1





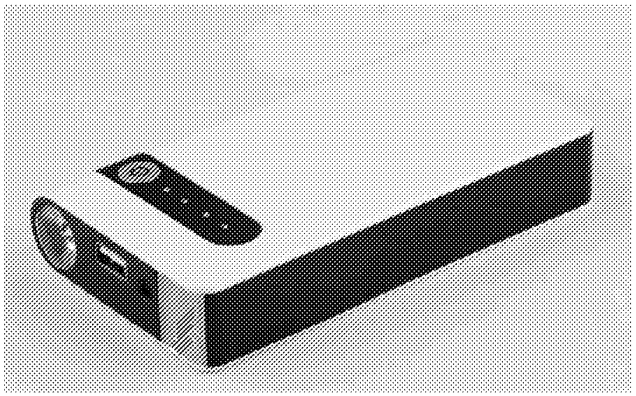
Packing: Color Box + PE tray

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
3. Supply power for car refrigerator, blast pump, and other 12V devices.
4. LED light (light, burst flashing, SOS)

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Model : EPOWER-3



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 131*75*24mm
Weight : 300g,Battery capacity:8000mAh
Operating Temp. : -20℃ ~ 60℃/-4℉ ~140℉
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1





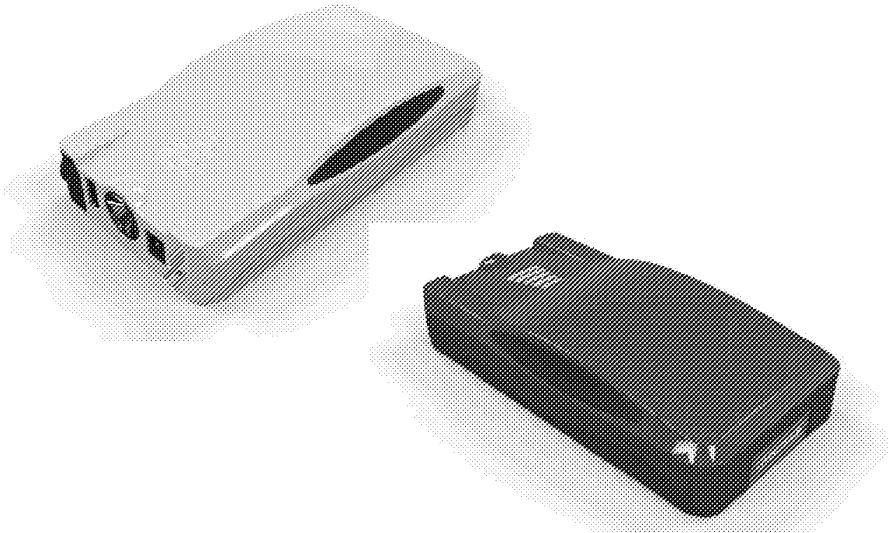
Packing: Color Box + PE tray

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
3. LED light(light, burst flashing, SOS)

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Model : EPOWER-05

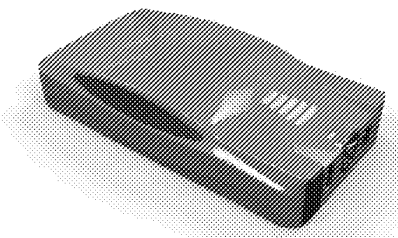


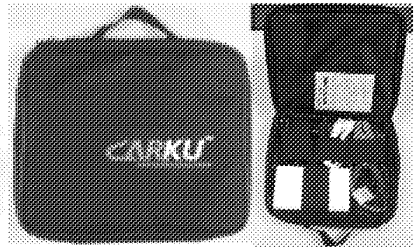
TECHNICAL SPECIFICATION :

Input : 14V1A
Output : 5V/2A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 200A
Peak Current : 400A
Size : 150*80*33mm
Weight : 450g,Battery capacity:12000mAh
Operating Temp. : -20℃ ~ 60℃/-4℉ ~140℉
Lifetime : >1000 cycles

ACCESSORIES :

Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	





Packing: Color Box + bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. LED light (light, burst flashing, SOS)

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Model : EPOWER-10

The slimmest jump starter

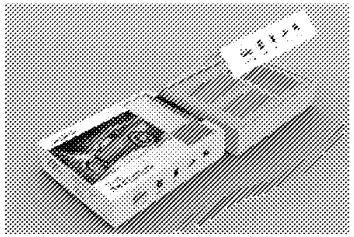


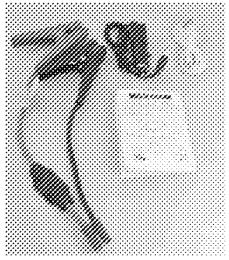
TECHNICAL SPECIFICATION :

Input : 14V1A; Micro USB5V/2A
Output : 5V/2A; 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 150A
Peak Current : 300A
Size : 139*75*15mm
Weight : 200g,Battery capacity:6000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :

Home charger*1	Jumper Cable*1
Car charger*1	3 mobile connectors*1





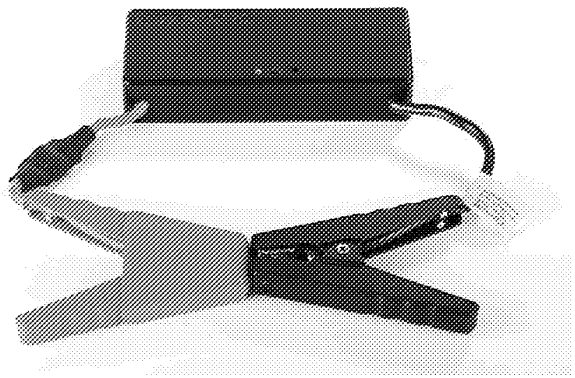
Packing: Color Box + EVA tray

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
3. LED light(light, burst flashing, SOS)

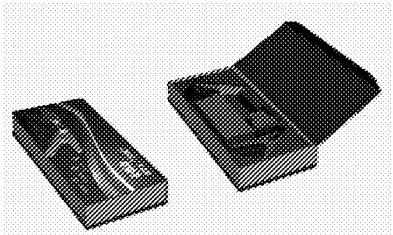
CARKU卡儿酷®

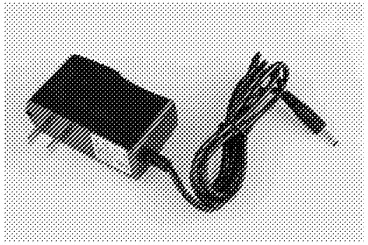
Model : Electronic Scorpion



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 12V Jump start
Start Current : 300A
Peak Current : 600A
Size : 180*70*35mm
Weight : 690g,Battery capacity:13000mAh
Operating Temp. : -20℃~60℃/-4℉~140℉
Lifetime : >1000 cycles

ACCESSORIES :
Home charger*1





Packing: Color Box + PE tray

FEATURES :
Powerful capability for jump Start 12V vehicle

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Model : 12V/24V Jump Starter



TECHNICAL SPECIFICATION :

Input： 14V1A

Output： 12V Jump start; 24V Jump start

Start Current： 500A(12V)/300A(24V)

Peak Current： 1000A(12V)/500A(24V)

Size： 247*216*64mm

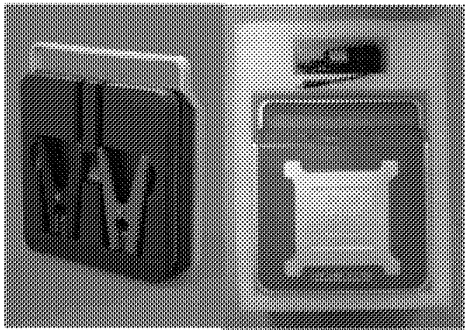
Weight： 1500g,Battery capacity:24000mAh

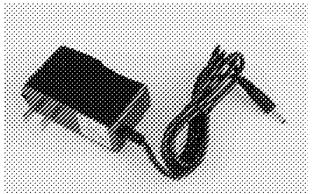
Operating Temp.：-20℃~60℃/-4℉~140℉

Lifetime： >1000 cycles

ACCESSORIES :

Home charger*1





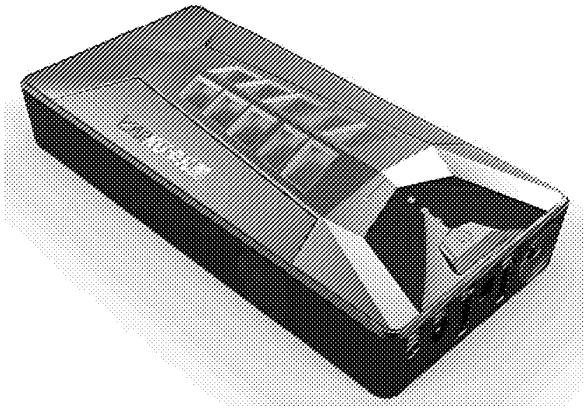
Packing: Color Box + PE tray

FEATURES :

Powerful capability for jump Start 12V vehicle and 24V vehicle
Recognize the positive and negative poles intelligently
Anti-recharge protection.
Short circuit protection.

CARKU卡儿酷®

Model : E-Power-20

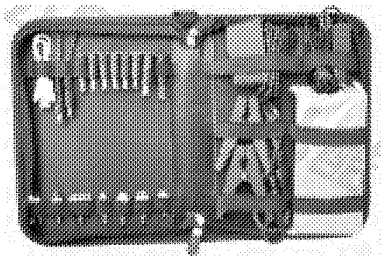


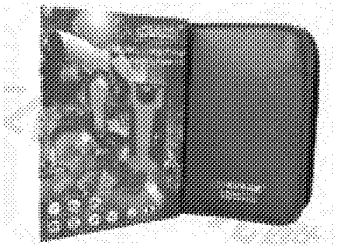
TECHNICAL SPECIFICATION :

Input :	14V1A
Output :	5V/2A; 5V/1A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current :	200A
Peak Current :	400A
Size :	155*74*31.5mm
Weight :	400g,Battery capacity:10000mAh
Operating Temp. :	-20℃~60℃
Lifetime :	>1000 cycles

ACCESSORIES :

Home charger*1	Intelligent Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	





Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. LED light (light, burst flashing, SOS)

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Model : E-Power-20B



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 5V/1A; 15V10A (Car fast charge) LED light (light, burst flashing, SOS)
Size : 155*75*31mm
Weight : 325g,Battery capacity:7500mAh
Operating Temp. : 0℃~60℃
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Car charger*1



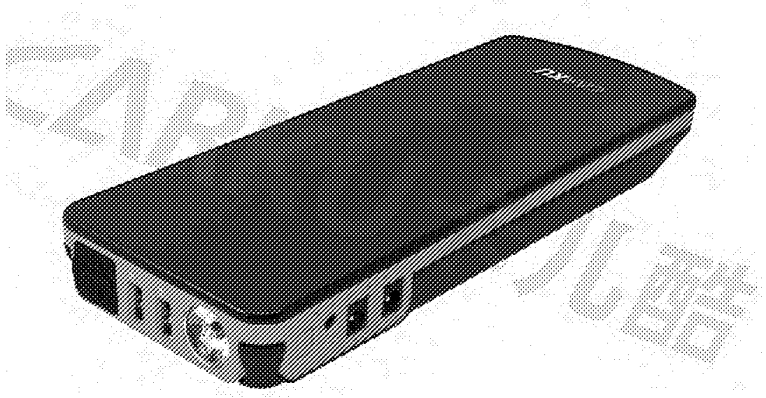
Packing: Color Box + PE tray

FEATURES :

1. Emergency start the vehicle, fast charge vehicle battery from Cigar socket.
2. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices
3. LED light (light, burst flashing, SOS)

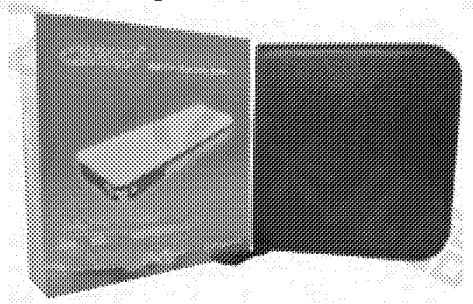
CARKU卡儿酷®

Model : E-Power-21



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 5V/1A; 12V10A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 300A
Peak Current : 600A
Size : 230*87*28mm
Weight : 615g,Battery capacity:18000mAh
Operating Temp. : -20℃~60℃
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Intelligent Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	



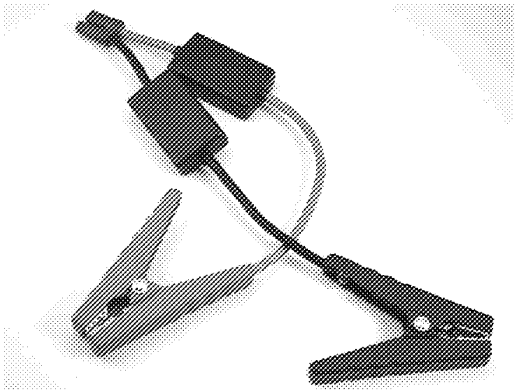
Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. Supply power for car refrigerator, blast pump, and other 12V devices.
5. LED light (light, burst flashing, SOS)

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Jumper Cable

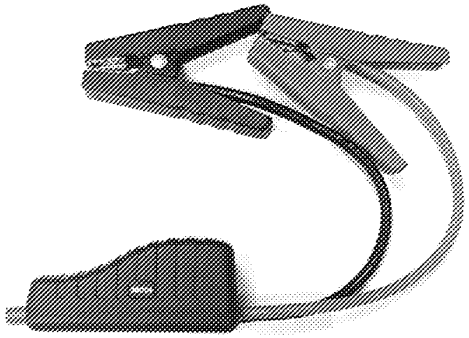


FEATURES :

1.Reverse Charge Protection.

2.Short-Circuit Protection.

Intelligent Jumper Cable



FEATURES :

1.Reverse Polarity Protection: No short-circuit damage is possible even when the clamps are connected incorrectly between positive (+) and negative (-) terminals.

2.Reverse Charge Protection: No reverse charge back to our products after the vehicle starts.

3.Short-Circuit Protection: No short circuit occurs in the product when the two Clamps are connected.

4.Overload Protection: Stop the product from over discharging, protecting the battery when it reaches a low level.

5.Starting override: While the vehicle battery is completely dead or no battery is present, Push “Test” button to force- start the vehicle.

Espacenet

CN104442429A Vehicle starting power source with double-battery system

Applicants: KE GUOPING

Inventors: KE GUOPING

Classifications:
IPC ***B60L11/18;***

CPC Y02T10/70 (EP);

Priorities: CN201310413538A 2013-09-12

Application: CN201310413538A·2013-09-12

Publication: CN104442429A·2015-03-25

Published as: CN104442429A

Vehicle starting power source with double-battery system

Abstract

The invention relates to a vehicle starting power source with a double-battery system. A battery pack of the vehicle starting power source is composed of a starting battery pack and an energy-storing battery, the starting battery pack is only responsible for starting of an engine, does not power a vehicular electric device and can independently start the engine, and the energy-storing battery pack powers the vehicular electric device and can assist in starting when electric quantity is sufficient. By the vehicle starting power source, the problem that the engine cannot be started due to excessive discharging of batteries can be prevented effectively.

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 104442429 A
(43)申请公布日 2015.03.25

(21)申请号 201310413538.0

(22)申请日 2013.09.12

(71)申请人 柯国平
地址 437100 湖北省咸宁市温泉银泉大道九鼎花园A栋二单元204室

(72)发明人 柯国平

(51)Int.Cl.
B60L 11/18(2006.01)

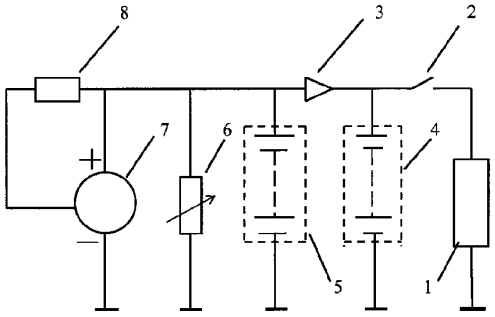
权利要求书1页 说明书3页 附图1页

(54)发明名称

一种双电池系统的车辆启动电源

(57)摘要

本发明涉及一种双电池系统的车辆启动电源。本发明的启动电源的电池组由启动电池组和储能电池组构成。启动电池组只负责发动机的启动，不给车载用电装置供电，并且可以独立启动发动机。储能电池组一方面给车载用电装置供电，同时，在电量较充足的情况下，还可以辅助启动。本发明可以有效防止由于电池过度放电导致发动机无法启动的问题。



CN 104442429 A

1. 一种双电池系统的车辆启动电源，用于车辆启动和给车载用电装置提供电能，主要由蓄电池系统和导电线缆组成，其特征是：所述的蓄电池系统由启动电池组和储能电池组两个蓄电池组组成，其中启动电池组仅用于车辆的启动，不向车载用电装置供电，该电池组可以独立完成车辆的启动；储能电池组用于给车载用电装置提供电能及辅助启动电池组对车辆进行启动。

2. 如权利要求 1 所述的车辆启动电源，其特征是：所述的两个蓄电池组通过单向二极管或者由多个单向二极管并联形成的单向二极管的阵列并联连接，电流只能由储能电池组向启动电池组方向单向流动，而不能由启动电池组向储能电池组方向流动。

3. 如权利要求 1 和 2 所述的车辆启动电源，其如权利要求 1 和 2 所述的车辆启动电源特征是：所述的启动电池组的容量比储能电池组的容量小。

4. 如权利要求 1 和 2 所述的车辆启动电源，其特征是：所述的启动电池组的单体电池是卷绕式高倍率铅酸电池。

5. 如权利要求 1 和 2 所述的车辆启动电源，其特征是：所述的启动电池组的单体电池是锂离子电池。

6. 如权利要求 1 和 2 所述的车辆启动电源，其特征是：所述的储能电池组的单体电池是铅酸电池。

7. 如权利要求 1 和 2 所述的车辆启动电源，其特征是：所述的储能电池组的单体电池是锂离子电池。

DELTRAN EX1002
IPR2024-01219

一种双电池系统的车辆启动电源

[0001] 【技术领域】本发明涉及各种内燃机车辆的启动电源。

[0002] 【背景技术】各种内燃机车辆已经成为人们日常的交通和运输工具，如载人的轿车和客车，运输货物的卡车等。这些车辆的启动都是依靠主要由电池组成的启动电源来实现的，由启动电源驱动启动电机，再由电机驱动发动机工作。在车载发电机停止工作的状态下，启动电源还负责给车载用电装置供电，这些装置如车灯、音响、电动门窗等。

[0003] 启动电源的核心部件是蓄电池组。现行的各类车辆的启动电源采用的技术方案中，都是采用一个蓄电池组同时完成和肩负车辆启动和给车载用电装置供电的两重功能，表现在启动电源中只有一个蓄电池组。在运行实践中，这种方案暴露出很大的问题：

[0004] 其一，常常出现因为各种原因导致在车载发电机不工作的状况下，车载用电装置长时间用电的情况，这导致启动电源的核心部件——蓄电池组储电量不足，从而无法完成车辆的下次启动。出现这种情况时，将不得不请专业服务公司进行服务；或者备用一个称之为 jump starter 的应急电源帮助启动。

[0005] 其二，启动电源的两种不同功能对电池性能要求差异很大，启动功能要求电池放电倍率性能优异，而给车载用电装置供电功能则要求电池容量大，倍率性能要求不高。这种情况导致启动电源核心部件的蓄电池组的选配的困难。如，目前绝大多数启动电源的蓄电池组都使用极板式铅酸电池，这往往导致低温下的启动困难。而如果全部使用放电倍率高（尤其是低温放电性能优异）的卷绕式铅酸电池，则成本太高，而且占用体积过大。

[0006] 本发明即是针对现有技术方案的不足，提出一种新的解决方案。

[0007] 【发明内容】本发明旨在克服现有技术的不足，提出一种新的车辆启动电源方案。

[0008] 本发明的技术方案是：采用双电池系统，启动电源核心部件——蓄电池系统由启动电池组和储能电池组两个蓄电池组组成，其中启动电池组仅用于车辆的启动，不向车载用电装置供电，该电池组可以独立完成车辆的启动；储能电池组用于给车载用电装置提供电能及辅助启动电池组对车辆进行启动。所述的两个蓄电池组通过单向二极管或者由多个单向二极管并联形成的单向二极管的阵列并联连接，电流只能由储能电池组向启动电池组方向单向流动，而不能由启动电池组向储能电池组方向流动。

[0009] 本发明的车辆启动电源中，蓄电池系统的的启动电池组的容量比储能电池组的容量小。一般地，启动电池组的容量占整个蓄电池系统容量的 15-35％左右。

[0010] 本发明的车辆启动电源中，蓄电池系统的启动电池组的单体电池是卷绕式高倍率铅酸电池。这种电池不仅放电倍率性能好，而且也具有出色的低温放电性能。

[0011] 本发明的车辆启动电源中，蓄电池系统的启动电池组的单体电池也可以是锂离子电池。目前，锂离子电池的技术得到长足发展，许多电池体系（如磷酸铁锂系、三元系、锰酸锂系、钛酸锂系等）可以做到很高倍率的放电，并且一些体系还具有出色的低温性能。

[0012] 本发明的车辆启动电源中，蓄电池系统的储能电池组的单体电池是铅酸电池，可以是传统的极板式铅酸电池，也可以是先进的卷绕式铅酸电池。作为储能电池，铅酸电池有很多优点，主要是价廉物美，技术成熟。

[0013] 本发明的车辆启动电源中，蓄电池系统的储能电池组的单体电池是锂离子电池，

DELTRAN EX1002
IPR2024-01219

可以是锰酸锂电池、磷酸铁锂电池、三元电池、钛酸锂电池等其中的任意一种。

[0014] 本发明的车辆启动电源的蓄电池系统因为采用启动电池组和储能电池组双电池组，启动电池组只承担启动任务，不给车载用电装置供电，并且可以独立完成启动任务，储能电池组除了给车载装置供电外，还能辅助启动，因而可以有效克服现有技术的不足，防止因电池放电过度导致不能启动的情况。此外，因为采用双电池组，可以选择倍率性能及低温性能优异的电池作为启动电池，克服低温下的启动困难，又不太多的增加成本。

[0015] 【附图说明】附图为本发明的原理示意图，图中：

[0016] 1——启动电机

[0017] 2——启动开关

[0018] 3——单向二极管（或二极管阵列）

[0019] 4——启动电池组

[0020] 5——储能电池组

[0021] 6——车载用电装置

[0022] 7——车载发电机

[0023] 8——调节器

[0024] 下面结合附图进一步阐述本发明的技术方案。单向二极管（或二极管阵列）3 的作用是保证启动电池组 4 只能够向启动电机 1 供电，而不能向车载用电装置 6 以及储能电池组 5 供电，这就有效防止启动电池组 4 用电过度导致不能进行后续的启动的问题。单向二极管（二极管阵列）3 允许储能电池组向启动电机 1 供电，实现辅助启动功能；同时，单向二极管（单向二极管阵列）3 还允许车载发电机 7 给启动电池组 4 充电。调节器 8 用于实现各种调节功能。启动时，闭合启动开关 2，启动电池组 4 向启动电机 1 放电，同时，在电量较充分时，储能电池组 5 经过单向二极管 3 向启动电机 1 放电，辅助启动电池组 4 实现启动功能。

[0025] 启动完成后，启动开关 2 断开，同时车载发电机 7 开始向车载用电装置 6 供电，并且给启动电池组 4 和储能电池组 5 充电。当发电机 7 停止工作时，若车载用电装置 6 继续工作，则此时所需电能完全由储能电池组 5 提供，单向二极管（人际关系战略）3 阻止启动电池组 4 放电，从而保证启动电池组 4 能够继续进行以后的启动。

[0026] 【具体实施方式】下面举例说明本发明的实施方式。

[0027] 实施例一

[0028] 对于一个 1.5L 排量的家用轿车，采用 12V 的车辆启动电源，其中启动电池组为容量 10Ah、标称电压 12V 的卷绕式铅酸电池组，储能电池组采用容量 45Ah、标称电压 12V 的极板式铅酸电池组。选用 6 个过流 50A 的单向二极管并联构成单向二极管阵列。按照说明书附图的连接方式进行连接，即可实现本发明的目的。

[0029] 实施例二

[0030] 将储能电池组换成 12.6V 的磷酸铁锂电池组，其余同实施例一。

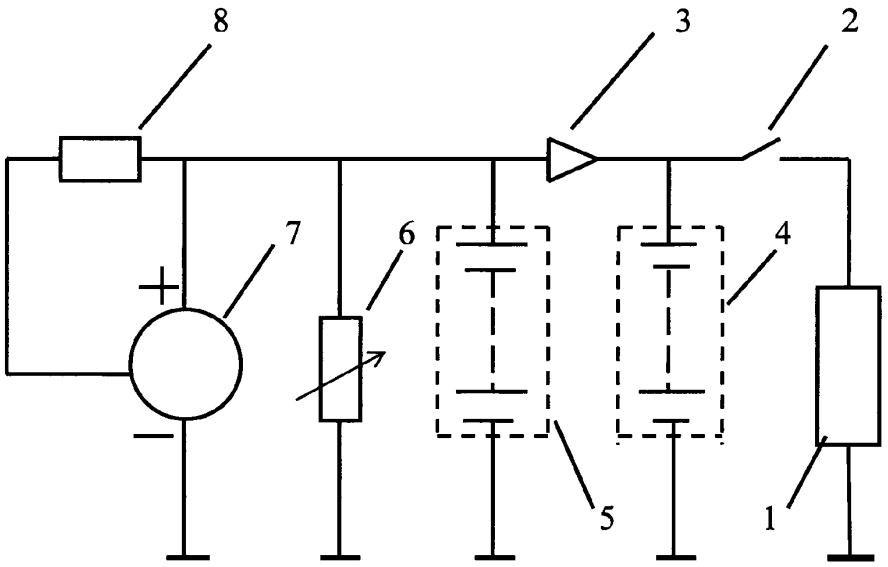
[0031] 实施例三

[0032] 对于载货卡车，采用 24V 的车辆启动电源，其中启动电池组为容量 20Ah、标称电压 24V 的卷绕式铅酸电池组，储能电池组采用 80AH、标称电压 24V 的极板式铅酸电池组。选用 12 个过流 50A 的单向二极管并联构成单向二极管阵列。按照说明书附图的连接方式进行连

DELTRAN EX1002
IPR2024-01219

接,即可实现本发明的目的。

DELTRAN EX1002
IPR2024-01219



DELTRAN EX1002
IPR2024-01219

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CN103715737A Lithium battery charging/ discharging management system

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Lithium battery charging/ discharging management system

Abstract

The invention discloses a lithium battery charging/ discharging management system. The lithium battery charging/ discharging management system comprises a first switch, a first switch driving module, a charging module, a lithium battery monitoring unit, a current detection module, a main voltage detection module, a micro controller, a lithium battery set, a second switch driving module and a power source module, wherein the micro controller is mutually connected with the lithium battery monitoring unit, the current detection module, the main voltage detection module, the first switch driving module, the charging module and the second switch driving module, signals sent by the lithium battery monitoring unit, the current detection module and the main voltage detection module are received, analysis processing on the signals is carried out, the control signals after processing are sent to the first switch driving module, the charging module and the second switch driving module, and charging/ discharging management control for the lithium battery is carried out. According to the lithium battery charging/ discharging management system, by detecting voltage, current and temperature of the lithium battery set in real time, over-charging, over-discharging, over-temperature and over-current phenomena of a vehicle battery are avoided, and thereby hidden use safety trouble of the battery is reduced to a minimum degree.

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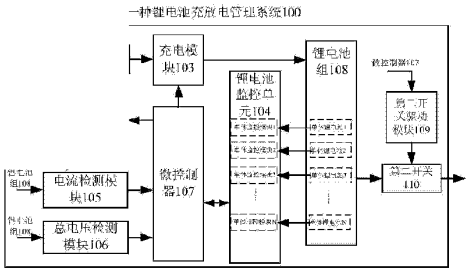
权书2页 说明书6页 附图3页

(54)发明名称

一种锂电池充放电管理系统

(57)摘要

本发明公开了一种锂电池充放电管理系统，包括第一开关、第一开关驱动模块、充电模块、锂电池监控单元、电流检测模块、总电压检测模块、微控制器、锂电池组、第二开关驱动模块、第二开关和电源模块；微控制器与锂电池监控单元、电流检测模块、总电压检测模块、第一开关驱动模块、充电模块以及第二开关驱动模块相连接，接收锂电池监控单元、电流检测模块和总电压检测模块发送的信号，并对这些信号进行分析处理，同时将处理后的控制信号发送给第一开关驱动模块、充电模块和第二开关驱动模块，从而对锂电池充放电进行控制管理。本发明通过实时检测电池组的电压、电流、温度，从而防止车载电池的过充、过放、过温及过流等现象，将电池使用的安全隐患降到最低。



CN 103715737 A

DELTRAN EX1002
IPR2024-01219

1. 一种锂电池充放电管理系统，其特征在于，包括第一开关（101）、第一开关驱动模块（102）、充电模块（103）、锂电池监控单元（104）、电流检测模块（105）、总电压检测模块（106）、微控制器（107）、锂电池组（108）、第二开关驱动模块（109）、第二开关（110）和电源模块（111）；

所述电源模块（111）与市电连接，其为系统各个模块提供供电；

所述第一开关（101）控制市电输入与充电模块（103）之间的连接或断开，其输入端与市电连接，其输出端与充电模块（103）连接；

所述第一开关驱动模块（102）与所述第一开关（101）连接，控制所述第一开关（101）的导通或闭合；

所述第二开关（110）控制锂电池组（108）与负载的连接或断开，其输入端与锂电池组（108）连接，其输出端与负载连接；

所述第二开关驱动模块（109）与所述第二开关（110）连接，控制所述第二开关（110）的导通或闭合；

所述充电模块（103）与锂电池组（108）连接，控制所述锂电池组（108）的充电；

所述锂电池组（108）由 N 个单体锂电池串联组成；

所述锂电池监控单元（104）由 N 个独立的单体监控模块组成，任一个单体监控模块监控与其相连接的一个单体锂电池的性能参数；

所述单体监控模块至少包括电压采样模块（201）、温度采样模块（202）和过压均衡模块（203）；所述电压采样模块（201）检测单体锂电池的电压值；所述温度采样模块（202）检测单体锂电池的温度值；所述过压均衡模块（203）用于将多余的能量消耗掉，当单体锂电池电压高于预设电压值时，自动开启过压均衡模块消耗多余的能量；

所述电流检测模块（105）与锂电池组（108）相连接，检测充放电时锂电池组（108）的工作电流；

所述总电压检测模块（106）与锂电池组（108）相连接，检测充放电时锂电池组（108）的工作电压；

所述微控制器（107）为本锂电池充放电管理系统的核心，它与锂电池监控单元（104）、电流检测模块（105）、总电压检测模块（106）、第一开关驱动模块（102）、充电模块（103）以及第二开关驱动模块（109）相连接；所述微控制器（107）接收锂电池监控单元（104）、电流检测模块（105）和总电压检测模块（106）发送的信号，并对这些信号进行分析处理，同时将处理后的控制信号发送给第一开关驱动模块（102）、充电模块（103）和第二开关驱动模块（109），从而对锂电池充放电进行控制管理。

2. 根据权利要求 1 所述的锂电池充放电管理系统，其特征在于，所述过压均衡模块（203）包括三端可调稳压器 U1、第一三极管 Q1、第一二极管 D1、第二二极管 D2、第一电阻 R1、第二电阻 R2、第三电阻 R3、第四电阻 R4、第五电阻 R5、第六电阻 R6、第七电阻 R7、第一电容 C1 以及第二电容 C2，其中，

三端可调稳压器 U1 的 1 脚与第五电阻 R5 的一端和第七电阻 R7 的一端连接；第五电阻 R5 的另一端与第一电阻 R1 的一端连接；第一电阻 R1 的另一端与第一电容 C1 的一端、第二电阻 R2 的一端以及第一三极管 Q1 的发射极连接；

三端可调稳压器 U1 的 2 脚与第二电阻 R2 的另一端和第四电阻 R4 的一端连接；第四电

DELTRAN EX1002
IPR2024-01219

阻 R4 的另一端与第一三极管 Q1 的基极连接；

二端可调稳压器 U1 的 3 脚与第七电阻 R7 的另一端、第一电容 C1 的另一端、第二二极管 D2 的阴极、第二电容 C2 的一端以及第六电阻 R6 的一端连接；第二二极管 D2 的阳极与第二电容 C2 的另一端和第三电阻 R3 的一端连接；第三电阻 R3 的另一端与第一三极管 Q1 的集电极和第一二极管 D1 的阳极连接；第一二极管 D1 的阴极与第六电阻 R6 的另一端连接。

3. 根据权利要求 1 或 2 所述的锂电池充放电管理系统，其特征在于，所述微控制器 (107) 发送控制信号给充电模块 (103) 选择充电模式。

4. 根据权利要求 3 所述的锂电池充放电管理系统，其特征在于，在充电过程中，当所述微控制器 (107) 检测到某一个单体锂电池处于过压状态时，发出控制信号给所述充电模块 (103)，使其以一定的恒定电流对所述锂电池组 (108) 充电。

5. 根据权利要求 1 或 2 所述的锂电池充放电管理系统，其特征在于，至少有一个单体监控模块包括电压采样模块 (201)，所述锂电池监控单元 (104) 还包括多路选择开关 (112)，所述多路选择开关 (112) 与锂电池组 (108)、电压采样模块 (201) 和微控制器 (107) 连接，所述微控制器 (107) 发送控制信号给多路选择开关 (112) 选择一路导通，使一个单体锂电池与电压采样模块 (201) 相连接。

DELTRAN EX1002
IPR2024-01219

一种锂电池充放电管理系统

技术领域

[0001] 本发明涉及一种电动自行车用动力电池系统的管理系统领域，具体涉及一种锂电池充放电管理系统。

背景技术

[0002] 随着锂电池性能的逐渐提高，其作为动力电源应用于电动汽车、混合动力汽车已非常广泛。一般动力电源都需要比较高的电压，几节甚至十几节才可以作为动力电池使用。在多节电池串联使用的情况下，基于每节单体锂电池的内部特性的不一致，会影响整个系统的供电能力，一节单体电池性能发生变化的话，比如出现电压过充、电压过放、充放电电流过大甚至是短路等现象，会影响整组电池的性能，导致整组电池使用寿命缩短或者损害，严重时甚至会发生着火、爆炸等危险事件。为使锂电池组能够最大程度地发挥其优越性能、保证其使用的安全性以及延长使用寿命，人们研究设计了电池管理系统。

[0003] 目前电池管理系统广泛应用于电动汽车、混合动力汽车等大型车载电池上，但电动自行车领域，考虑到其成本及人们的消费水平，其车载电池尚未安装电池管理系统，这对于铅酸电池及镍氢电池来说还可以，但随着锂电池电动自行车的普及，针对锂电池的特殊性，充放电不当如过充、过放、过温、过流等将损坏电池，造成锂电池的不可修复，严重时还会发生安全事故。在电动自行车的使用过程中，需要实时检测电池组的电压、电流、温度，防止车载电池的过充、过放、过温及过流等现象，实现对锂电池组的保护，并有效防止各种安全隐患的发生，因此电池管理系统应该发展成为锂电池电动自行车的一部分，是锂电池电动车的安全保障。

[0004] 在现有技术中，关于电动自行车锂电池充放电管理系统仍存在以下几方面的缺陷：

[0005] 为解决各个单体锂电池充放电不一致，必须在系统中增加均衡模块，但电动自行车内部空间有限，而现有均衡模块体积庞大模块复杂。不利于实际应用。

[0006] 对锂电池的系统使用时的安全性能检测处理不够完善，应实时检测电池组的电压、电流、温度，防止车载电池的过充、过放、过温及过流等现象，将电池使用的安全隐患降到最低。

发明内容

[0007] 为了克服上述现有技术存在的缺陷，本发明提供一种锂电池充放电管理系统，实时监控锂电池的状态参数，并根据状态参数进行过充保护、过放保护以及单体锂电池间的不均衡控制等，从而提高锂电池系统的性能和安全。

[0008] 为解决上述技术问题，本发明的技术方案为：

[0009] 一种锂电池充放电管理系统，包括第一开关、第一开关驱动模块、充电模块、锂电池监控单元、电流检测模块、总电压检测模块、微控制器、锂电池组、第二开关驱动模块、第二开关和电源模块；

DELTRAN EX1002
IPR2024-01219

[0010] 所述电源模块与市电连接，其为系统各个模块提供供电；

[0011] 所述第一开关控制市电输入与充电模块之间的连接或断开，其输入端与市电连接，其输出端与充电模块连接；

[0012] 所述第一开关驱动模块与所述第一开关连接，控制所述第一开关的导通或闭合；

[0013] 所述第二开关控制锂电池组与负载的连接或断开，其输入端与锂电池组连接，其输出端与负载连接；

[0014] 所述第二开关驱动模块与所述第二开关连接，控制所述第二开关的导通或闭合；

[0015] 所述充电模块与锂电池组连接，控制所述锂电池组的充电；

[0016] 所述锂电池组由 N 个单体锂电池串联组成；

[0017] 所述锂电池监控单元由 N 个独立的单体监控模块组成，任一个单体监控模块监控与其相连接的一个单体锂电池的性能参数；

[0018] 所述单体监控模块至少包括电压采样模块、温度采样模块和过压均衡模块；所述电压采样模块检测单体锂电池的电压值；所述温度采样模块检测单体锂电池的温度值；所述过压均衡模块用于将多余的能量消耗掉，当单体锂电池电压高于预设电压值时，自动开启过压均衡模块消耗多余的能量；

[0019] 所述电流检测模块与锂电池组相连接，检测充放电时锂电池组的工作电流；

[0020] 所述总电压检测模块与锂电池组相连接，检测充放电时锂电池组的工作电压；

[0021] 所述微控制器为本锂电池充放电管理系统的核心，它与锂电池监控单元、电流检测模块、总电压检测模块、第一开关驱动模块、充电模块以及第二开关驱动模块相连接；所述微控制器接收锂电池监控单元、电流检测模块和总电压检测模块发送的信号，并对这些信号进行分析处理，同时将处理后的控制信号发送给第一开关驱动模块、充电模块和第二开关驱动模块，从而对锂电池充放电进行控制管理。

[0022] 优选地，所述过压均衡模块包括三端可调稳压器 U1、第一三极管 Q1、第一二极管 D1、第二二极管 D2、第一电阻 R1、第二电阻 R2、第三电阻 R3、第四电阻 R4、第五电阻 R5、第六电阻 R6、第七电阻 R7、第一电容 C1 以及第二电容 C2，其中，

[0023] 三端可调稳压器 U1 的 1 脚与第五电阻 R5 的一端和第七电阻 R7 的一端连接；第五电阻 R5 的另一端与第一电阻 R1 的一端连接；第一电阻 R1 的另一端与第一电容 C1 的一端、第二电阻 R2 的一端以及第一三极管 Q1 的发射极连接；

[0024] 三端可调稳压器 U1 的 2 脚与第二电阻 R2 的另一端和第四电阻 R4 的一端连接；第四电阻 R4 的另一端与第一三极管 Q1 的基极连接；

[0025] 三端可调稳压器 U1 的 3 脚与第七电阻 R7 的另一端、第一电容 C1 的另一端、第二二极管 D2 的阴极、第二电容 C2 的一端以及第六电阻 R6 的一端连接；第二二极管 D2 的阳极与第二电容 C2 的另一端和第三电阻 R3 的一端连接；第三电阻 R3 的另一端与第一三极管 Q1 的集电极和第一二极管 D1 的阳极连接；第一二极管 D1 的阴极与第六电阻 R6 的另一端连接。

[0026] 优选地，所述微控制器发送控制信号给充电模块选择充电模式。

[0027] 优选地，在充电过程中，当所述微控制器检测到某一个单体锂电池处于过压状态时，发出控制信号给所述充电模块，使其以一定的恒定电流对所述锂电池组充电。

[0028] 优选地，至少有一个单体监控模块包括电压采样模块，所述锂电池监控单元还包括多路选择开关，所述多路选择开关与锂电池组、电压采样模块和微控制器连接，所述微控

DELTRAN EX1002
IPR2024-01219

制器发送控制信号给多路选择开关选择一路导通，使一个单体锂电池与电压采样模块相连接。

[0029] 通过采用以上技术方案，本发明的有益效果是：

[0030] (1)通过在系统中增加过压均衡模块，解决了各个单体锂电池充放电不一致，同时过压均衡模块体积较小，有利于实际应用。

[0031] (2)通过实时检测电池组的电压、电流、温度，防止车载电池的过充、过放、过温及过流等现象，将电池使用的安全隐患降到最低。

附图说明

[0032] 图 1 是本发明实施例锂电池充放电管理系统的原理框图。

[0033] 图 2 是本发明实施例的锂电池在不同环境温度下 SOC 放电曲线的示意图。

[0034] 图 3 是本发明实施例锂电池静态时开路电压与 SOC 关系曲线示意图。

[0035] 图 4 是本发明实施例锂电池充电模式及充电曲线的示意图。

[0036] 图 5 是本发明实施例锂电池充放电管理系统中单体监控模块的原理框图。

[0037] 图 6 是本发明实施例锂电池充放电管理系统的过压均衡模块的原理图。

[0038] 图 7 是本发明实施例锂电池充放电管理系统中锂电池监控单元的原理框图。

具体实施方式

[0039] 为了使本发明的目的、技术方案及优点更加清楚明白，以下结合附图及实施例，对本发明进行进一步详细说明。应当理解，此处所描述的具体实施例仅仅用以解释本发明，并不用于限定本发明。

[0040] 相反，本发明涵盖任何由权利要求定义的在本发明的精髓和范围上做的替代、修改、等效方法以及方案。进一步，为了使公众对本发明有更好的了解，在下文对本发明的细节描述中，详尽描述了一些特定的细节部分。对本领域技术人员来说没有这些细节部分的描述也可以完全理解本发明。

[0041] 参见图1，所示为本发明实施例的锂电池充放电管理系统的原理框图。本实施例的锂电池充放电管理系统 100 包括包括第一开关 101、第一开关驱动模块 102、充电模块 103、锂电池监控单元 104、电流检测模块 105、总电压检测模块 106、微控制器 107、锂电池组 108、第二开关驱动模块 109、第二开关 110 和电源模块 111；

[0042] 电源模块 111 与市电连接，其为系统各个模块提供供电；

[0043] 第一开关 101 控制市电输入与充电模块 103 之间的连接或断开，其输入端与市电连接，其输出端与充电模块 103 连接；

[0044] 第一开关驱动模块 102 与第一开关 101 连接，驱动第一开关 101 的导通或闭合；

[0045] 第二开关 110 控制锂电池组 108 与负载的连接或断开，其输入端与锂电池组 108 连接，其输出端与负载连接；

[0046] 第二开关驱动模块 109 与第二开关 110 连接，驱动第二开关 110 的导通或闭合；

[0047] 充电模块 103 与锂电池组 108 相连接，对锂电池组 108 进行充电；

[0048] 锂电池组 108 由 N 个单体锂电池串联组成，分别为单体锂电池 1、单体锂电池 2、单体锂电池 3..... 和单体锂电池 N；

DELTRAN EX1002
IPR2024-01219

[0049] 锂电池监控单元 104 至少由 N 个独立的单体监控模块组成，即由单体监控模块 1、单体监控模块 2、单体监控模块 3..... 和单体监控模块 N 组成，任一个单体监控模块监控与其相连接的一个单体锂电池的性能参数；

[0050] 单体监控模块至少包括电压采样模块 201、温度采样模块 202 和过压均衡模块 203，电压采样模块 201 检测单体锂电池的电压值；温度采样模块 202 检测单体锂电池的温度值；过压均衡模块 203 的均衡方式采用电阻耗能的方式，当单体锂电池电压高于预设电压值时，自动开启过压均衡模块消耗多余的能量；

[0051] 电流检测模块 105 与锂电池组 108 相连接，检测充放电时锂电池组 108 的工作电流；

[0052] 总电压检测模块 106 与锂电池组 108 相连接，检测充放电时锂电池组 108 的工作电压；

[0053] 微控制器 107 为本锂电池充放电管理系统的核心，它与锂电池监控单元 104、电流检测模块 105、总电压检测模块 106、第一开关驱动模块 102、充电模块 103 以及第二开关驱动模块 109 相连接；

[0054] 微控制器 107 接收锂电池监控单元 104、电流检测模块 105 和总电压检测模块 106 发送的信号，并对这些信号进行分析处理，同时将处理后的信号发送给第一开关驱动模块 102、充电模块 103 和第二开关驱动模块 109，从而对锂电池充放电进行控制管理。

[0055] 在锂电池充放电管理系统中，主要检测锂电池的总电压值、电流值、各个单体锂电池的电压值和单体锂电池的温度值，微控制器 107 根据这些信号对锂电池充放电开关以及充电模式进行控制管理。

[0056] 在动力电池的使用过程中，锂电池放电是一个非线性的动态过程，受到温度、充放电次数及电池老化等诸多因素的影响，只有精确估计出锂电池剩余容量（SOC）的情况下，才能实现对锂电池的充放电控制管理。参见图 2，所示为本发明实施例的锂电池在不同环境温度下 SOC 放电曲线，锂电池以 0.2C 放电倍率完全放电在 0℃、20℃和 40℃下的 SOC 曲线图，从图中可以看出，电池温度对 SOC 的影响很大，本设计所采用电池的充电温度为 0 至 45℃，放电温度为 -20 至 60℃。

[0057] 因此，在对锂电池 SOC 的估算中，首先根据单体锂电池的温度值，选择相对应的 SOC 放电曲线，分别估算出每一个单体锂电池的 SOC，再计算出锂电池组的 SOC。

[0058] 当锂电池处于静态，即锂电池没有放电时，采用开路电压法估算电池 SOC。参见图 3，所示为锂电池静态时开路电压与 SOC 关系曲线示意图，电池的开路电压与电池的 SOC 间存在一定的对应关系，通过试验方法测得不同放电电流情况下电池端电压与电池 SOC 的关系曲线，记录为数据表格存储下来。这样通过实时采样电池放电时的端电压，查表即可求得当前时刻电池的 SOC。使用该方法时，锂电池组需要静置一段时间，所以无法检测动态检测开路电压，故此方法无法用于动态电池的 SOC 估算。

[0059] 动态 SOC 估算采用安时法，安时法是通过不停检测电流并进行积分来计算电池吸收或释放的电量，计算公式如式（1），式中：t0 是测量初始时间；t1 为测量结束时间；Q0 为电池容量；Qt0 为测量初始时刻电量；η 为充放电效率；i 为充放电电流。

[0060] $$SOC = (Q_{t0} - \int_{t_0}^{t_1} \eta i dt) / Q_0 \qquad (1)$$

DELTRAN EX1002
IPR2024-01219

[0061] 安时法计算简便，但还存在很大缺陷。例如电流测量精度不高将导致积分误差增加，使得 SOC 值的准确度降低，因此本系统对电流测量精度要求很高。

[0062] 以下详细介绍下，本系统 SOC 估算的方法。在电动车启动前，用开路电压法计算电池初始时刻的 SOC0。因锂电池在其性能稳定的时候其开路电压与 SOC 存在着很明显的线性关系，且受温度、电池老化等因素影响较小，故可用公式（2）直接计算得到剩余电量的初始值 SOC0，式中 Uk 为开路电压，a、b 为估计系数，a 为电池充满电时的开路电压，b 为电池充分放完电后的开路电压。

[0063] $SOC_0=(U_k-b)/(a-b)$ （2）

[0064] 在电动车启动后，用安时积分法计算电池的剩余容量，CB 为电池以标定的电流 iB 为恒流放电所具有的容量；如公式（3）所示：

[0065] $SOC=SOC_0-Q_B/C_B$ （3）

[0066] 式中 $Q_B=\int_{t_0}^{t_1} Ki_B dt$ （4）

[0067] 且 K=K1*K2 为电流补偿系数，K1 为温度补偿系数，K2 是锂离子电池以标准电流 iB 在标准温度下进行放电所放出的电量 QB 与其他不同的放电电流 i 在标准温度下放电所放出的电量 Q 之比，即 $K_2=Q_B/Q$，K2 的值可以通过试验求得。

[0068] K1 是通过常用公式（5）即对温度进行补偿的公式确定的，其中，标准温度用 TB 表示，设定温度用 T 表示。

[0069] $K_1=1+0.008(T_B-T)$ （5）

[0070] K2 值的确定如下，由派克特（peukert）公式知，电池放电的剩余容量与电池组的放电电流的关系如式（6）所示。

[0071] $SOC=K\times i^{1-n}$ （6）

[0072] 只要初始条件相同，K 和 n 是相同的，因此有式（7），从而可以用几组 SOC、i 来求出 K2。其值在 1.15 ～ 1.42 之间，该方程还说明放电电流越大，电池容量越小。

[0073] $K_2=C_B/C=(i/i_B)^{n-1}$ （7）

[0074] 将开路电压与安时法结合得到式（8），该方法中需要测量的数据有：开路电压 Uk、动态电流 i 及温度 T。利用该公式可求得电池组的剩余电量。

[0075] $$SOC=SOC_0-\left(\int_{t_0}^{t_1}(i/i_B)^{1-n}K_2 i dt\right)\Big/C_B \quad (8)$$

[0076] 参见图 4，所示为本发明实施例锂电池充电模式及充电曲线的示意图，本系统对锂电池充电采用二段充电方法，即预充电、恒流充电和恒压充电。图中所示是锂电池充电过程中电压、电流等变化曲线。

[0077] 电动自行车或者电动电瓶车中的锂电池工作在密封环境中，再加上锂离子电池本身的特殊性，充电过程不当极易发生爆炸等，不仅损坏电池，严重时还会造成安全事故，所以对锂电池要进行严格的充电控制，主要是控制充电电压和限定充电电流。

[0078] 充电模块 103 具有至少三种充电模式，分别为预充电模式、恒流充电模式和恒压充电模式；微控制器 107 发送控制信号选择充电模块 103 的充电模式。根据锂电池组 108 的参数选择相应模式对锂电池组 108 进行充电；

DELTRAN EX1002
IPR2024-01219

[0079] 预充电模式是以小电流先充到一定的电压，再进行快速充电。因锂离子电池具有较高的能量比，如果直接进行快速充电，会对电池产生损坏，所以设计了预充电过程，实际中采用的优选方案，在充电开始阶段，若锂电池电压小于标称电压的 30% 时，微控制器 107 向充电模块 103 控制命令，充电模块 103 进入预充电模式。

[0080] 恒流充电模式中提供大的恒定电流对锂电池进行充电，从而使得充电速度加快，电池电压快速上升，实际中采用的优选方案，在充电过程中，当 SOC 大于 30% 但未达到 80% 时，微控制器 107 向充电模块 103 控制命令，充电模块 103 保持在恒流充电模式。

[0081] 恒压充电模式中电流比较小，充电速度慢，当充电电流下降到规定值时，停止充电，实际中采用的优选方案，当 SOC 大于 80% 时，微控制器 107 向充电模块 103 控制命令，充电模块 103 进入恒压充电模式，当电流下降到 10mA 以下，微控制器 107 向充电模块 103 控制命令，充电模块 103 停止充电。

[0082] 在各个单体锂电池之间的一致性差别不是太大的时候，采用以上方法基本上能实现对锂电池组的充电。但各个单体锂电池之间的一致性差别特别大的时候，比如当处于恒流充电模式的时候，其中一个单体锂电池已经处于过压状态了，此时虽然开启了过压均衡模块，但是本发明实施例过压均衡模块是采用功率电阻耗能的方式，在恒流充电模式下，充电电流很大，均衡模块无法消耗全部能量，会烧坏均衡模块或者因为过充电而造成单体锂电池的损坏。

[0083] 为了解决上述技术问题，充电模块 103 还具有过压恒流充电模式，过压恒流充电模式是指当检测到某一个或者几个单体锂电池处于过压状态时，充电模块 103 以一定的恒定小电流对锂电池组 108 充电，一定的恒定小电流的大小与过压均衡模块的耗能电阻相适应。此充电模式下，已经处于过压状态下的单体锂电池，其充电能量足以被均衡模块消耗掉，避免了因为过充电而对单体锂电池造成损坏；其他单体锂电池仍然能以恒定小电流进行充电，单体锂电池之间的一致性能得到一定改善，从而整体上提升了锂电池的性能。

[0084] 参如图 6，所示为本发明实施例过压均衡模块的电路原理图，图中 U1 为并联型三端稳压管 TL431，第一三极管是功率三极管 S8550，第一二极管 D1 为发光二极管，第三电阻 R3 是功率电阻，主要用来消耗电能。一旦电池过充时，TL431 便开通，S8550 的发射 PN 结由于承受正压而打开，随即功耗电阻便开始消耗电池电能，直至把电池电压拖到均衡点，通过发光二极管的亮灭判断电池的均衡状态。通过调节第一电阻 R1、第五电阻 R5 和第七电阻 R7 的阻值来设置均衡点。

[0085] 锂电池监控单元 104 由 N 个单体监控模块组成，如果每个单体监控模块都采用一个电压采集模块，将会增加电路的复杂度，也会影响电压采样的一致性。

[0086] 为了解决上述问题，参见图 7，所示为本实施例锂电池充放电管理系统中锂电池监控单元的原理框图，至少有一个单体监控模块 200 包括电压采样模块 201，锂电池监控单元 104 还包括多路选择开关 112，多路选择开关 112 与锂电池组 108、电压采样模块 201 和微控制器 107 连接，微控制器 107 发送控制信号给多路选择开关 112 选择一路导通，每一时刻电压采样模块 201 只采集一个单体锂电池的电压。

[0087] 以上所述仅为本发明的较佳实施例而已，并不用以限制本发明，凡在本发明的精神和原则之内所作的任何修改、等同替换和改进等，均应包含在本发明的保护范围之内。

DELTRAN EX1002
IPR2024-01219

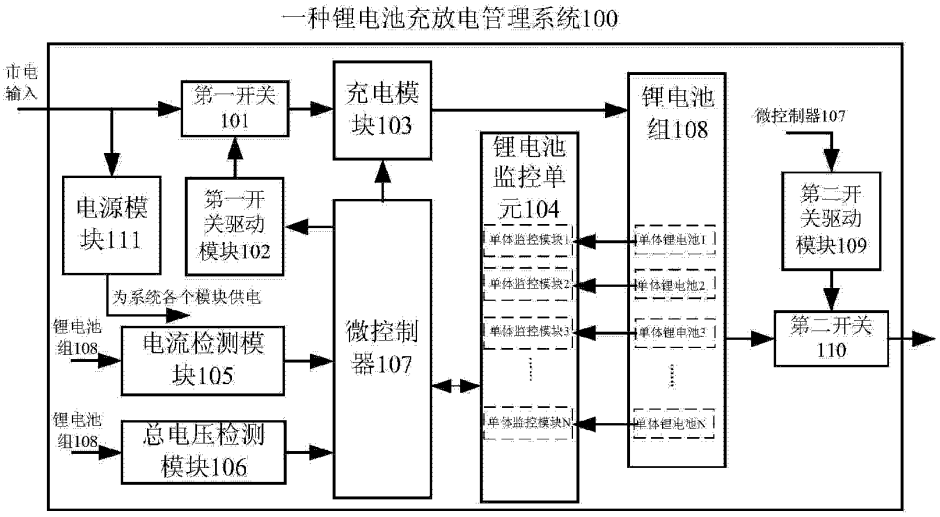


图 1

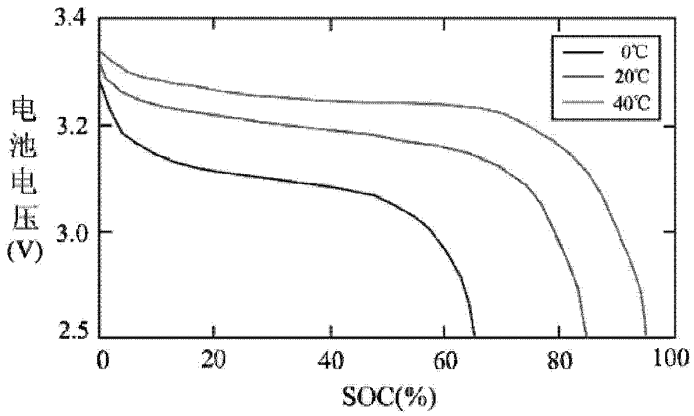


图 2

DELTRAN EX1002
IPR2024-01219

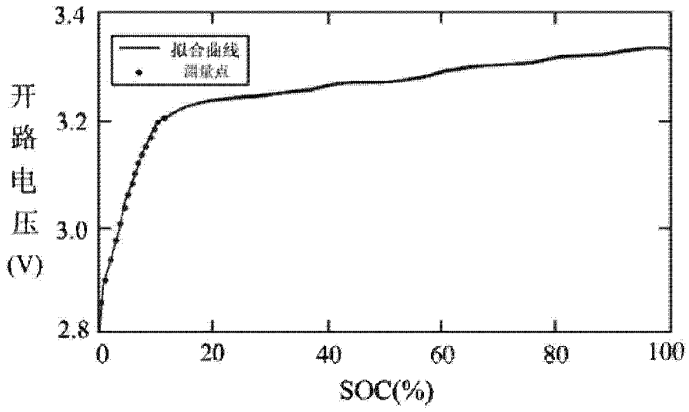


图 3

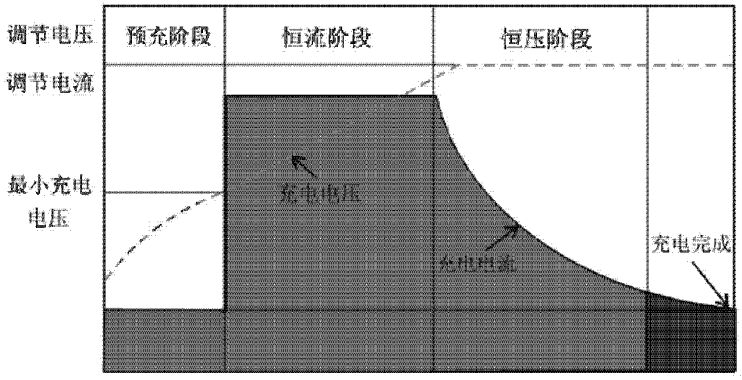


图 4

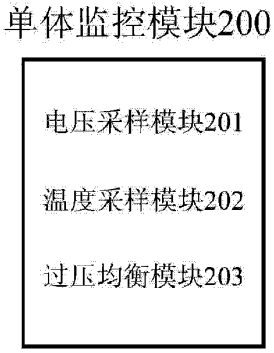


图 5

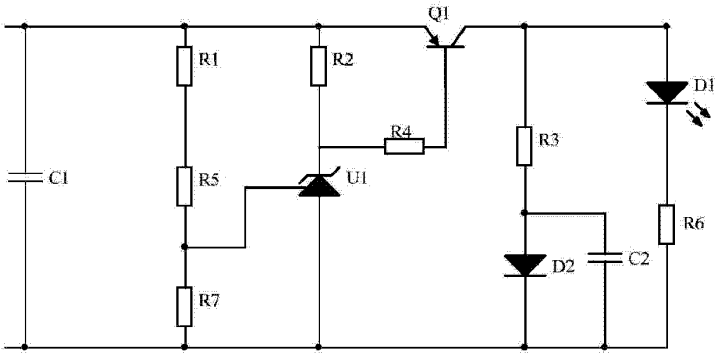


图 6

DELTRAN EX1002
IPR2024-01219

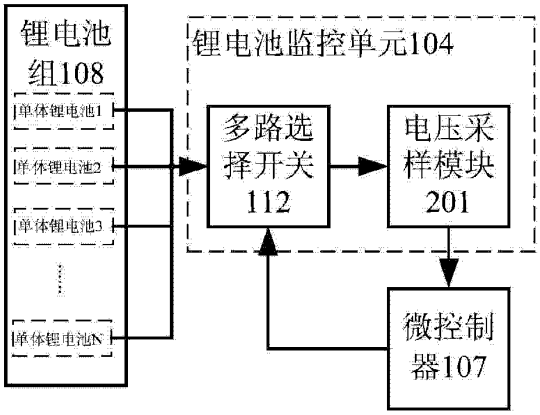


图 7

DELTRAN EX1002
IPR2024-01219

Espacenet

JP2012230962A POWER STORAGE DEVICE, AND ELECTRIC STORAGE MODULE

Applicants: JM ENERGY CORP

Inventors: UENO NAOKI,OHASHI KAZUHIRO,OSHIMA TOSHIHIRO

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POWER STORAGE DEVICE, AND ELECTRIC STORAGE MODULE

Abstract

PROBLEM TO BE SOLVED: To provide a power storage device having high safety.SOLUTION: The power storage device 100 comprises a power storage cell 10 having an outer sheath 12 housing a positive electrode, a negative electrode and an electrolyte, and a cell case 30 holding the power storage cell 10. The outer sheath 12 comprises a body part 13, and a periphery part 14 provided around the body part 13. The periphery part 14 comprises a first part 15 held by the cell case 30 and a second part 16 serving as a relief valve for discharging a gas in the outer sheath 12, and the cell case 30 comprises an exhaust passage 32 exhausting the gas discharged from the second part 16 and extending along the periphery part 14.

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H01G	9/26	(2006.01)	H01G	9/00	521	5H011
H01M	2/02	(2006.01)	H01M	2/02	K	5H012
H01M	2/12	(2006.01)	H01M	2/12	101	5H043
H01M	2/34	(2006.01)	H01M	2/34	B	

審査請求 未請求　請求項の数 10　ＯＬ　（全 21 頁）

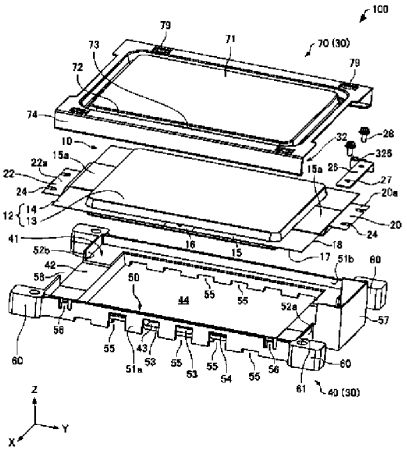
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最終頁に続く

(54)【発明の名称】蓄電デバイスおよび蓄電モジュール

(57)【要約】
【課題】高い安全性を有する蓄電デバイスを提供する。
【解決手段】本発明に係る蓄電デバイス１００は、正極、負極、および電解液が収容された外装体１２を有する蓄電セル１０と、蓄電セル１０を挟持するセルケース３０と、を含み、外装体１２は、本体部１３と、本体部１３の周囲に設けられた外周部１４と、を有し、外周部１４は、セルケース３０によって挟持された第１部分１５と、外装体１２内のガスを放出させる安全弁となる第２部分１６と、を有し、セルケース３０は、第２部分１６から放出されたガスを排出するための排出流路３２を有し、排出流路３２は、外周部１４に沿って延在している。
【選択図】図１



DELTRAN EX1002
IPR2024-01219

【特許請求の範囲】
【請求項１】
正極、負極、および電解液が収容された外装体を有する蓄電セルと、
前記蓄電セルを挟持するセルケースと、
を含み、
前記外装体は、本体部と、前記本体部の周囲に設けられた外周部と、を有し、
前記外周部は、
前記セルケースによって挟持された第１部分と、
前記外装体内のガスを放出させる安全弁となる第２部分と、
を有し、
前記セルケースは、前記第２部分から放出されたガスを排出するための排出流路を有し、
前記排出流路は、前記外周部に沿って延在している、蓄電デバイス。
【請求項２】
請求項１において、
前記外装体は、長辺と短辺とを備えた平面形状を有し、
前記排出流路は、前記長辺に沿って延在している、蓄電デバイス。
【請求項３】
請求項１または２において、
前記セルケースは、基体と蓋体とを有し、
前記基体は、前記第１部分を載置する載置部を有し、
前記蓋体は、
前記本体部を覆う被覆部と、
前記被覆部の周囲に形成され、前記基体側に突出した突出部と、
を有し、
前記第１部分は、前記載置部と前記突出部とによって挟持されている、蓄電デバイス。
【請求項４】
請求項３において、
前記載置部には、前記第２部分に沿って凹部が形成されている、蓄電デバイス。
【請求項５】
請求項４において、
前記基体は、前記載置部の周囲に設けられた側壁部を有し、
前記蓋体は、前記蓋体の外周に設けられた屈曲部を有し、
前記側壁部および前記屈曲部は、前記排出流路を形成し、
前記側壁部には、前記凹部と前記排出流路と連通する連通部が形成されている、蓄電デバイス。
【請求項６】
請求項３ないし５のいずれか１項において、
前記載置部には、開口部が形成され、
前記本体部は、前記開口部に配置されている、蓄電デバイス。
【請求項７】
請求項１ないし６のいずれか１項において、
前記排出流路内には、前記第２部分から放出された電解液を吸収する吸液体が設けられている、蓄電デバイス。
【請求項８】
請求項１ないし７のいずれか１項において、
前記蓄電セルは、リチウムイオンキャパシタである、蓄電デバイス。
【請求項９】
請求項１ないし８のいずれか１項に記載の蓄電デバイスは、複数積層され、
複数の前記蓄電デバイスは、電気的に接続されている、蓄電モジュール。

DELTRAN EX1002
IPR2024-01219

【請求項１０】
請求項９において、
前記蓄電セルは、
前記正極に電気的に接続された正極端子と、
前記負極に電気的に接続された負極端子と、を有し、
前記基体には、前記正極端子および前記負極端子を囲む絶縁性のカバー部が形成されている、蓄電モジュール。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、蓄電デバイスおよび蓄電モジュールに関する。
【背景技術】
【０００２】
正極および負極を備えた電極積層体を、電解液とともに外装体の内部に収容して密閉した構造の密閉型蓄電セルが知られている。
【０００３】
このような密閉型蓄電セルの使用時に規格範囲外の電圧が印加されると、電解液溶媒が、正極ないし負極の活物質と反応し、その結果、密閉空間内でガスが発生することがある。また、密閉型蓄電セルが規格範囲外の高温条件で使用される場合にも、電解質塩の分解等に起因してガスが発生することがある。
【０００４】
このようにして発生したガスを放出して外装体の破裂を防止するために、外装体に安全弁を設ける技術が知られている。例えば特許文献１には、組電池と、組電池を覆う上部カバーと、の間に、ガスを排出するための部材を設け、この部材に上部カバーを被せて形成した流路を通して、ガスを単電池の積層方向に排出する技術が開示されている。また、特許文献２では、電池セルを収納するセルケースの側面に設けたガス放出口に、放出用通路を組み付けることで、ガスを電池セルの積層方向に排出する技術が開示されている。
【先行技術文献】
【特許文献】
【０００５】
【特許文献１】特開２００２－１５１０２５号公報
【特許文献２】特開２００６－２３６６０５号公報
【発明の概要】
【発明が解決しようとする課題】
【０００６】
上記のガスを排出するための流路は、容積が大きいことが望ましい。流路の容積が小さいと、流路内においてガスの圧力が上昇し、ガスが激しく放出されることがある。特に、外装体から放出されるガスは高温であるため、高い安全性を有する蓄電デバイスが要求されている。
【０００７】
本発明のいくつかの態様に係る目的の１つは、高い安全性を有する蓄電デバイスを提供することにある。また、本発明のいくつかの態様に係る目的の１つは、上記蓄電デバイスを有する蓄電モジュールを提供することにある。
【課題を解決するための手段】
【０００８】
本発明は上述の課題の少なくとも一部を解決するためになされたものであり、以下の態様または適用例として実現することができる。
【０００９】
［適用例１］
本発明に係る蓄電デバイスの一態様は、

DELTRAN EX1002
IPR2024-01219

正極、負極、および電解液が収容された外装体を有する蓄電セルと、
前記蓄電セルを挟持するセルケースと、
を含み、
前記外装体は、本体部と、前記本体部の周囲に設けられた外周部と、を有し、
前記外周部は、
前記セルケースによって挟持された第１部分と、
前記外装体内のガスを放出させる安全弁となる第２部分と、
を有し、
前記セルケースは、前記第２部分から放出されたガスを排出するための排出流路を有し、
前記排出流路は、前記外周部に沿って延在している。
【００１０】
［適用例２］
適用例１において、
前記外装体は、長辺と短辺とを備えた平面形状を有し、
前記排出流路は、前記長辺に沿って延在していてもよい。
【００１１】
［適用例３］
適用例１または２において、
前記セルケースは、基体と蓋体とを有し、
前記基体は、前記第１部分を載置する載置部を有し、
前記蓋体は、
前記本体部を覆う被覆部と、
前記被覆部の周囲に形成され、前記基体側に突出した突出部と、
を有し、
前記第１部分は、前記載置部と前記突出部とによって挟持されていてもよい。
【００１２】
［適用例４］
適用例３において、
前記載置部には、前記第２部分に沿って凹部が形成されていてもよい。
【００１３】
［適用例５］
適用例４において、
前記基体は、前記載置部の周囲に設けられた側壁部を有し、
前記蓋体は、前記蓋体の外周に設けられた屈曲部を有し、
前記側壁部および前記屈曲部は、前記排出流路を形成し、
前記側壁部には、前記凹部と前記排出流路と連通する連通部が形成されていてもよい。
【００１４】
［適用例６］
適用例３ないし５のいずれか１例において、
前記載置部には、開口部が形成され、
前記本体部は、前記開口部に配置されていてもよい。
【００１５】
［適用例７］
適用例１ないし６のいずれか１例において、
前記排出流路内には、前記第２部分から放出された電解液を吸収する吸液体が設けられていてもよい。
【００１６】
［適用例８］
適用例１ないし７のいずれか１例において、

DELTRAN EX1002
IPR2024-01219

前記蓄電セルは、リチウムイオンキャパシタであってもよい。

【００１７】

［適用例９］

適用例１ないし８のいずれか１例に記載の蓄電デバイスは、複数積層され、

複数の前記蓄電デバイスは、電気的に接続されていてもよい。

【００１８】

［適用例１０］

適用例９において、

前記蓄電セルは、

前記正極に電気的に接続された正極端子と、

前記負極に電気的に接続された負極端子と、を有し、

前記基体には、前記正極端子および前記負極端子を囲む絶縁性のカバー部が形成されていてもよい。

【発明の効果】

【００１９】

本発明に係る蓄電デバイスによれば、外装体の外周部に沿って、排出流路の全長を長くすることができる。これにより、本発明に係る蓄電デバイスでは、例えば蓄電セルの厚み方向に沿う排出流路を設けた形態に比べて、容易に排出流路の容量を大きくすることができる。したがって、排出流路内のガスの圧力が高くなることを抑制できる。さらに、高温（例えば３００℃程度）のガスを、効率よく冷却することができる。よって、本発明に係る蓄電デバイスは、高い安全性を有することができる。

【図面の簡単な説明】

【００２０】

【図１】本実施形態に係る蓄電デバイスを模式的に示す分解斜視図。

【図２】本実施形態に係る蓄電デバイスを模式的に示す斜視図。

【図３】本実施形態に係る蓄電デバイスを模式的に示す断面図。

【図４】本実施形態に係る蓄電デバイスを模式的に示す断面斜視図。

【図５】本実施形態に係る蓄電デバイスの蓄電セルを模式的に示す断面図。

【図６】本実施形態に係る蓄電デバイスの基体を模式的に示す斜視図。

【図７】本実施形態に係る蓄電デバイスの蓋体を模式的に示す図。

【図８】本実施形態に係る蓄電デバイスの蓋体を模式的に示す断面図。

【図９】本実施形態に係る蓄電デバイスの蓋体を模式的に示す断面図。

【図１０】本実施形態に係る蓄電デバイスの蓋体を模式的に示す断面図。

【図１１】本実施形態に係る蓄電デバイスの蓋体を模式的に示す断面図。

【図１２】本実施形態に係る蓄電デバイスの蓋体を模式的に示す断面図。

【図１３】本実施形態の変形例に係る蓄電デバイスを模式的に示す断面斜視図。

【図１４】本実施形態に係る蓄電モジュールを模式的に示す分解斜視図。

【図１５】本実施形態に係る蓄電モジュールを模式的に示す図。

【図１６】本実施形態に係る蓄電モジュールを模式的に示す斜視図。

【図１７】本実施形態に係る蓄電モジュールの一部を模式的に示す斜視図。

【発明を実施するための形態】

【００２１】

以下、本発明の好適な実施形態について、図面を参照しながら説明する。

【００２２】

１．　蓄電デバイス

まず、本実施形態に係る蓄電デバイスについて、図面を参照しなら説明する。図１は、本実施形態に係る蓄電デバイス１００を模式的に示す分解斜視図である。図２は、本実施形態に係る蓄電デバイス１００を模式的に示す斜視図である。図３は、本実施形態に係る蓄電デバイス１００を模式的に示す図２のＩＩＩ－ＩＩＩ線断面図（例えばＹＺ平面の断面図）である。図４は、本実施形態に係る蓄電デバイス１００を模式的に示す斜視図であ

DELTRAN EX1002
IPR2024-01219

って、図２のＩＶ－ＩＶ線断面図を含んで示している。

【００２３】

蓄電デバイス１００は、図１～図４に示すように、蓄電セル１０と、セルケース３０と、を含む。

【００２４】

１．１．　蓄電セルについて

蓄電セル１０の形態としては、リチウムイオンキャパシタ、二次電池、電気二重層キャパシタなどを例示することができる。蓄電セル１０は、図１に示すように、外装体１２と、正極端子２０と、負極端子２２と、を有することができる。

【００２５】

外装体１２は、正極、負極、および電解液を収容している。外装体１２の形状は、正極、負極、および電解液を収容することができれば特に限定されないが、例えば、２枚のラミネートフィルムを張り合わせたラミネート型である。なお、図３および図４では、便宜上、外装体１２内に収容される正極や負極等を省略して図示している。

【００２６】

ラミネートフィルムとしては、例えば、アルミニウム箔や銅箔などの金属箔を、ポリプロピレンやナイロンなどの合成樹脂で挟んだものを用いることができる。このようなフィルム状の外装体１２を用いることにより、例えば、金属等からなる硬質の外装体（金属缶等）を用いる場合に比べて、蓄電セル１０の小型化や軽量化を図ることができる。

【００２７】

外装体１２は、図１に示すように、本体部１３と、本体部１３の周囲に設けられた外周部１４と、を有する。本体部１３には、正極および負極等からなる電極積層体が収容されている。本体部１３の厚み（Ｚ軸方向の長さ）は、例えば、外周部１４の厚みよりも大きく、例えば、１ｍｍ以上１０ｍｍ以下である。外装体１２は、２枚のラミネートフィルムを、外周部１４において熱圧着して形成されていてもよい。外装体１２は、平面視において（Ｚ軸方向から見て）長方形の形状を有し、長辺１７と短辺１８とを備えることができる。

【００２８】

外周部１４は、セルケース３０によって挟持される第１部分１５と、安全弁となる第２部分１６と、を有する。第１部分１５は、端子２０，２２を挟む端子挟持部１５ａを有することができる。端子挟持部１５ａは、第１部分１５の他の部分（端子挟持部１５ａ以外の第１部分１５）に対して、端子２０，２２の厚み分、Ｚ軸方向に変位していてもよい。図示の例では、端子挟持部１５ａは、外周部１４の短辺１８に沿う部分に設けられている。

【００２９】

第２部分１６は、例えば、外周部１４の長辺１７に沿う部分に設けられている。図示の例では、第２部分１６は、外周部１４の長辺１７に沿う部分の中央に設けられている。第２部分１６は、例えば、２枚のラミネートフィルムの密着性が第１部分１５より低い部分である。そのため、第２部分１６は、正極、負極、および電解液が収容された密閉空間の圧力が所定値に達すると、第１部分１５に先立って優先的に剥離する。これにより、蓄電セル１０は、仮に外装体１２内にガスが発生しても、そのガスを第２部分１６から放出させることで圧力開放を行うことができる。その結果、外装体１２が破裂することを防止できる。

【００３０】

正極端子２０および負極端子２２は、外装体１２から延出して設けられている。より具体的には、正極端子２０および負極端子２２は、外装体１２の密閉性を保持した状態で、本体部１３から外周部１４を通って外装体１２の外にまで延出している。正極端子２０および負極端子２２は、互いに反対方向に延出している。端子２０，２２の一部は、蓋体７０から露出している。

【００３１】

DELTRAN EX1002
IPR2024-01219

正極端子２０の形状は、特に限定されないが、図示の例では、正極端子２０は、外装体１２の外周部１４よりも上方（＋Ｚ方向）に位置する接続部２０ａを有する。例えば蓄電デバイス１００が積層された場合に（図１４参照）、正極端子２０は、接続部２０ａによって、上隣りの蓄電デバイス１００の負極端子２２と、容易に接続されることができる。接続部２０ａには、例えば、貫通孔２４が設けられている。貫通孔２４と座金２６の貫通孔２７とを連通するように配置させ、貫通孔２４，２７にネジ２８を貫通させることにより、正極端子２０を、基体４０の端子固定部４６（図３参照）に固定することができる。蓄電デバイス１００が積層された場合は、正極端子２０は、上隣りの蓄電デバイス１００の負極端子２２と接続した状態で、座金２６およびネジ２８により、端子固定部４６に固定されてもよい。

【００３２】

負極端子２２の形状は、特に限定されないが、図示の例では、負極端子２２は、外装体１２の外周部１４よりも下方（－Ｚ方向）に位置する接続部２２ａを有する。例えば蓄電デバイス１００が積層された場合に（図１４参照）、負極端子２２は、接続部２２ａによって、下隣りの蓄電デバイス１００の正極端子２０と、容易に接続されることができる。蓄電デバイス１００が積層された場合は、負極端子２２は、下隣りの蓄電デバイス１００の正極端子２０と接続した状態で、座金およびネジにより、下隣りの蓄電デバイス１００の端子固定部４６（図３参照）に固定されてもよい。

【００３３】

正極端子２０は、外装体１２内の正極と電気的に接続されている。負極端子２２は、外装体１２内の負極と電気的に接続されている。正極端子２０の材質としては、例えば、アルミニウムが挙げられる。負極端子２２の材質としては、例えば、銅、ニッケルが挙げられる。

【００３４】

なお、図示の例では、外装体１２から＋Ｙ方向に延在している端子を正極端子２０とし、外装体１２から－Ｙ方向に延在している端子を負極端子２２としたが、外装体１２から－Ｙ方向に延在している端子を正極端子とし、外装体１２から＋Ｙ方向に延在している端子を負極端子としてもよい。

【００３５】

次に、蓄電デバイス１００の蓄電セル１０の内部構造について説明する。図５は、蓄電セル１０を示す断面図あって、蓄電セル１０の（外装体１２の）内部構造を模式的に示す断面図である。以下では、一例として、蓄電セル１０がリチウムイオンキャパシタである場合について説明する。

【００３６】

蓄電セル１０は、図５に示すように、外装体１２に収容された電極積層体５および電解液（図示せず）を有することができる。図示の例では、電極積層体５および電解液は、第１ラミネートフィルム１２ａと第２ラミネートフィルム１２ｂとからなる外装体１２内に収容されている。

【００３７】

電極積層体５は、電解液に浸漬されている。電極積層体５は、正極１と、負極２と、リチウム極３と、セパレータ４と、を有する。正極１、負極２、リチウム極３、およびセパレータ４は、シート状の形状を有する。図示の例では、電極積層体５は、第１ラミネートフィルム１２ａ側から、リチウム極３、負極２、正極１、負極２、正極１、負極２、リチウム極３の順で積層され、極と極との間、および極とラミネートフィルムとの間にセパレータ４を介することによって構成されている。電極積層体５において、正極１および負極２は、並列に接続されている。

【００３８】

なお、正極１および負極２の数は、特に限定されない。同様に、リチウム極３の数および設置場所も特に限定されない。また、電極積層体５の形態は、図示の例に限定されず、例えば、正極、負極、リチウム極、およびセパレータを重ねて積層シートを形成し、該積

DELTRAN EX1002
IPR2024-01219

層シートを巻回させてなる巻回型でもよい。

【００３９】

正極１は、正極集電体１ａと、正極活物質層１ｂと、を有することができる。正極集電体１ａとしては、多孔性の金属箔を用いることができる。正極集電体１ａの材質としては、例えば、アルミニウム、ステンレスが挙げられる。正極集電体１ａの厚みは、例えば、１５μｍ以上５０μｍ以下である。正極集電体１ａは、正極リード６を介して、正極端子１６に接続されている。正極リード６の材質は、例えば、正極集電体１ａの材質と同じである。

【００４０】

正極活物質層１ｂは、正極集電体１ａに形成されている。図示の例では、正極活物質層１ｂは、正極集電体１ａの両面に形成されているが、片面にのみ形成されていてもよい。正極活物質層１ｂの厚みは、例えば、３０μｍ以上９０μｍ以下である。

【００４１】

正極活物質層１ｂは、正極活物質を含有している。正極活物質は、ヘキサフルオロホスフェート（PF_6^-）や、テトラフルオロボレート（BF_4^-）のようなアニオンを可逆的に担持できる物質である。より具体的には、正極活物質としては、活性炭、芳香族系縮合ポリマーの熱処理物であるポリアセン系物質（ＰＡＳ）が挙げられる。

【００４２】

正極活物質層１ｂの形成方法としては、まず、正極活物質粉末およびバインダーを、水系媒体または有機溶媒中に分散してスラリーを調整する。必要に応じて、導電性粉末を混入させてもよい。次に、調整したスラリーを正極集電体１ａの表面に塗布して乾燥させる。このようにして、正極活物質層１ｂを得ることをできる。

【００４３】

負極２は、負極集電体２ａと、負極活物質層２ｂと、を有することができる。負極集電体２ａとしては、多孔性の金属箔を用いることができる。負極集電体２ａの材質としては、例えば、銅、ステンレス、ニッケルが挙げられる。負極集電体２ａの厚みは、例えば、１０μｍ以上５０μｍ以下である。負極集電体２ａは、負極リード７を介して、負極端子１８に接続されている。負極リード７の材質は、例えば、負極集電体２ａの材質と同じである。

【００４４】

負極活物質層２ｂは、負極集電体２ａに形成されている。図示の例では、負極活物質層２ｂは、負極集電体２ａの両面に形成されているが、片面にのみ形成されていてもよい。負極活物質層２ｂの厚みは、例えば、２０μｍ以上５０μｍ以下である。

【００４５】

負極活物質層２ｂは、負極活物質を含有している。負極活物質は、リチウムイオンを可逆的に吸蔵できる物質である。より具体的には、負極活物質としては、黒鉛（グラファイト）、難黒鉛化炭素（ハードカーボン）、もしくはそれらの粉砕品が挙げられる。

【００４６】

負極活物質層２ｂの形成方法としては、まず、負極活物質粉末およびバインダーを、水系媒体または有機溶媒中に分散してスラリーを調整する。必要に応じて、導電性粉末を混入させてもよい。次に、調整したスラリーを負極集電体２ａの表面に塗布して乾燥させる。このようにして、負極活物質層２ｂを得ることをできる。

【００４７】

リチウム極３は、リチウム極集電体３ａと、リチウム箔３ｂと、を有する。リチウム極集電体３ａとしては、多孔性の金属箔を用いることができる。リチウム極集電体３ａの材質としては、例えば、銅、ステンレスが挙げられる。リチウム極集電体３ａの厚みは、例えば、１０μｍ以上２００μｍ以下である。

【００４８】

リチウム箔３ｂは、例えば、リチウム極集電体３ａの一方の面に圧着されている。リチウム箔３ｂの材質は、リチウムである。リチウム箔３ｂは、リチウムイオンの供給源とし

DELTRAN EX1002
IPR2024-01219

て機能することができる。すなわち、リチウム極集電体３ａと負極集電体２ａとを負極リード７を介して接続させて短絡させることにより、リチウム箔３ｂは、電解液に溶解してリチウムイオンとなることができる。そして、リチウムイオンは、電気化学的に電解液を介して負極活物質層２ｂにドープ（「プレドープ」ともいえる）される。その結果、負極２の電位を下げることができる。これにより、エネルギー密度を大きくすることができる。リチウム箔３ｂの厚みは、例えば、５０μｍ以上３００μｍ以下である。

【００４９】

なお、リチウム箔３ｂは、プレドープによって、例えば完全に電解液に溶解するが、図示の例では、便宜上、電解液の図示を省略し、電解液に溶解する前のリチウム箔３ｂを図示している。

【００５０】

電解液としては、リチウム塩を電解質とする非プロトン性有機溶媒電解質溶液を用いることができる。非プロトン性有機溶媒としては、エチレンカーボネート、プロピレンカーボネート、ジメチルカーボネート、ジエチルカーボネート、γ－ブチロラクトン、アセトニトリル、ジメトキシエタン、テトラヒドロフラン、ジオキソラン、塩化メチレン、スルホランなどが挙げられる。これらの溶媒は、単独で用いてもよいし、２種類以上を混合して用いてもよい。リチウム塩としては、$LiPF_6$、$LiBF_4$、$LiClO_4$、$LiAsF_6$、$Li(C_2F_5SO_2)_2N$などが挙げられる。

【００５１】

セパレータ４は、正極活物質、負極活物質、および電解質に対して耐久性がある多孔性材料を用いることができる。セパレータ４としては、セルロース、レーヨン、セルロース／レーヨン、ポリエチレン、ポリプロピレン、アラミド樹脂、アミドイミド、ポリフェニレンサルファイド、ポリイミドなどからなる不織布や、多孔質のフィルムなどを用いることができる。セパレータ４の厚みは、例えば、２０μｍ以上５０μｍ以下である。セパレータは、正極１と負極２との間や、負極２とリチウム極３との間を、隔離することができる。さらに、セパレータ４は、電解質を浸潤することができる。

【００５２】

１．２．　セルケースについて

セルケース３０は、蓄電セル１０を挟持することができる。セルケース３０の形状は、蓄電セル１０を挟持できれば、特に限定されない。セルケース３０は、基体４０と、蓋体７０と、を有することができる。

【００５３】

１．２．１．　基体について

基体４０の材質は、特に限定されないが、例えば、プラスチック等の樹脂である。ここで、図６は、基体４０を模式的に示す斜視図であって、図１とは異なる方向から見た図である。

【００５４】

基体４０は、図１および図６に示すように、載置部４１と、載置部４１の周囲に設けられた側壁部５０と、を有する。

【００５５】

載置部４１は、基体４０の底部を構成することができる。載置部４１は、例えば、外装体１２の第１部分１５に沿って形成されている。載置部４１は、図３および図４に示すように、第１部分１５を載置することができる。

【００５６】

載置部４１は、図１および図６に示すように、端子支持部４２を有することができる。端子支持部４２は、載置部４１の他の部分（端子支持部４２以外の載置部４１）よりも厚みが小さい部分である。端子支持部４２は、図３に示すように、外装体１２の端子挟持部１５ａを支持することができる。

【００５７】

載置部４１には、図３に示すように、例えば、段差部４６が形成されている。段差部４

DELTRAN EX1002
IPR2024-01219

６は、載置部４１よりも大きい厚みを有することができる。段差部４６は、正極端子２０を支持する端子支持部４２と隣接して設けられていてもよい。段差部４６と座金２６とで正極端子２０を挟み、ネジ２８で固定することによって、正極端子２０を、基体４０に固定することができる。段差部４６は、載置部４１と一体的に形成されていてもよい。

【００５８】

載置部４１には、図１および図６に示すように、凹部４３が形成されている。凹部４３は、例えば、外装体１２の第２部分１６に沿って設けられている。すなわち、第２部分１６は、凹部４３の上方に配置されている。これにより、第２部分１６は、基体４０と離間することができる。そのため、第２部分１６からガスが放出される場合に、基体４０によってガスの放出が抑制されることを防止できる。

【００５９】

載置部４１には、例えば、開口部４４が形成されている。開口部４４は、載置部４１を厚み方向に貫通している。開口部４４の平面形状は、特に限定されないが、図示の例では長方形である。図３および図４に示すように、開口部４４には、外装体１２の本体部１３が配置されていてもよい。これにより、外装体１２内でガスが発生した場合に、本体部１３は膨らむことができ、その分、外装体１２内の圧力を小さくすることができる。さらに、蓄電デバイス１００が積層された場合に、本体部１３は、膨らむことによって、本体部１３の上方の蓋体７０のみならず、下隣りの蓄電セル１００の蓋体７０とも接することができる。すなわち、本体部１３は、放熱性の高い金属からなる蓋体７０によって挟まれることができる。これにより、蓄電セル１０の放熱性を向上させることができる。

【００６０】

側壁部５０は、図１および図６に示すように、載置部４１の周囲に設けられている。側壁部５０は、載置部４１よりもＺ軸方向に延在している。図示の例では、側壁５０は、長辺１７に沿う２つの第１側壁部５１ａ，５１ｂと、短辺１８に沿う２つの第２側壁部５２ａ，５２ｂと、を有している。第１側壁部５１ａ，５１ｂは、互いに対向して配置されていてもよい。第２側壁部５２ａ，５２ｂは、互いに対向して配置されていてもよい。

【００６１】

第１側壁部５１ａには、凹部４３と連通する第１連通部５３が形成されている。第１連通部５３は、第１側壁部５１ａをＸ軸方向に貫通している。第１連通部５３の数は、特に限定されないが、図示の例では、２つ設けられている。第１連通部５３の形状は、特に限定されないが、図示の例では、長方形である。第１連通部５３は、第２部分１６からガスが放出された場合にガスを排出流路３２（図４参照）に導くことができる。

【００６２】

第１側壁部５１ａには、図６に示すように、第２連通部５４が形成されていてもよい。第２連通部５４は、第１側壁部５１ａをＸ軸方向に貫通している。図示の例では、第２連通部５４は、２つ設けられ、２つの第１連通部５３を挟んで設けられている。第１連通部５３および第２連通部５４は、一例に配列していてもよい。第２連通部５４は、外装体１２の第１部分１５に隣接して形成されている。第２連通部５４は、第２部分１６から放出されたガスが、仮に、基体４０と蓋体７０とによって挟持される第１部分１５近傍に流出した場合に、該ガスを排出流路３２に導くことができる。

【００６３】

第１側壁部５１ａ，５１ｂには、例えば、切り欠き部５５が形成されている。切り欠き部５５は、第１側壁部５１ａ，５１ｂをＸ軸方向に貫通し、さらに、載置部４１をＸ軸方向に貫通している。切り欠き部５５は、例えば、連通部５３，５４よりも下方に形成されている。切り欠き部５５は、第１側壁部５１ａ，５１ｂおよび載置部４１の下側を切り欠くことにより形成されていてもよい。切り欠き部５５の数は、特に限定されないが、図示の例では、第１側壁部５１ａ，５１ｂに６つずつ設けられている。切り欠き部５５の形状は、特に限定されないが、図示の例では、長方形である。第１側壁部５１ａに形成された切り欠き部５５と、第１側壁部５１ｂに形成された切り欠き部５５とは、互いに対向して配置されていてもよい。切り欠き部５５は、特に、蓄電デバイス１００が複数積層された

DELTRAN EX1002
IPR2024-01219

場合に（図１５参照）、隣り合う蓄電デバイス１００の間に形成された通気孔として機能することができる。すなわち、切り欠き部５５によって、蓄電セル１０の放熱性を向上させることができる。

【００６４】

第１側壁部５１ａ，５１ｂには、図１および図６に示すように、引掛け部５６が設けられていてもよい。図示の例では、引掛け部５６は、第１側壁部５１ａ，５１ｂに２つずつ設けられているが、その数は特に限定されない。図示はしないが、引掛け部５６は、第２側壁部５２ａ，５２ｂに設けられていてもよい。引掛け部５６は、蓋体７０の開口部７９に挿入されて蓋体７０に引掛けられることができる。これにより、基体４０と蓋体７０とを接続することができる。引掛け部５６および開口部７９の形状は、基体４０と蓋体７０とを接続することができれば、特に限定されない。

【００６５】

第２側壁部５２ａには、例えば、カバー部５７が形成されている。カバー部５７は、蓋体７０から露出している。カバー部５７は、例えば正極端子２０を包囲している。カバー部５７は、第２側壁部５２ａよりもＺ軸方向に延在している。カバー部５７は、絶縁性を有する。カバー部５７によって、正極端子２０が、例えば導電性部材（図示せず）と接触し、短絡することを抑制できる。さらに、上下に蓄電デバイス１００を積層させる際に、スタックし易くなる。なお、図示はしないが、カバー部５７は、負極端子２２を包囲していてもよい。

【００６６】

カバー部５７は、基体４０と異なる部材として形成されていてもよいが、基体４０と一体的に形成されていることが望ましい。これにより、蓄電デバイス１００の部品数を削減することができ、製造工数を低減することができる。

【００６７】

第２側壁部５２ｂには、例えば、切り欠き部５８が形成されている。切り欠き部５８を通って、負極端子２２は、セルケース３０の外に延出することができる。なお、負極端子２２は、蓄電デバイス１００が複数積層された場合に（図１４参照）、下隣りの蓄電デバイス１００の正極端子２０と接続された状態で、下隣りの蓄電デバイス１００のカバー部５７により包囲されていてもよい。

【００６８】

基体４０は、積層用固定部６０を有することができる。積層用固定部６０は、蓋体７０から露出している。積層用固定部６０は、側壁部５０の角部に配置されている。より具体的には、積層用固定部６０は、第１側壁部５１ａ，５１ｂと第２側壁部５２ａ，５２ｂとの接続部に配置されている。積層用固定部６０には、Ｚ軸方向に貫通する貫通孔６１が形成されている。例えば、蓄電デバイス１００が複数積層された場合に（図１４参照）、貫通孔６１にネジを通すことにより、複数の蓄電デバイス１００を固定することができる。

【００６９】

１．２．２．　蓋体について

蓋体７０の材質としては、例えば、アルミニウム、鉄、銅等の金属や、樹脂などが挙げられるが、特電セル１０の放熱性を考慮すると、金属が好ましい。ここで、図７は、蓋体７０を模式的に示す平面図である。図８は、蓋体７０を模式的に示す図７のＶＩＩＩ－ＶＩＩＩ線断面図である。図９は、蓋体７０を模式的に示す図７のＩＸ－ＩＸ線断面図である。

【００７０】

蓋体７０は、被覆部７１と、突出部７２と、屈曲部７４と、を有することができる。

【００７１】

被覆部７１は、外装体１２の本体部１３を覆うことができる。被覆部７１の形状は、本体部１３を覆うことができれば特に限定されない。例えば、平面視において、被覆部７１の面積は、本体部１３の面積以上であるが、蓄電デバイス１００のコンパクト化を考慮すると、本体部１３の面積と同程度であることが好ましい。被覆部７１は、本体部１３と接

DELTRAN EX1002
IPR2024-01219

してもよいし、１ｍｍ程度の距離を隔てて離間していてもよい。

【００７２】

突出部７２は、被覆部７１の周囲に設けられている。突出部７２は、被覆部７１よりも、基体４０側に（－Ｚ方向に）突出している。突出部７２は、外装体１２の第１部分１５に沿って設けられている。第１部分１５は、図３および図４に示すように、載置部４１と突出部７２とによって挟持されている。すなわち、載置部４１と突出部７２とは、第１部分１５を挟んで押さえることができる。これにより、セルケース３０は、蓄電セル１０を挟持することができる。

【００７３】

蓋体７０は、図７および図８に示すように、突出部７２より突出度合いの小さい（Ｚ軸方向の長さが小さい）小突出部７３を有することができる。小突出部７３は、外装体１２の第２部分１６に沿って設けられている。すなわち、小突出部７３は、第２部分１６の上方に設けられている。これにより、第２部分１６は、蓋体７０と離間することができる。そのため、第２部分１６からガスが放出される場合に、蓋体７０によってガスの放出が抑制されることを防止できる。

【００７４】

なお、図示はしないが、小突出部７３を設けず、蓋体７０の第２部分１６上方に位置する部分を、被覆部７１と連続する平坦な部分としてもよい。また、図４に示す例では、第２部分１６は、基体４０および蓋体７０と離間しているが、ガスの放出を抑制しない程度であれば、第２部分１６は、基体４０および蓋体７０と接していてもよい。

【００７５】

屈曲部７４は、蓋体７０の外周に設けられている。屈曲部７４は、例えば、外装体１２の長辺１７に沿って設けられている。屈曲部７４および第１側壁部５１ａは、図４に示すように、排出流路３２を形成することができる。屈曲部７４の断面形状は、排出流路３２を形成することができれば、特に限定されない。

【００７６】

図示の例では、屈曲部７４は、被覆部７１と同程度の高さを有する第１流路形成部７４ａと、第１壁状部材５１ａと対向配置された第２流路形成部７４ｂと、第１流路形成部７４ａと対向配置された第３流路形成部材７４ｃと、を有している。第１流路形成部７４ａと第２流路形成部７４ｂとは、直交していてもよい。第２流路形成部７４ｂと第３流路形成部７４ｃとは、直交していてもよい。第３流路形成部７４ｃと第１側壁部５１ａとは、互いに、離間していてもよいし、接していてもよい。蓄電デバイス１００のコンパクト化を考慮すると、第２流路形成部７４ｂのＺ軸方向の長さは、第１壁状部材５１ａのＺ軸方向の長さと同等、もしくはそれ以下であることが好ましい。

【００７７】

なお、屈曲部７４の断面形状は、上記の形状に限定されず、図１０に示すように、第３流路形成部７４ｃは、第２流路形成部７４ｂから斜め上方に向けて延在していてもよい。また、図１１に示すように、第２流路形成部７４ｂの断面形状は、円弧の形状であってもよい。また、図１２に示すように、第２流路形成部７４ｂの断面形状は、屈曲した形状であってもよい。なお、図１０～図１２は、本実施形態に係る蓋体を模式的に示す断面図であって、図９に対応するものである。

【００７８】

セルケース３０は、図４に示すように、排出流路３２を有する。排出流路３２は、外装体１２の外周部１４に沿って延在している。より具体的には、排出流路３２は、外装体１２の長辺１７に沿って延在している。上述のように、排出流路３２は、屈曲部７４と第１側壁部５１ａとによって形成されている。排出流路３２は、外装体１２の第２部分１６からガスが排出された場合に、ガスを外部に排出することができる。より具体的には、第２部分１６から放出されたガスは、第１連通部５３を通って排出流路３２内に導入され、屈曲部７４の第２流路形成部７４ｂに衝突する。衝突されたガスは、排出流路３２内を＋Ｙ方向に進行するものと、排出流路３２内を－Ｙ方向に進行するものと、に分かれることが

DELTRAN EX1002
IPR2024-01219

できる。そして、例えば、排出流路３２と積層用固定部６０との間に形成された隙間や、第３流路形成部７４ｃと第１側壁部５１ａとの間に形成された隙間を通って、外部に排出されることができる。

【００７９】

蓋体７０は、例えば１枚の板状部材を加工することにより、形成されていてもよい。具体的な加工方法としては、プレス加工、モールド加工、光造形、削り出し加工などが挙げられる。これにより、被覆部７１、突出部７２、および屈曲部７４等を一体的に形成することができる。そのため、蓄電デバイス１００の部品数を削減することができ、製造工数を低減することができる。

【００８０】

１．３．　作用効果等について

蓄電デバイス１００によれば、セルケース３０は、外装体１２の第２部分１６からガスが放出された場合に、該ガスを排出するための排出流路３２を有し、排出流路３２は、外装体１２の外周部１４に沿って延在している。そのため、蓄電デバイス１００では、外装体１２の外周部１４に沿って、排出流路３２の全長を長くすることができる。これにより、蓄電デバイス１００では、例えば蓄電セルの厚み方向（Ｚ軸方向）に沿う排出流路を設けた形態に比べて、容易に排出流路３２の容量を大きくすることができる。したがって、排出流路３２内のガスの圧力が高くなることを抑制できる。さらに、高温（例えば３００℃程度）のガスを、効率よく冷却することができる。よって、蓄電デバイス１００は、高い安全性を有することができる。

【００８１】

蓄電デバイス１００によれば、排出流路３２は、外装体１２の長辺１７に沿って延在することができる。そのため、蓄電デバイス１００は、外装体の短辺に沿った排出流路を有する形態に比べて、排出流路３２の全長を長くすることができる。

【００８２】

蓄電デバイス１００によれば、外装体１２の第１部分１５は、基体４０の載置部４１と、蓋体７０の突出部７２と、によって挟持されることができる。そのため、基体４０および蓋体７０によって、安定して蓄電セル１０を保持することができる。さらに、載置部４１には、外装体１２の第２部分１６に沿って凹部４３が形成されることができる。そのため、第２部分１６からガスが放出される場合に、基体４０によってガスの放出が抑制されることを防止できる。

【００８３】

蓄電デバイス１００によれば、排出流路３２は、基体４０の側壁部５１ａと、蓋体７０の屈曲部７４と、によって形成されることができる。したがって、排出流路３２を形成するために新たな部材を必要としないので、蓄電デバイス１００の部品数を削減することができ、製造工数を低減することができる。さらに、蓄電デバイス１００のコンパクト化を図ることができ、エネルギー密度を向上させることができる。

【００８４】

蓄電デバイス１００によれば、載置部４１には、開口部４４が形成され、外装体１２の本体部１３は、開口部４４に配置されることができる。これにより、外装体１２内でガスが発生した場合に、本体部１３は膨らむことができ、その分、外装体１２内の圧力を小さくすることができる。

【００８５】

なお、蓄電デバイス１００は、例えば、自動搬送機、自動車、フォークリフト等の車載用途や、発電装置、風力発電装置等の静置用途などに、適用することができる。

【００８６】

２．　蓄電デバイスの変形例

次に、本実施形態の変形例に係る蓄電デバイスについて、図面を参照しながら説明する。図１３は、本実施形態の変形例に係る蓄電デバイス２００を模式的に示す断面図であって、図４に対応している。以下、本実施形態の変形例に係る蓄電デバイス２００において

DELTRAN EX1002
IPR2024-01219

、本実施形態に係る蓄電デバイス１００の構成部材と同様の機能を有する部材については同一の符号を付し、その詳細な説明を省略する。

【００８７】

蓄電デバイス２００では、図１３に示すように、排出流路３２内に吸液体３４が設けられている。吸液体３４は、ガスの放出に伴って、外装体１２内の電解液が第２部分１６から放出された場合に、放出された電解液を吸収することができる。これにより、放出された電解液が外部に流出して、電蝕等が発生することを抑制できる。吸収体３４は、連通部５３（図４参照）に隣接する位置のみに設けられていてもよいし、排出流路３２内全体を充填して設けられていてもよい。

【００８８】

吸収体３４は、電解液を吸収でき、かつ、ガスの流通を妨げない材料からなることができる。より具体的には、吸収体３４の材質としては、例えば、脱脂綿、海綿、ウレタンフォーム、石綿、不織布が挙げられる。

【００８９】

蓄電デバイス２００によれば、吸液体３４によって電蝕等が発生することを抑制できる。そのため、蓄電デバイス２００は、高い信頼性を有することができる。

【００９０】

３．　蓄電モジュール

次に、本実施形態に係る蓄電モジュールについて、図面を参照しながら説明する。図１４は、本実施形態に係る蓄電モジュール３００を模式的に示す分解斜視図である。図１５は、本実施形態に係る蓄電モジュール３００を模式的に示す図であって、図１４のＸＶ矢印方向から見た図である。

【００９１】

蓄電モジュール３００は、本発明に係る蓄電デバイスを有する。以下では、本発明に係る蓄電デバイスとして、蓄電デバイス１００を有する蓄電モジュール３００について説明する。

【００９２】

蓄電モジュール３００は、図１４および図１５に示すように、複数の蓄電デバイス１００と、ベース部材３１０と、制御基板収容部材３２０と、カバー部材３３０と、正極用モジュール端子３４０と、負極用モジュール端子３５０と、を有することができる。なお、便宜上、図１４では、制御基板収容部材３２０、カバー部材３３０、および正極用モジュール端子３４０の図示を省略している。また、便宜上、図１４では、図１５より蓄電デバイス１００の数が１つ少ない状態を図示している。

【００９３】

複数の蓄電デバイス１００は、Ｚ軸方向に沿って積層されている。蓄電デバイス１００の数は、特に限定されず、蓄電モジュール３００の用途に応じて適宜変更することができる。

【００９４】

複数の蓄電デバイス１００は、図１４に示すように、交互に、Ｚ軸を中心として１８０°回転された状態で積層されている。すなわち、平面視において、隣り合う蓄電デバイス１００のうち、一方の蓄電デバイス１００を、Ｚ軸を中心として１８０°回転させると、他方の蓄電デバイス１００と重なることができる。

【００９５】

複数の蓄電デバイス１００は、電気的に接続されている。より具体的には、複数の蓄電デバイス１００は、直列に接続されている。すなわち、隣り合う蓄電デバイス１００において、一方の蓄電デバイス１００の正極端子２０と、他方の蓄電デバイス１００の負極端子２２とは、接続されている。接続された正極端子２０および負極端子２２は、カバー部５７によって囲まれている。これにより、端子２０，２２が、例えば導電性部材（図示せず）と接触し、短絡することを抑制できる。

【００９６】

DELTRAN EX1002
IPR2024-01219

図１５に示すように、隣り合う蓄電デバイス１００の間には、基部４０に形成された切り欠き部５５が配置されている。切り欠き部５５は、Ｘ軸方向に貫通している。切り欠き部５５は、通気孔として機能することができ、蓄電モジュール３００の放熱性を向上させることができる。

【００９７】

ベース部材３１０は、積層された蓄電デバイス１００の下方に配置されている。ベース部材３１０は、支持部３１２と、固定部３１４と、を有することができる。支持部３１２は、積層された蓄電デバイス１００を支持することができる。より具体的には、支持部３１２は、平坦面３１３を備え、平坦面３１３において安定して蓄電デバイス１００を支持することができる。固定部３１４は、支持部３１２の周囲に設けられている。固定部３１４には、貫通孔３１５が形成されており、貫通孔３１５にネジ等（図示せず）を通すことにより、蓄電モジュール３００を所望の部材（図示せず）に固定することができる。ベース部材３１０の材質としては、例えば、アルミニウム、ステンレス、鉄、ニッケルめっき処理された金属（例えば銅）が挙げられる。

【００９８】

制御基板収容部材３２０は、積層された蓄電デバイス１００上に設けられている。制御基板収容部材３２０の材質としては、例えば、プラスチック等の樹脂が挙げられる。制御基板収容部材３２０の下側には、例えば、切り欠き部３２２が形成されている。切り欠き部３２２は、Ｘ軸方向に貫通している。切り欠き部３２２の形状や数は、特に限定されない。切り欠き部３２２は、通気孔として機能することができ、蓄電モジュール３００の放熱性を向上させることができる。

【００９９】

制御基板収容部材３２０内には、制御基板（図示せず）が収容されている。制御基板には、ＩＣ等からなる制御部（図示せず）が搭載されている。制御部は、蓄電デバイス１００各々の蓄電セル１０の出力電圧を検出し、該出力電圧が正常か否かを判断することができる。制御部は、蓄電セル１０の出力電圧が正常ではないと判断したときに、該出力電圧を回復させるための機構を備えていてもよい。

【０１００】

ここで、図１６は、蓄電モジュール３００を模式的に示す斜視図であって、図１４とは異なる方向から見た図である。なお、便宜上、図１６では、制御基板収容部材３２０、カバー部材３３０、および正極用モジュール端子３４０の図示を省略している。また、便宜上、図１６では、図１５より蓄電デバイス１００の数が１つ少ない状態を図示している。

【０１０１】

制御部は、例えば、図１６に示すコネクター３２４を介して、端子２０，２２と電気的に接続されている。より具体的には、コネクター３２４は、基体４０から（セルケース３０から）露出したコネクター用端子部３２６と接合されている。コネクター用端子部３２６は、例えば、端子２０，２２を固定する際に用いる座金２６（図１参照）と一体的に形成されている。

【０１０２】

ここで、図１７は、コネクター用端子部３２６が一体的に形成された座金２６を模式的に示す斜視図であって、図１とは異なる方向から見た図である。コネクター用端子部３２６は、板状の座金２６の端部２６ａに接続されている。コネクター用端子部３２６は、コネクター３２４と接続できれば、特にその形状は限定されない。

【０１０３】

コネクター用端子部３２６は、座金２６と一体的に形成されるため、コネクター用端子部を形成するために新たな部材を必要としない。そのため、蓄電モジュール３００の部品数を削減することができる。なお、図１６では、便宜上、コネクター３２４を接合させる前の状態のコネクター用端子部３２６をも図示している。

【０１０４】

カバー部材３３０は、図１５に示すように、制御基板収容部材３２０上に形成されてい

DELTRAN EX1002
IPR2024-01219

る。カバー部材３３０の形状は、ベース部材３１０とともに、積層された蓄電デバイス１００を挟持できれば、特に限定されない。カバー部材３３０の材質としては、例えば、上記のベース部材３１０の材質として列挙したものが挙げられる。

【０１０５】

カバー部材３３０、制御基板収容部材３２０、およびベース部材３１０には、例えば、Ｚ軸方向に貫通する貫通孔（図示せず）が形成されている。該貫通孔と、蓄電デバイス１００の積層用固定部材６０に形成された貫通孔６１と、を連通するように配置させ、図１４に示すように、これらの貫通孔にネジ３６０を通して固定することができる。これにより、積層された蓄電デバイス１００および制御基板収容部材３２０は、カバー部材３３０とベース部材３１０とによって挟持されることができる。

【０１０６】

正極用モジュール端子３４０は、例えば、積層された蓄電デバイス１００のうち、最も上方に配置された蓄電デバイス１００の正極端子２０と電気的に接続されている。正極用モジュール端子３４０の形状は、特に限定されない。正極用モジュール端子３４０の材質としては、例えば、銅、アルミニウム、およびこれらにニッケルめっきや金めっきを施した金属が挙げられる。正極用モジュール端子３４０は、蓄電モジュール３００としての正極となることができる。

【０１０７】

負極用モジュール端子３５０は、例えば、積層された蓄電デバイス１００のうち、最も下方に配置された蓄電デバイス１００の負極端子２２と電気的に接続されている。負極用モジュール端子３５０の形状は、特に限定されない。負極用モジュール端子３５０の材質としては、例えば、銅、アルミニウム、およびこれらにニッケルめっきや金めっきを施した金属が挙げられる。負極用モジュール端子３５０は、蓄電モジュール３００としての負極となることができる。

【０１０８】

なお、負極用モジュール端子３５０の大きさによっては、負極用モジュール端子３５０は、積層された蓄電デバイス１００のうち、例えば２番目に下方に配置された蓄電デバイス１００の負極端子２２と電気的に接続されていてもよい。この場合、最も下方に配置される蓄電デバイス１００の代わりに、蓄電セル１０を挟持していないセルケース３０を配置してもよい。

【０１０９】

また、図示の例では、上方に配置されたモジュール端子を正極用モジュール端子３４０とし、下方に配置されたモジュール端子を負極用モジュール端子３５０としたが、下方に配置されたモジュール端子を正極用モジュール端子とし、上方に配置されたモジュール端子を負極用モジュール端子としてもよい。

【０１１０】

本実施形態に係る蓄電モジュール３００によれば、例えば、以下の特徴を有する。

【０１１１】

蓄電モジュール３００によれば、複数の蓄電デバイス１００が直列に接続されることができる。そのため、高エネルギー化を図ることができる。

【０１１２】

蓄電モジュール３００によれば、接続された正極端子２０および負極端子２２は、基体４０に設けられたカバー部５７によって囲まれることができる。これにより、端子２０，２２が、例えば導電性部材（図示せず）と接触し、短絡することを抑制できる。

【０１１３】

蓄電モジュール３００によれば、制御部と電気的に接続されたコネクター３２４を、座金２６と一体的に形成されたコネクター用端子部３２６に接合させることができる。これにより、コネクター用端子部を形成するための新たな部材を必要としないので、蓄電モジュール３００の部品数を削減することができる。そのため、製造工数を低減することができる。

DELTRAN EX1002
IPR2024-01219

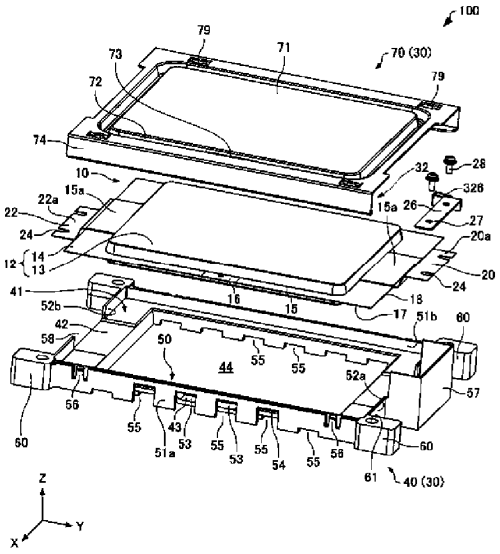
【０１１４】
本発明は、上述した実施形態に限定されるものではなく、種々の変形が可能である。本発明は、上述した各実施形態および各変形例を適宜組み合わせることも可能である。また、本発明は、例えば、実施形態で説明した構成と実質的に同一の構成（例えば、機能、方法および結果が同一の構成、あるいは目的および効果が同一の構成）を含む。また、本発明は、実施形態で説明した構成の本質的でない部分を置き換えた構成を含む。また、本発明は、実施形態で説明した構成と同一の作用効果を奏する構成または同一の目的を達成することができる構成を含む。また、本発明は、実施形態で説明した構成に公知技術を付加した構成を含む。

【符号の説明】

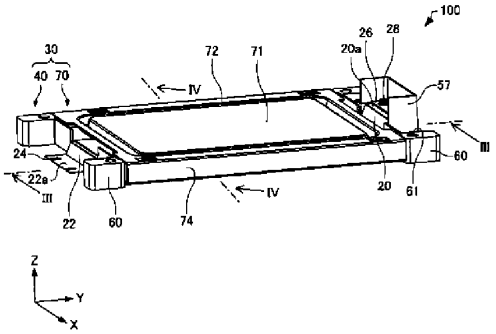
【０１１５】
１　正極、１ａ　正極集電体、１ｂ　正極活物質層、２　負極、２ａ　負極集電体、
２ｂ　負極活物質層、３　リチウム極、３ａ　リチウム極集電体、３ｂ　リチウム箔、
４　セパレータ、５　電極積層体、６　正極リード、７　負極リード、１０　蓄電セル、
１２　外装体、１２ａ　第１ラミネートフィルム、１２ｂ　第２ラミネートフィルム、
１３　本体部、１４　外周部、１５　第１部分、１６　第２部分、１７　長辺、
１８　短辺、２０　正極端子、２０ａ　接続部、２２　負極端子、２２ａ　接続部、
２４　貫通孔、２６　座金、２６ａ　端部、２７　貫通孔、２８　ネジ、
３０　セルケース、３２　排出流路、３４　吸液体、４０　基体、４１　載置部、
４２　端子支持部、４３　凹部、４４　開口部、４６　端子固定部、５０　側壁部、
５１ａ　第１側壁部、５１ｂ　第１側壁部、５２ａ　第２側壁部、５２ｂ　第２側壁部、
５３　第１連通部、５４　第２連通部、５５　切り欠き部、５６　引掛け部、
５７　カバー部、５８　切り欠き部、６０　積層用固定部、６１　貫通孔、７０　蓋体、
７１　被覆部、７２　突出部、７３　小突出部、７４　屈曲部、
７４ａ　第１流路形成部、７４ｂ　第２流路形成部、７４ｃ　第３流路形成部、
７９　開口部、１００　蓄電デバイス、２００　蓄電デバイス、
３００　蓄電モジュール、３１０　ベース部材、３１２　支持部、３１３　平坦面、
３１４　固定部、３１５　貫通孔、３２０　制御基板収容部材、３２２　切り欠き部、
３２４　コネクター、３２６　コネクター用端子部、３３０　カバー部材、
３４０　正極用モジュール端子、３５０　負極用モジュール端子、３６０　ネジ

DELTRAN EX1002
IPR2024-01219

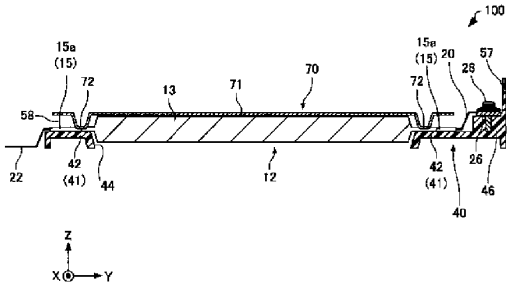
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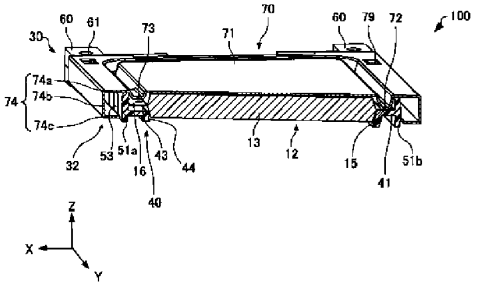
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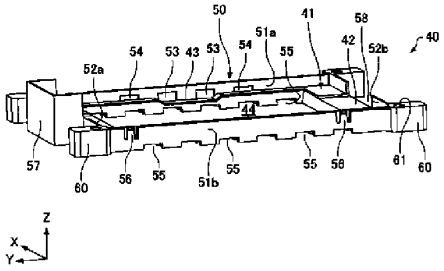
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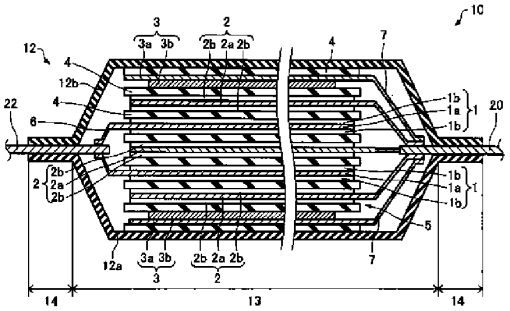
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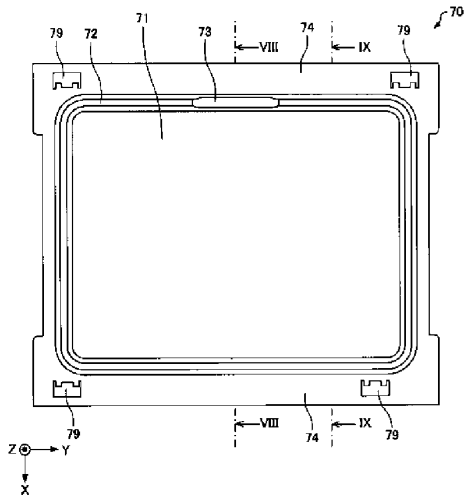


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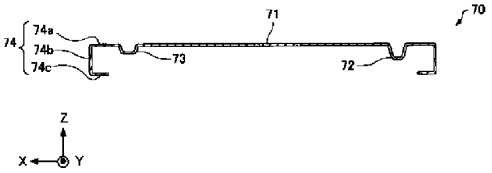


DELTRAN EX1002
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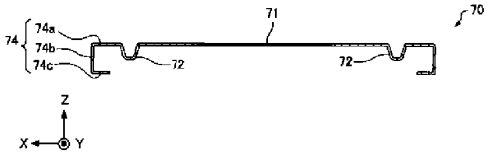
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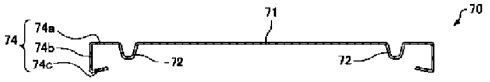
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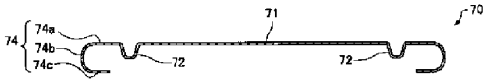
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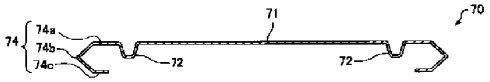
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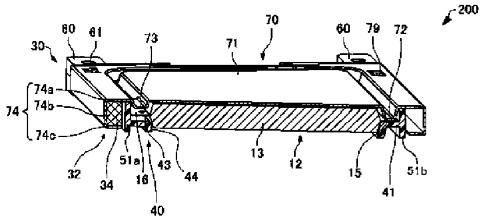
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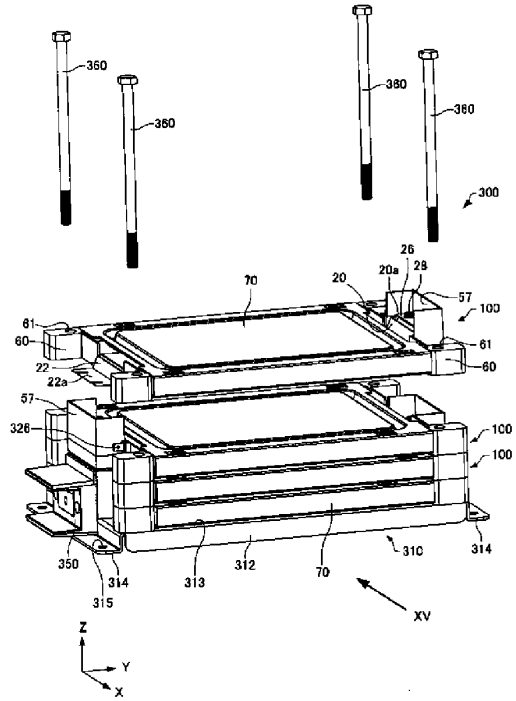
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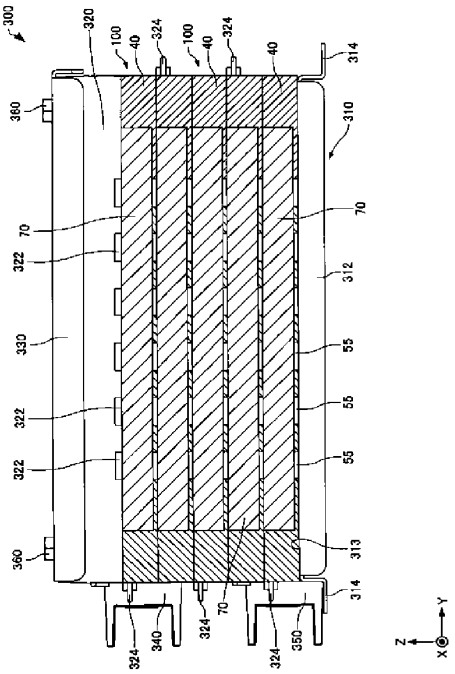
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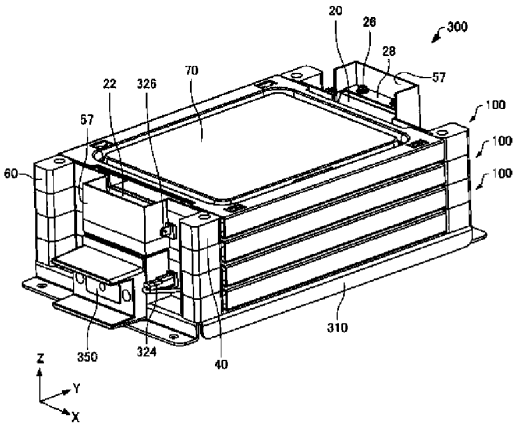
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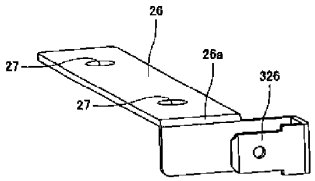
【図１５】



【図１６】



【図１７】



DELTRAN EX1002
IPR2024-01219

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(54) **Title**: PORTABLE POWER SUPPLY

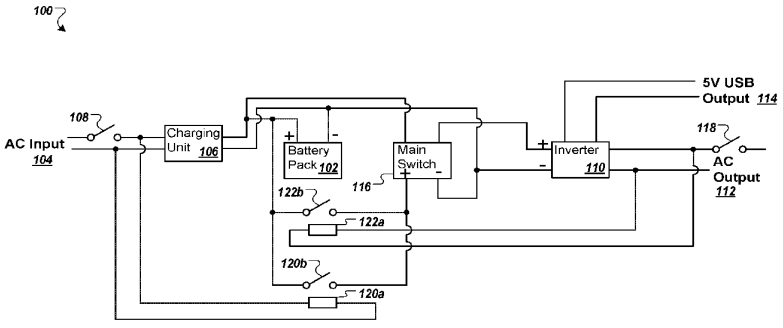


FIG. 1

(57) **Abstract**: In one aspect, the present disclosure describes an apparatus that may include a battery unit including one or more lithium-ion battery cells, and a charging unit configured with a first automatic shut-off, where the automatic shut-off is responsive to detection of an upper threshold voltage level of the battery unit. The apparatus may include an inverter configured with a second automatic shut-off, where the second automatic shut-off is responsive to detection of a lower threshold voltage level of the battery unit, and an input connection functionally connected to the charging unit. The apparatus may be configured to isolate the battery unit from the inverter responsive to detecting both (a) the input connection is disconnected from an input voltage source, and (b) the inverter is shut off.

WO 2013/137873 A1

PORTABLE POWER SUPPLY

Background

A back up power supply may be used to provide power when a wired electricity supply is unavailable. For example, during power outages or while away from a building (e.g., while camping or hunting, when providing an outdoor presentation, etc.), a back up power supply may be used to power one or more devices or pieces of equipment. In another example, a portable power supply may be used to jump start a vehicle. The source of power for the back up power supply, in some examples, may include propane, gas, and/or battery.

Summary

In one aspect, the present disclosure describes an apparatus that may include a battery unit including one or more lithium-ion battery cells, and a charging unit configured with a first automatic shut-off, where the automatic shut-off is responsive to detection of an upper threshold voltage level of the battery unit. The apparatus may include an inverter configured with a second automatic shut-off, where the second automatic shut-off is responsive to detection of a lower threshold voltage level of the battery unit, and an input connection functionally connected to the charging unit. The apparatus may be configured to isolate the battery unit from the inverter responsive to detecting both (a) the input connection is disconnected from an input voltage source, and (b) the inverter is shut off.

The apparatus may include a first switching unit connected between the battery unit and a main switching unit. Detecting the inverter is shut off may include failing to detect a threshold output voltage of the inverter at an output connection. The first switching unit may be configured to move to a closed position responsive to detecting the threshold output voltage. The threshold output voltage may be substantially equivalent to 110 Volts.

The apparatus may include a second switching unit connected between the battery unit and the main switching unit. Detecting the input connection is disconnected from an input voltage source may include failing to detect a threshold input voltage at the input connection. The second switching unit may be configured to move to a second closed position upon detecting the threshold input voltage at the input connection. The threshold input voltage is substantially equivalent to 110 Volts.

The apparatus may include a three-way switch including a charging position, a discharging position, and an off position. The apparatus may be configured to isolate the battery unit from the inverter when the three-way switch is in the off position.

DELTRAN EX1002
IPR2024-01219

The apparatus may include two or more light emitting diodes presented in series. A relative number of activated light emitting diodes of the two or more light emitting diodes may correlate to an approximate percentage of charge of the battery unit.

A capacity of the battery unit may be at least 400 Watt hours. The battery unit may include at least four lithium-ion battery cells. The battery unit may include a potential of approximately twelve Volts.

The input connection may include an A/C plug interface for providing a wired connection to a household electrical output socket. The apparatus may include at least one A/C output socket connection functionally connected to the inverter. The apparatus may include at least one USB output connection functionally connected to the inverter.

The apparatus may include a balancing system connected to the battery unit, where the balancing system includes a discharging circuit configured to, responsive to detecting a battery cell voltage of a predetermined voltage threshold, draw a constant discharging current from at least a first battery cell of the one or more lithium-ion battery cells. The balancing system may draw the constant discharging current until detecting the battery cell voltage is below the predetermined voltage threshold.

In one aspect, the present disclosure describes a system including a rechargeable battery unit including one or more lithium-ion battery cells, a charging unit, an inverter functionally connected to an output connection, and an input connection functionally connected to the charging unit. The input connection may be configured for connection to a recharging power source. The system may include a main switching unit and a first switching unit connected between the battery unit and the main switching unit. The first switching unit may be configured to activate the main switching unit responsive to detecting a threshold output voltage of the inverter at an output connection. The system may include second switching unit connected between the battery unit and the main switching unit. The second switching unit may be configured to activate the main switching unit responsive to detecting a threshold input voltage at the input connection. The first switching unit and the second switching unit may be configured to prevent over-discharging the rechargeable battery unit by isolating the battery unit from a parasitic load of the inverter.

The output connection may be configured for connection to at least one of a universal serial bus port and an A/C socket outlet. At least one of the first switching unit and the second switching unit may include a solenoid. The charging unit may be configured with an automatic shut-off, where the automatic shut-off is responsive to detection of an upper

DELTRAN EX1002
IPR2024-01219

threshold voltage level of the battery unit. The inverter may be configured with an automatic shut-off, where the automatic shut-off is responsive to detection of a lower threshold voltage level of the battery unit.

Brief Description of the Figures

The foregoing and other objects, aspects, features, and advantages of the present disclosure will become more apparent and better understood by referring to the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic diagram of an example battery unit configuration for a portable power supply;

FIGS. 2A and 2B provide views of an example portable power supply.

The features and advantages of the present disclosure will become more apparent from the detailed description set forth below when taken in conjunction with the drawings, in which like reference characters identify corresponding elements throughout. In the drawings, like reference numbers generally indicate identical, functionally similar, and/or structurally similar elements.

Detailed Description

In some implementations, a portable power supply may include a lithium-ion battery pack, and an alternating current (A/C) input for charging the lithium-ion battery pack, for example by connecting the A/C input to a household wall socket. The portable power supply may further include an A/C output in communication with an A/C socket connector. In some implementations, a device such as a small household appliance, electronic device, or power tool may be plugged into the A/C socket connector to supply power to the device. In some examples, the device may include a television, laptop computing device, electric cook top, miniature refrigerator, blender, electric light, or stereo system. In some implementations, the portable power supply may include two or more A/C socket connectors, for example to temporarily supply power to a number of items such as both a household computer and a computer monitor. In other examples, the portable power supply may be used to provide power to both a television and a blender during a tailgate party, or to a sound system and display unit for an information booth at an outdoor fair or festival.

In some implementations, the portable power supply may further include one or more universal serial bus (USB) output connectors. For example, one or more USB ports may be

DELTRAN EX1002
IPR2024-01219

available to attach a USB cord between the portable power supply and a USB-powered device such as a smart phone, personal digital assistant (PDA), tablet computer, or portable digital media player.

In some implementations, the portable power supply may further include a direct current output port. For example, the portable power supply may be configured for use as a jump starter to jump start a car battery using a 12 Volt D/C output.

In some implementations, the portable power supply may be configured to provide power to one or more devices, such as a television, for more than ten hours. In some implementations, the portable power supply may include a forty, sixty, or one hundred amp output. In some implementations, the portable power supply may be capable of providing approximately five hundred Watts per hour. The portable power supply, in some implementations, may weigh approximately twenty to seventy pounds. For example, based upon 100 Amp-hour lithium-ion battery cells arranged in a 12 Volt D/C configuration, the portable power supply may weigh approximately twenty-five to forty pounds.

In some implementations, the portable power supply may be designed to protect the lithium-ion battery pack from damage due to overcharging and/or over-discharging. For example, a battery charging unit may be designed to shut off automatically when a voltage of the lithium-ion battery pack reaches an approximate upper threshold level. In another example, an inverter unit may be designed to shut off automatically when a voltage of the lithium-ion battery pack reaches an approximate lower threshold level. In some implementations, the portable power supply may include circuitry for isolating the lithium-ion battery pack from an inverter unit while the portable power supply is not in use to remove a potential parasitic load due to the inverter.

FIG. 1 illustrates a schematic diagram 100 of an example battery unit configuration for a portable power supply. The portable power supply, in some implementations, may include a lithium-ion battery pack 102 connected to a charging unit 106. In some implementations, the lithium-ion battery pack 102 may include a 12 Volt direct current (D/C) lithium-ion battery. In other implementations, the lithium-ion battery pack 102 may include a number of smaller battery units connected together to equal a 12 V D/C battery. For example, the lithium-ion battery pack 102 may contain four 3.3 V lithium-ion battery cells in serial connection.

The charging unit 106, in some implementations, may accept an A/C voltage input 104, such as an 110V or 220V input provided through a connection to a wall socket. A switch 108, in some implementations, may be activated (e.g., caused to move to a closed position) to

DELTRAN EX1002
IPR2024-01219

connect the A/C voltage input 104 to the charging unit 106. In some implementations, the charging unit 106 may output a 12V D/C power supply for charging the lithium-ion battery pack 102. The charging unit 106, in some implementations, may be programmed for automatic shut-off upon detecting that the voltage of the lithium-ion battery pack 102 has reached a threshold voltage. For example, the charging unit 106 may shut off upon determining that the voltage of the lithium-ion battery pack 102 has reached approximately 14.4 Volts D/C.

To provide power to one or more devices, in some implementations, the portable power supply may include an inverter 110 connected to one or more output power supplies, such as an A/C output 112 and a 5V D/C output 114. The A/C output 112, in some implementations, may be connected to one or more input plugs such as two- or three-pronged power sockets, for providing an 110V or 220V A/C power supply to one or more devices. In some implementations, an output switch 118 may be activated (e.g., closed) to connect the output of the inverter 110 to the A/C output 112 (e.g., one or more outlets, plug connections, or cords configured to supply A/C power to one or more devices). The output switch 118, in some implementations, may be triggered manually, for example using a switch button (e.g., two way "on/off" or three-way switch) on the exterior of the power supply. In some implementations, the output switch 118 may be triggered automatically, for example upon detecting a device plugged into the portable power supply. In some implementations, the 5V D/C output 114 may be connected to one or more USB ports to supply power to one or more USB-tethered devices. In Some implementations, the 5V D/C output 114 may be connected to theinverter 110 via the output switch 118 or a separate output switch (not illustrated). Additionally, in some implementations, a 12V D/C output (not illustrated) may be provided, for example to allow the option of jump-starting a car battery using the portable power supply.

In some implementations, the inverter 110 may be designed to automatically shut off upon detecting that the charge of the lithium-ion battery pack 102 has fallen to a threshold voltage level. For example, the inverter 110 may be designed to shut off upon detecting that the lithium-ion battery pack 102 is at or below a charge level of approximately 11.2 Volts. In some implementations, shutting off the inverter 110 upon detection of a threshold voltage level may protect the lithium-ion battery pack 102 from over-discharging.

To further protect the lithium-ion battery pack 102 of the portable power supply from over-discharging, in some implementations, a main switching unit 116 may be provided between the lithium-ion battery pack 102 and the inverter 110. For example, the inverter 110

DELTRAN EX1002
IPR2024-01219

may continue to drain the lithium-ion battery pack 102 through a parasitic load, even in times of shut-off. To avoid the drain on the lithium-ion battery pack 102 due to this parasitic load, in some implementations, the main switching unit 116 may be configured to electrically isolate the lithium-ion battery pack 102 from the inverter 110. In some implementations, the main switching unit 116 may be a solid state relay (SSR). The main switching unit 116, in some implementations, may be controlled by both an input relay 120 (e.g., solenoid 120a and switch 120b) and an output relay 122 (e.g., solenoid 122a and switch 122b). The switch 120b of the input relay 120, for example, may be configured to close when the corresponding solenoid 120a receives an approximate A/C voltage input (e.g., 110V, 220V, etc.). For example, the solenoid 120a may detect the A/C voltage input 104. When the input relay 120 is in the active, or closed, position (e.g., upon receiving an input voltage to the charging unit 106), the main switching unit 116 may be activated, placing the lithium-ion battery pack 102 in electrical communication with the inverter 110. If, instead, the charging unit 106 is not being supplied with power, the inverter 110 may be placed in electrical communication with the lithium-ion battery pack 102, in some implementations, if the output switch 118 is in a closed position. For example, if the solenoid 122a of the output relay 122 detects an approximate A/C voltage output (e.g., 110 V, 220 V, etc.) at the A/C output 112, the solenoid 122a may cause the output relay switch 122b to move to the closed position. In this manner, the inverter 110 may be in electrical communication with the lithium-ion battery pack 102 only when the portable power supply is in either a charging mode or a discharging mode. If, instead, the portable power supply is in a powered down mode (e.g., offline, unplugged, or otherwise not in use), the main switching unit 116 may effectively isolate the lithium-ion battery pack 102 from the inverter 110.

In some implementations, a three-way switch on the portable power supply may be used to select the current input state (e.g., charging, discharging, or offline). Turning to FIGS. 2A and 2B, example portable power supplies 200 and 250, in some implementations, may include a three-way switch 202 to select an operational mode of the portable power supply 200, 250. In some implementations, a visual indicator may provide a user an indication of the current operational state of the portable power supply 200. For example, a series of light emitting diodes (LEDs) 204 may include one or more power indicators (e.g., a green LED indicating "on," or a red LED indicating "off"). In some implementations, the series of LEDs 204 may further include a series of LEDs configured to indicate a relative charge level of a battery unit of the portable power supply 200. For example, as illustrated in FIG. 2B, a first LED 204 may indicate on/off (e.g., lit/unlit), while the remaining five LEDs

DELTRAN EX1002
IPR2024-01219

204 may indicate an approximate percentage charge level of the battery unit (e.g., one light for twenty percent full, two lights for forty percent full, etc.).

Returning to FIG. 2A, within an exterior enclosure 206, the portable power supply 200, in some implementations, may include a series of rechargeable battery cells 208, such as lithium-ion battery cells. In a particular example, the rechargeable battery cells 208 may be 3.3 Volt rechargeable lithium-ion battery cells connected in series to achieve a 12 Volt battery unit. In some implementations, a balancing unit 220 may be provided for equalizing the charge levels of the lithium-ion battery cells. The balancing unit 220, for example, may be positioned beneath a battery unit cap 236, as illustrated in FIG. 2B. An example implementation of a balancing unit is described in relation to U.S. Patent Application Serial Number 12/939,889 entitled "Battery Unit Balancing System" and filed November 4, 2010, now published as U.S. Patent Publication Number 2011/0074355, the contents of which is herein incorporated in its entirety.

A balancing unit, in some implementations, may be connected to each rechargeable battery cell 208. For example, as illustrated in FIG. 2A, each of the four rechargeable battery cells 208a, 208b, 208c, and 208d may include a correlating balancing unit including a discharging circuit. The discharging circuit, in some implementations, may be configured for automatic activation. For example, upon detection of the voltage of one of the battery cells 208 exceeding a predetermined threshold, the discharging circuit may draw a constant discharging current from the particular battery cell 208 until the voltage of the particular battery cell 208 falls below the predetermined threshold. In some implementations, the predetermined threshold may be set to approximately 3.60 Volts.

In some implementations, the discharging circuit may include a voltage dividing circuit, a comparator circuit, and one or more current source circuits. The voltage dividing circuit may be connected to the comparator circuit that is activated to conduct when the voltage of a particular battery cell 208 exceeds the predetermined threshold. The voltage dividing circuit, in some implementations, may be configured to generate a predetermined voltage that activates the one or more current source circuits via the comparator circuit. The discharging current of the discharging circuit, in some implementations, may be configured to discharge at approximately 0.5% of the ampere-hour rate of the particular rechargeable battery cell 208. The discharging current, in some examples, may be selected from 0.22 A, 0.33 A, 0.5 A, 0.89 A or 1.11 A.

Although illustrated in FIG. 2A as a series of four rechargeable battery cells 208a, 208b, 208c, and 208d, in other implementations more or fewer rechargeable battery cells 208

DELTRAN EX1002
IPR2024-01219

may be included in the portable power supply 200. For example, the portable power supply 250, described in relation to FIG. 2B, may include three rechargeable battery cells 208a, 208b, and 208c. The number of rechargeable battery cells 208, in some implementations, may be increased or decreased to adjust an available total power supply, for example as described in Watt-hours capacity. In some examples, the battery capacity of the rechargeable battery cells 208 may be 480 Watt-hours (Wh), 720 Wh, and 1.2 kiloWatt-hours (kWh). The battery capacity, in some implementations, may be indicative of an ampere-hour (Ah) charge transfer ability of each cell. For example, a 480 Wh capacity may correlate to 40 Ah battery cells, while a 720 Wh capacity may correlate to 60 Ah battery cells, and a 1.2 kWh capacity may correlate to 100 Ah battery cells.

In some implementations, a charging unit 210 may provide a mechanism for recharging the rechargeable battery cells 208, for example through an exterior electrical connection. Turning to FIG. 2B, an A/C wall cord port 230 may be provided for connecting the portable power supply 250 to an electrical source. In some implementations, upon plugging in the portable power supply 250, the portable power supply 250 may recognize the availability of charging electricity and automatically engage the charging unit 210. In some implementations, while the portable power supply 250 is connected to a power source, the charging unit 210 may supply a trickle charge or float charge feature. For example, the charging unit 210 may detect that a current level of charge in the rechargeable battery cells 208 has dropped to a threshold level and initiate charging the rechargeable battery cells 208. In some implementations, the charging unit 210 may charge the rechargeable battery cells 208 to an upper voltage threshold (e.g., approximately 14.4 Volts), then automatically end the charging cycle to protect the rechargeable battery cells 208 from becoming over-charged.

An inverter 212, in some implementations, may be provided for converting the power stored by the rechargeable battery cells 208 to an appropriate output (e.g., 110 V A/C, 220 V A/C, 5V D/C, etc.). The inverter 212, for example, may supply one or more output ports, such as, in some examples, a two- or three-prong A/C supply port, a USB port, and a vehicle jumper cable connection. As illustrated in relation to FIG. 2B, in a particular example, the portable power supply 250 may include a set of three-prong A/C supply ports 232a, 232b and a set of five Volt USB ports 234a, 234b.

In some implementations, the inverter 212 may be selectively placed in electrical communication with the rechargeable battery cells 208 through a main switching unit 214. The main switching unit 214, for example, may include a solid state relay. The main switching unit 214, in some implementations, may be controlled by an output voltage-

DELTRAN EX1002
IPR2024-01219

triggered switching unit 216 (e.g., an output relay such as the output relay 122 described in relation to FIG. 1) and/or an input voltage-triggered switching unit 218 (e.g., an input relay such as the input relay 120 as described in relation to FIG. 1). Turning to FIG. 2B, for example, the output-voltage triggered switching unit 216 may activate the main switching unit 214 upon detecting an output voltage. The output voltage, for example, may be detected from an A/C output supplied from the inverter 212 to at least one of the A/C supply ports 232a, 232b. In another example, the output voltage may be detected from a D/C output supplied from the inverter 212, such as a 5 V D/C output supplied to at least one of the five Volt USB ports 234a, 234b or a 12 Volt supply provided to a vehicle jumper cable connection (not illustrated). The input-voltage triggered switching unit 218 may activate the main switching unit 214 upon detecting an input voltage. The input voltage, for example, may be detected from an A/C input supplied to the charging unit 210, such as 110 V or 220 V A/C input connected to the A/C wall cord port 230. If neither the input-voltage triggered switching unit 218 nor the output voltage-triggered switching unit 216 is triggered, the main switching unit 218 may be deactivated, thus isolating the battery unit 208 from the inverter 212. In this manner, the battery unit 208 may be protected from over-discharging via a parasitic load from the inverter 212, for example in the circumstance where the portable power supply 250 is left activated (e.g., when the three-way switch 202 is in a discharge or charge position rather than in an off position).

In view of the structure, functions and apparatus of the systems and methods described here, in some implementations, an apparatus and method of use for a portable power supply are provided. Having described certain implementations of methods and apparatus for supporting analysis of genetic sequence data, it will now become apparent to one of skill in the art that other implementations incorporating the concepts of the disclosure may be used. Therefore, the disclosure should not be limited to certain implementations, but rather should be limited only by the spirit and scope of the following claims.

DELTRAN EX1002
IPR2024-01219

What is claimed:

1. An apparatus comprising:
a battery unit comprising one or more lithium-ion battery cells;
a charging unit configured with a first automatic shut-off, wherein the automatic shut-off is responsive to detection of an upper threshold voltage level of the battery unit;
an inverter configured with a second automatic shut-off, wherein the second automatic shut-off is responsive to detection of a lower threshold voltage level of the battery unit; and
an input connection functionally connected to the charging unit;
wherein the apparatus is configured to isolate the battery unit from the inverter responsive to detecting both
(a) the input connection is disconnected from an input voltage source; and
(b) the inverter is shut off.

2. The apparatus of claim 1, further comprising a first switching unit connected between the battery unit and a main switching unit, wherein
detecting the inverter is shut off comprises failing to detect a threshold output voltage of the inverter at an output connection, and
the first switching unit is configured to move to a closed position responsive to detecting the threshold output voltage.

3. The apparatus of claim 2, wherein the threshold output voltage is substantially equivalent to 110 Volts.

4. The apparatus of claim 2, further comprising a second switching unit connected between the battery unit and the main switching unit, wherein
detecting the input connection is disconnected from an input voltage source comprises failing to detect a threshold input voltage at the input connection; and
the second switching unit is configured to move to a second closed position upon detecting the threshold input voltage at the input connection.

DELTRAN EX1002
IPR2024-01219

5. The apparatus of claim 4, wherein the threshold input voltage is substantially equivalent to 110 Volts.

6. The apparatus of claim 1, further comprising a three-way switch, wherein the three-way switch comprises a charging position, a discharging position, and an off position; and
the apparatus is configured to isolate the battery unit from the inverter when the three-way switch is in the off position.

7. The apparatus of claim 1, further comprising a plurality of light emitting diodes presented in series, wherein a relative number of activated light emitting diodes of the plurality of light emitting diodes correlates to an approximate percentage of charge of the battery unit.

8. The apparatus of claim 1, wherein a capacity of the battery unit is at least 400 Watt hours.

9. The apparatus of claim 1, wherein the battery unit comprises at least four lithium-ion battery cells.

10. The apparatus of claim 1, wherein the battery unit comprises a potential of approximately twelve Volts.

11. The apparatus of claim 1, wherein the input connection comprises an A/C plug interface for providing a wired connection to a household electrical output socket.

12. The apparatus of claim 1, further comprising at least one A/C output socket connection functionally connected to the inverter.

13. The apparatus of claim 12, further comprising at least one USB output connection functionally connected to the inverter.

14. The apparatus of claim 1, further comprising a balancing system connected to the battery unit, wherein the balancing system comprises a discharging circuit configured

DELTRAN EX1002
IPR2024-01219

to, responsive to detecting a battery cell voltage of a predetermined voltage threshold, draw a constant discharging current from at least a first battery cell of the one or more lithium-ion battery cells.

15. The apparatus of claim 14, wherein the balancing system draws the constant discharging current until detecting the battery cell voltage is below the predetermined voltage threshold.

16. A system, comprising:
a rechargeable battery unit comprising one or more lithium-ion battery cells;
a charging unit;
an inverter functionally connected to an output connection;
an input connection functionally connected to the charging unit, wherein the input connection is configured for connection to a recharging power source;
a main switching unit;
a first switching unit connected between the battery unit and the main switching unit, wherein the first switching unit is configured to activate the main switching unit responsive to detecting a threshold output voltage of the inverter at an output connection; and
a second switching unit connected between the battery unit and the main switching unit, wherein the second switching unit is configured to activate the main switching unit responsive to detecting a threshold input voltage at the input connection;
wherein the first switching unit and the second switching unit are configured to prevent over-discharging the rechargeable battery unit by isolating the battery unit from a parasitic load of the inverter.

17. The system of claim 16, wherein the output connection is configured for connection to at least one of a universal serial bus port and an A/C socket outlet.

18. The system of claim 16, wherein at least one of the first switching unit and the second switching unit comprises a solenoid.

DELTRAN EX1002
IPR2024-01219

19. The system of claim 16, wherein the charging unit is configured with an automatic shut-off, wherein the automatic shut-off is responsive to detection of an upper threshold voltage level of the battery unit.

20. The system of claim 16, wherein the inverter is configured with an automatic shut-off, wherein the automatic shut-off is responsive to detection of a lower threshold voltage level of the battery unit.

DELTRAN EX1002
IPR2024-01219

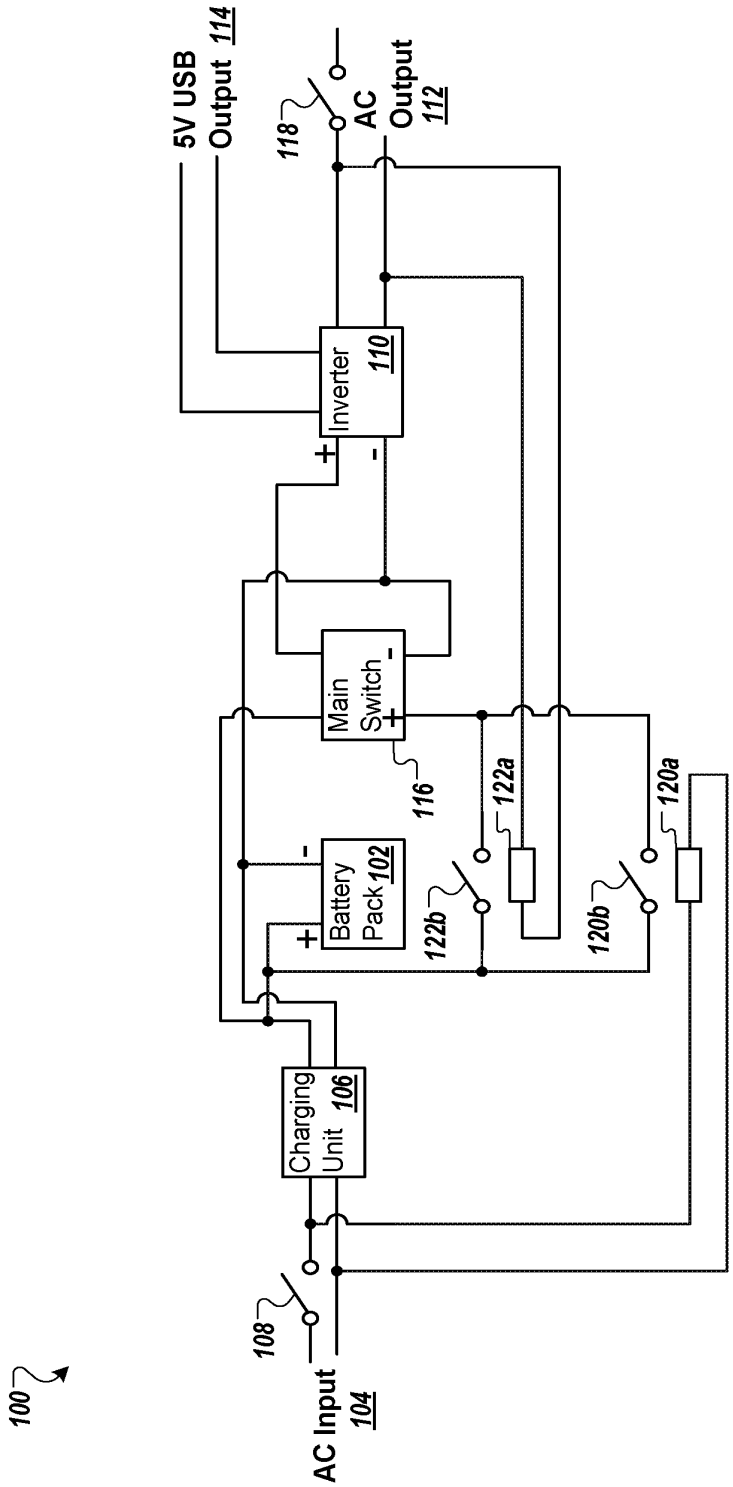

5V USB Output 114
AC Output 112
118
Inverter 110
+
-
Main Switch
116
122a
120a
Battery Pack 102
122b
120b
Charging Unit 106
108
AC Input 104
100

FIG. 1

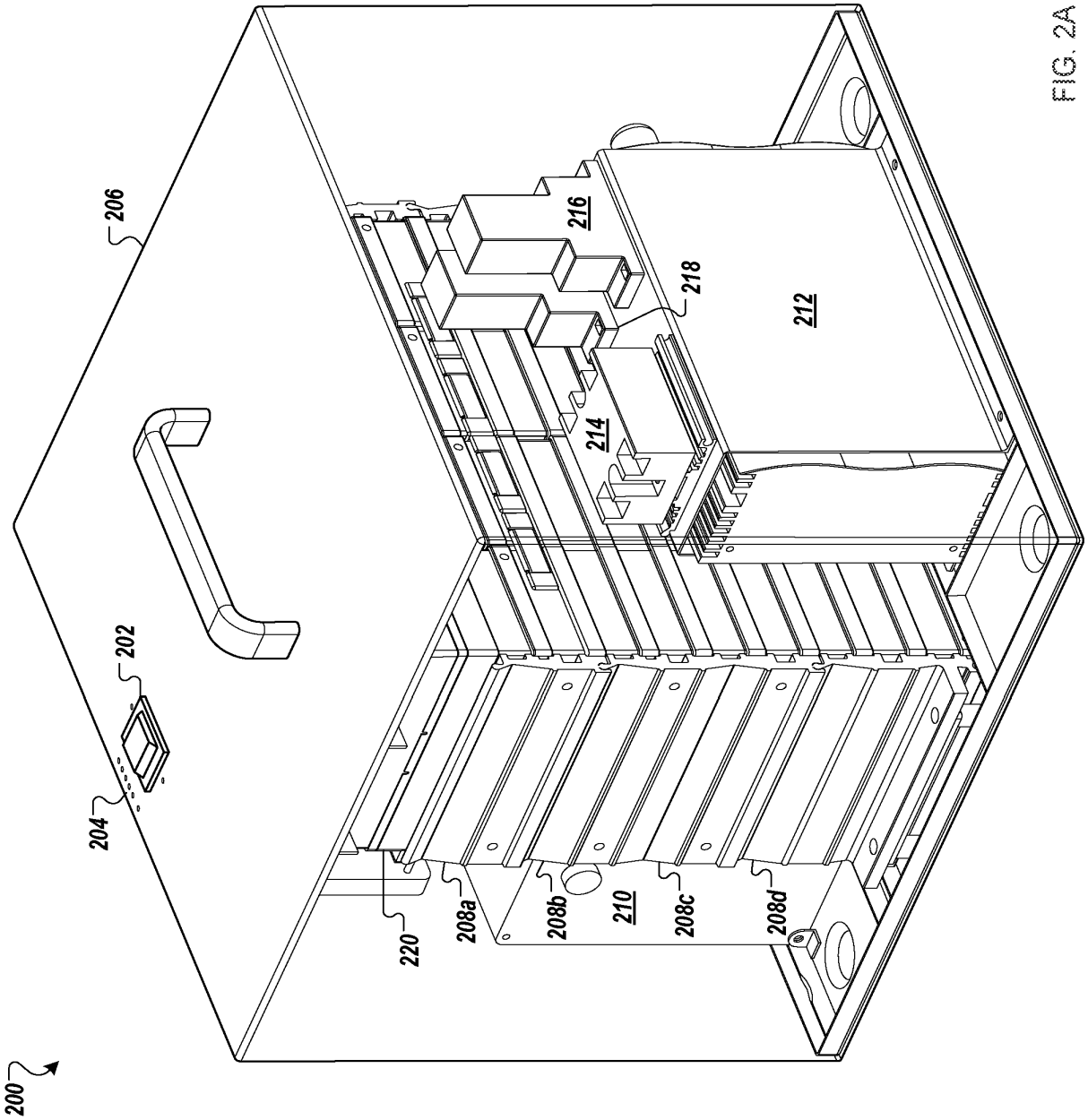


FIG. 2A

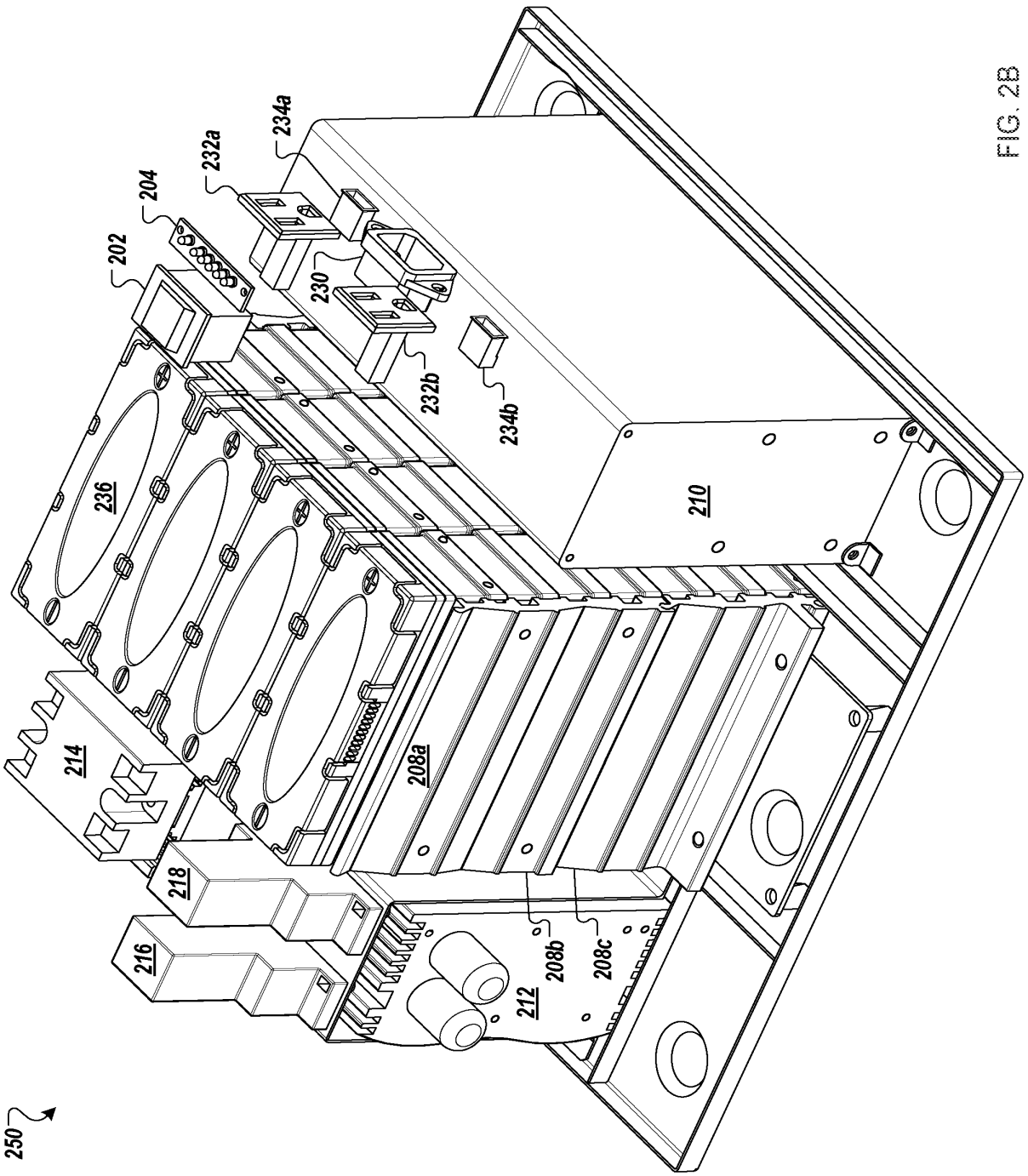

250
202
204
232a
234a
230
232b
234b
236
210
214
208a
218
216
212
208b
208c

FIG. 2B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/029058

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02J7/00 H02J9/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011/090726 A1 (BROTTO DANIELE C [US] ET AL) 21 April 2011 (2011-04-21) the whole document	1-20
A	JP 2009 201275 A (OKAMURA MFG CO LTD) 3 September 2009 (2009-09-03) the whole document	1-20
A	JP 2007 295684 A (SANYO ELECTRIC CO) 8 November 2007 (2007-11-08) the whole document	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2012	14/12/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Moje, Andreas

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2012/029058

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011090726 A1	21-04-2011	US 2011090726 A1	21-04-2011
		WO 2012061044 A2	10-05-2012
JP 2009201275 A	03-09-2009	NONE	
JP 2007295684 A	08-11-2007	NONE	

DELTRAN EX1002
IPR2024-01219

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

THE NOCO COMPANY, INC., Plaintiff, v. **SHENZHEN LIANFA TONG TECHNOLOGY CO., LTD., *et al.*,** Defendants.	**Civil Action No. 1:19-cv-01855** **Judge Christopher A. Boyko** **JURY TRIAL DEMANDED**

DEFENDANTS' INVALIDITY AND UNENFORCEABILITY CONTENTIONS

Pursuant to L.P.R. 3-5, Defendants Shenzhen Lianfa Tong Technology Co., Ltd., Shenzhen Mediatek Tong Technology Co., Ltd., and Shenzhen Bi Te Yi Technology Co., Ltd. (collectively "Defendants") provide the following invalidity and unenforceability contentions with respect to U.S. Patent No. 9,007,015 (the "'015 Patent).

L.P.R. 3-5(a)

Defendants identify the follow prior art references which anticipate and/or render obvious claims 1-3, 8-15, 17, 19, and 20 of the '015 Patent:

U.S. Patent No. 7,345,450 to Krieger ("Krieger"), issued March 18, 2008.
U.S. Patent Application Publication No. US 2004/0130298 ("Krieger")
U.S. Patent No. 9,506,446 to Xinfang ("Xinfang"), issued November 29, 2016.
U.S. Patent No. 6,426,606 to Purkey ("Purkey"), issued July 30, 2002.
U.S. Patent No. 8,072,900 to Brown ("Brown"), issued December 13, 2011.
U.S. Patent No. 9,525,297 to Wang ("Wang'), issued December 20, 2011.
U.S. Patent No. 5,650,974 to Yoshimura ("Yoshimura") issued July 22, 1997.
Chinese Patent No. 202696190 to Zhang (Chinese language version) ("Zhang")
Chinese Patent No. 202696190 to Zhang (English language version) ("Zhang CN")
Certification of Translation for Chinese Patent No. 202696190 to Zhang
U.S. Patent Application Publication No. 2009/0174362 ("Richardson I")
U.S. Patent Application Publication No. 2013/0154543 ("Richardson II")
USB Battery Charging Specification Version 1.2 ("USB Charging Spec.")

DELTRAN EX1002
IPR2024-01219

U.S. Patent No. 5,496,658 to Hein ("Hein")
U.S. Patent No. 3,085,187 to Godshalk ("Godshalk")
U.S. Patent No. 3,105,183 to Hysler ("Hysler")
U.S. Patent No. 3,267,452 to Wolf ("Wolf")
U.S. Patent No. 5,793,185 to Prelec ("Prelec")
E-flite EC Connector Assembly Instructions 2008 ("EC Connector Instructions")
U.S. Patent No. 7,095,339 to Peng ("Peng")
Datasheet for LM7805 Voltage Regulator from Fairchild Semiconductor ("LM7805 Datasheet (2008)")
U.S. Patent No. 6,424,158 ("Klang")
U.S. Patent No. 9,954,391 ("Lei")
U.S. Patent No. 5,319,298 ("Wanzong")
WO Publication No. 2010/129723 to Baxter ("Baxter")
Carku Product Brochure for the Epower-20 jump starter product ("Epower-20 brochure")
Carku Product Brochure for the Epower-21 jump starter product ("Epower-21 brochure")
U.S. Patent No. 8,172,603 ("Richardet")
MC78XX/LM78XX/MC78XXA 3-Terminal 1A Positive Voltage Regulator from Fairchild Semiconductor Corporation 2001 ("LM7805 Datasheet")
Patent Owner The NOCO Company's Preliminary Response in the Dongguan IPR
Memorandum Opinion and Order of United States District Court Judge Pamela A. Barker construing the disputed terms of claims 1, 9 and 19 of the '015 patent issued in *The NOCO Co. v. SmarTech Products, Inc.*, Case No. 1:18-cv-2780 (N.D. Ohio April 16, 2020) ("SmarTech Order")
The NOCO Company's Amended Complaint in *The NOCO Company, Inc. v. Shenzhen Lianfa Tong Technology Co., Ltd., et al.*, Case No. 1:19-cv-01855 (N.D. Ohio April 2, 2020 ("Dkt. No. 19")
Declaration of Yingchun Wan ("Dec. of Wan")
Declaration of Dr. David Hartup ("Dec. of Hartup")
Declaration of James L. Kirtley Jr., Ph.D. ("Dec. of Kirtley")
Special Master Report On Proposed Claim Construction For U.S. Patent No. 9,007,015 issued in *NOCO Co. v. Shenzhen Dika Na'Er E-Commerce Co.*, Case No.1:17CV2282 (N.D. Ohio Jun. 28, 2018) accepted and adopted by United States District Court Judge Christopher A. Boyko, 2019 WL 1723358 ("Shenzhen Dika Order")

L.P.R. 3-5(b)

As per L.P.R. 3-5(b), Defendants identify the following claims as being anticipated and/or rendered obvious by the prior art cited herein, the grounds for which are cited fully in the accompanying exhibits. Claims 1-3, 9-15, and 17 are rendered obvious under 35. U.S.C. § 103 by Krieger in view of Xinfang. *See* Ex. A. Claims 19 and 20 are rendered obvious under 35. U.S.C. § 103 by Krieger in view of Xinfang and Purkey. *See* Ex. B. Claims 1-3, 9-15, 17, 19, and 20 are

DELTRAN EX1002
IPR2024-01219

rendered obvious under 35 U.S.C. § 103 by Purkey in view of Xinfang. *See* Ex. C. Claims 1-3, and 10-15 are rendered obvious under 35 U.S.C. § 103 by Brown in view of Wang and Xinfang. *See* Ex. D. Claims 1, 9, and 17 are obvious under 35 U.S.C. § 103 by Krieger in view of Yoshimura. *See* Ex. E. Claims 1-3, 9-15, and 17 are rendered obvious under 35 U.S.C. § 103 by Krieger in view of Xinfang and in view of Yoshimura. *See* Ex. F. Claims 1, 8-9, 17, and 19-20 are anticipated under 35 U.S.C. § 102 by Zhang. *See* Ex. G. Claims 2-3, 10, and 12-15 are rendered obvious under 35 U.S.C. § 103 by Zhang in view of Xinfang. *See* Ex. H. Claim 11 is rendered obvious under 35 U.S.C. § 103 by Zhang in view of the USB charging specification. *See* Ex. I. Claims 1, 8, 9, 17, and 19 are anticipated by Richardson I under 35 U.S.C. § 102. *See* Ex. J. Claims 2, 3, 10, and 12-15 are rendered obvious under 35 U.S.C. § 103 by Richardson I in view of Xinfang. *See* Ex. K. Claims 2, 3, and 12-14 are rendered obvious under 35 U.S.C. § 103 by Richardson II in view of Lei. *See* Ex. L. Claims 10-13 are rendered obvious under 35 U.S.C. § 103 by Richardson II in view of the Epower-20 and/or the Epower-21 brochures. *See* Ex. M. Claims 1 and 17are anticipated under 35 U.S.C. § 103 by Klang. *See* Ex N.

L.P.R. 3-5(c)

As per L.P.R. 3-5(c), Defendants hereby produce the attached charts marked Exhibits A – N.

L.P.R. 3-5(d)

Defendants state that claim 3 is invalid as indefinite under 35 U.S.C. § 112(b). In addition, claim 1-3, 8-15, 17, 19, and 20 are invalid under 35 U.S.C. § 112(a) as they all fail to meet the written description and enablement requirement. More specifically, the reverse polarity sensor circuitry disclosed in the '015 Patent is erroneous and will not enable a person of ordinary skill in the art to practice the disclosed inventions. For example, due to the presence of diode D8, the

DELTRAN EX1002
IPR2024-01219

optocoupler LED 11 of the reverse sensor 10 will provide a "1" or high output signal to the MCU 1 even if the car battery 72 is connected to the handheld booster device with reverse polarity.

L.P.R. 3-5(e)

Defendants do not assert that the '015 Patent is unenforceable at this time. However, Defendants reserve the right to assert such should any facts come to light during the course of discovery.

L.P.R. 3-6(a)

Defendants have produced documents bates labeled MTEK – 000001 through MTEK - 001020.

L.P.R. 3-6(b)

Defendants state that they currently have no documents relevant to L.P.R. 3-5(e).

DELTRAN EX1002
IPR2024-01219

Dated: September 18, 2020

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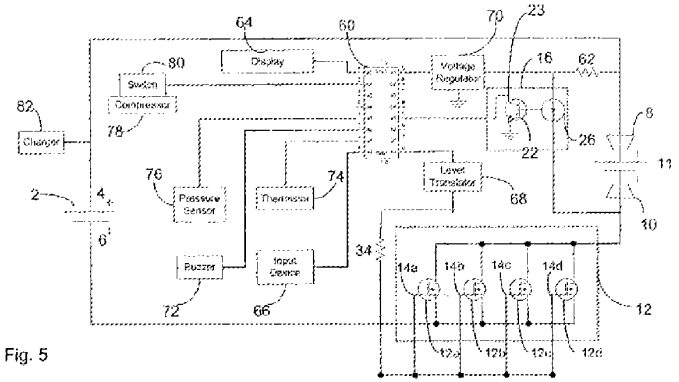
CERTIFICATE OF SERVICE

I hereby certify that all counsels of record are being served today with a copy of this document via electronic mail.

September 18, 2020 */s/ Timothy Wang*
Timothy Wang

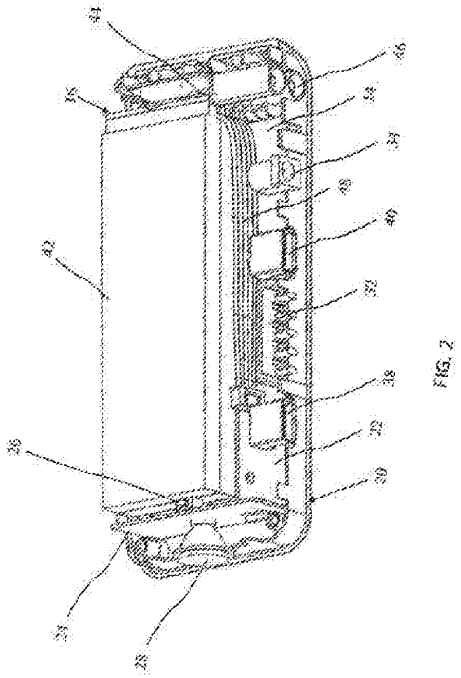
DELTRAN EX1002
IPR2024-01219

EXHIBIT A

'015 Patent Claims	**Disclosure in Krieger and/or Xinfang**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Krieger discloses an apparatus for jump starting a vehicle engine. *See, e.g.*, "Referring now to FIG. 5, an example of a jump starter System according to an embodiment of the invention is described." Krieger at ¶ 0043. *See also* Fig. 5.  Fig. 5 The jump starter system includes an internal power supply. *See, e.g.*, "The built-in battery provides a DC power source for boosting a depleted battery." Krieger at ¶ 0011.
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Krieger discloses "a first cable coupled to the positive terminal of the boosting battery and having a clamp for connection to a terminal of a depleted

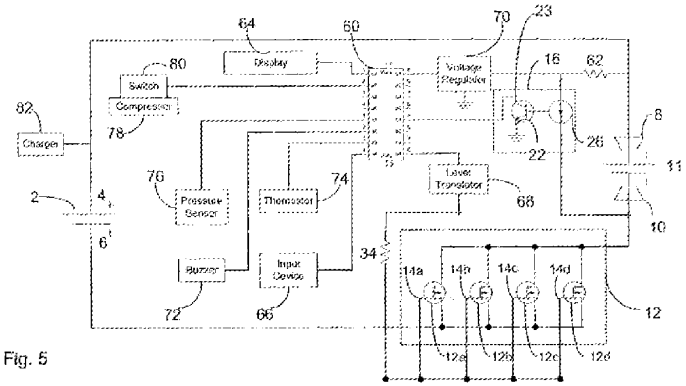
	battery; a second cable coupled to the negative terminal of the boosting battery and having a clamp for connection to another terminal of the depleted battery". Krieger at ¶2:66-3:5. Thus, according to Plaintiff's construction of this limitation, Krieger discloses an output port having positive and negative polarity outputs. In the alternative, to the extent Krieger does not explicitly disclose an output port combining the positive and negative polarity outputs, the portable jump starter disclosed in Xinfang, however, clearly teaches such an output port (*i.e.*, the ignition output port), which simply combines the positive and negative polarity outputs of the internal power supply as disclosed in Krieger. "In an embodiment, the ignition output port outputs power at a voltage higher than about 13.6 volts. The ignition output port may further comprise a positive and negative barrel jack." Xinfang at 1:64-67. *See also* the ignition output port 46 in Xinfang, Fig. 2.

DELTRAN EX1002
IPR2024-01219

	 Xinfang, Fig. 2
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected	Krieger discloses a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs. For example, Krieger discloses that through a feedback circuit or other means (*i.e.*, vehicle battery isolation sensor), the jump starter system can detect whether a vehicle

between said positive and negative polarity outputs;	battery is present between the positive and negative polarity outputs of the said internal battery. *See, e.g.*, "Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting State. If a battery is present, the jump starting process continues.;" Krieger at ¶ 0048.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Krieger discloses a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. For example, Krieger discloses using a polarity sensing circuit 16 (*i.e.*, reverse polarity sensor) to detect polarity of a connected vehicle battery. The polarity circuit 16 also provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. "In another embodiment of the invention, a polarity detection circuit is provided. The circuit comprises: cables for connecting a boosting battery to a depleted batter; a polarity sensing circuit coupled to the boosting battery for providing an enable

DELTRAN EX1002
IPR2024-01219

	signal when correct polarity connection is made between the boosting battery and the depleted batter." Krieger at ¶ 0013. *See, e.g.*, "The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11. The polarity sensing circuit 16 senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection." Krieger at ¶ 0031. *See also* Krieger, Fig. 5.  Fig. 5
1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. As shown above, Krieger discloses an output port consisting of positive and negative cables. *See d*isclosures in 1[B]. As such, Krieger

	discloses a power switch connected between said internal power supply and said output port. For example, Krieger discloses a power switch 12 between the internal battery and the output port. "A switch 12 is coupled to one of the wires or battery cables to be connected to the depleted battery 11. The switch 12 is activated to complete a boosting circuit between the boosting battery 2 and the depleted battery 11 only when a correct polarity connection between the batteries is attained." Krieger at ¶ 0029. Switch 12 is a power switch. "The switch 12 is preferable a solid state device, such as a transistor, diode, field effect transistor (FET), etc. FIG. 1 represents the switch 12 as a number FETs 12a-12d connected in parallel with each other. The FETs 12a-12d are preferably high power, very low on-resistance types." Krieger at ¶ 0030.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Krieger discloses a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. For example, Krieger discloses a microprocessor with embedded memory (*i.e.*, microcontroller) configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. "The microprocessor 60 provides output signals to activate the switch 12 into a conducting state when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second

DELTRAN EX1002
IPR2024-01219

	signal. Additionally, the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected." Krieger at ¶ 0045. Although Krieger refers to a "microprocessor," Krieger discloses the "microcontroller" of the '015 Patent. Kreiger states "Memory inside the microprocessor 60 can be used for Storing data that is used for later review and analysis." Krieger at ¶ 0061. The major difference between a microprocessor and microcontroller is a microcontroller usually includes both a microprocessor and some peripheral device such as memory. *See* https://www.electronicshub.org/difference-between-microprocessor-and-microcontroller/. The microprocessor in Krieger incorporates both a microprocessor and memory. It fully discloses the microcontroller of the '015 Patent. Krieger at ¶ 0061.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and	Krieger discloses that a power switch is turned on to cause the internal power supply to be connected to the vehicle battery only when signals from sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs. For example, Krieger disclose a feedback circuit or other means (*i.e.*, vehicle battery isolation sensor) to detect the presence of a vehicle battery; and a polarity sensing circuit 16 (*i.e.*, reverse polarity sensor) to detect polarity of a connected vehicle battery. The polarity circuit 16 also provide an output signal indicating whether

DELTRAN EX1002
IPR2024-01219

is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. The switch is only turned on when a proper connection with a depleted vehicle battery is made. "Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the Switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the Switch 12 is placed in a non-conducting State, that is, all the FETs 12a-12d are placed in a non-conducting State. If a battery is present, the jump starting process continues." Krieger at ¶ 0048;" "The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11. The polarity sensing circuit 16 senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection." Krieger at ¶ 0031. "The microprocessor 60 provides output signals to activate the switch 12 into a conducting state when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second signal. Additionally, the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected." Krieger at ¶ 0045.
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power	Krieger does not explicitly disclose the type of battery it uses, the portable jump starter disclosed in Xinfang, however, discloses an internal power supply comprises

DELTRAN EX1002
IPR2024-01219

supply comprises a lithium ion battery.	a lithium ion battery. For example, Xinfang states, "[t]he battery may comprise a lithium iron phosphate battery cell or a lithium cobalt oxide battery cell." Ex. 1008 at 1:67-2:1.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Krieger does not explicitly disclose the use of a battery pack of multiple lithium ion batteries, the portable jump starter disclosed in Xinfang, however, discloses the use of multiple lithium ion batteries. "The battery cell 42 may have a multi-cell structure. In an embodiment of the present invention, the 10 battery cell 42 has four battery cells." Xinfang at 5:9-11.
CLAIM 9	
9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus.	Krieger discloses a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus. "The voltage regulator then produces a voltage proportional to the Voltage of the boosting battery 2, and which is within the operating range of the microprocessor 60." Krieger at ¶ 0053.
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from	Krieger does not explicitly disclose a USB output port, the portable jump starter disclosed in Xinfang, however, teaches such a USB output port.

DELTRAN EX1002
IPR2024-01219

said internal power supply to a USB-chargeable device.	"The USB output module 36 is connectable via a USB cable to support USB charging of electronic devices where the battery module 16 provides power to the electronic devices." Xinfang at 4:59-62.
CLAIM 11	
11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from an external power source to said internal power supply.	Krieger does not explicitly disclose a USB charging port, the portable jump starter disclosed in Xinfang, however, discloses a USB charging port configured to provide charging power from an external power source to said internal power supply. "Optionally, the charging port, the at least one Universal Serial Bus interface, Light Emitting Diode indicator module, and ignition output port are sequentially arranged on a side of the housing." Xinfang at 2:22-25.
CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Krieger does not explicitly disclose a flashlight circuit, the portable jump starter disclosed in Xinfang, however, discloses a flashlight circuit configured to provide a source of light to a user. "For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing." Xinfang at 7:12-18.
CLAIM 13	

DELTRAN EX1002
IPR2024-01219

13. The apparatus of claim 12, wherein said source of light is at least one LED.	Krieger does not explicitly disclose a source of light using at least one LED, the portable jump starter disclosed in Xinfang, however, discloses source of light comprising at least one LED. *See* same disclosure above for claim 12.
CLAIM 14	
14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	Krieger does not explicitly disclose a microcontroller configured to control at least one LED to provide a visual alarm, the portable jump starter disclosed in Xinfang, however, discloses a microcontroller configured to control said at least one LED to provide a visual alarm indicating an emergency situation. *See* same disclosure above for claim 12.
CLAIM 15	
15. The apparatus of claim 1, further comprising a plurality of visual indicators configured to display remaining capacity status of said internal power supply.	Krieger does not explicitly disclose a plurality of visual indicators in this claim limitation, the portable jump starter disclosed in Xinfang, however, discloses a plurality of visual indicators configured to display remaining capacity status of said internal power supply. "For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing." Xinfang at 7:12-18.

DELTRAN EX1002
IPR2024-01219

CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.	Krieger discloses a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity. "If the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off. The display 64 may be controlled by the microprocessor 60 to display a message indicating reverse polarity. The microprocessor 60 may additionally activate an alarm such as buzzer 72 in response to the incorrect polarity connection." Krieger at ¶ 0047.

DELTRAN EX1002
IPR2024-01219

EXHIBIT B

'015 Patent Claims	**Disclosure in Krieger and/or Xinfang and/or Purkey**
CLAIM 19	
19. The apparatus of claim 1, further comprising a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery.	The combination of Krieger and Xinfang render claim 1 obvious. *See* Ex. A. Krieger does not include a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery. However, Purkey discloses a jump starter, which includes a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery. "The microcontroller 35 is also connected to power override circuitry 55. The power override function allows manual intervention in the event that the electrical system has insufficient residual power to provide even a minimum sensed voltage that would automatically initiate a power boost." Purkey at 12:52-57. It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to combine this function in Purkey with Krieger and Xinfang to deal with situation where the voltage of the depleted vehicle battery is too low to be detected.
CLAIM 20	
20. The apparatus of claim 19, wherein said microcontroller is configured to detect actuation of said	Krieger does not disclose a microcontroller configured to detect actuation of said manual override switch for at least a predetermined period of time before activation of said manual override mode. However, Purkey discloses wherein said microcontroller is configured to delay actuation of said manual override switch for

DELTRAN EX1002
IPR2024-01219

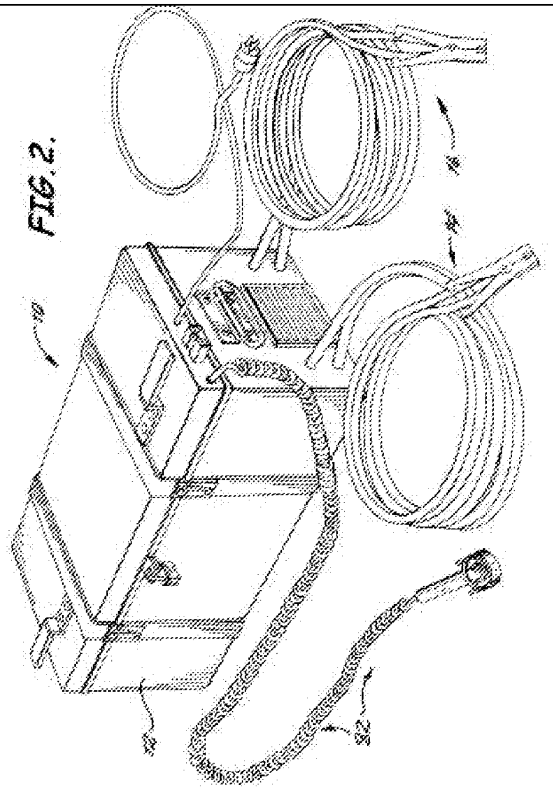
manual override switch for at least a predetermined period of time before activation of said manual override mode.	at least a predetermined period of time before activation of said manual override mode. For example, Purkey disclose before actuating a manual switch, delay is implemented as additional tests have to be performed by the sensing circuit and microcontroller. "In one specific embodiment of the invention, a manually actuated switch prevents any current exchange until the operator has connected the power booster and the electrical system and is safely situated to remotely control power delivery. Even after the switch is actuated, the sensing circuit operates to detect whether the proper voltages exist at power supply connection (*i.e.*, a 0.7V Voltage across the terminals of a disabled battery). If not, the isolation circuit, which can be an arrangement of magnetic Switches, prevents any electrical current to pass between the power source and the electrical system." Purkey at 5:40-51. It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to combine this function in Purkey with Krieger and Xinfang to deal with situation where the voltage of the depleted vehicle battery is too low to be detected and also allows a predetermined period of time before activation of said manual override mode to ensure safety. It is also natural for a person of ordinary skill in the art to implement such a delay before forcing the charging of a battery in a potentially dangerous situation.

DELTRAN EX1002
IPR2024-01219

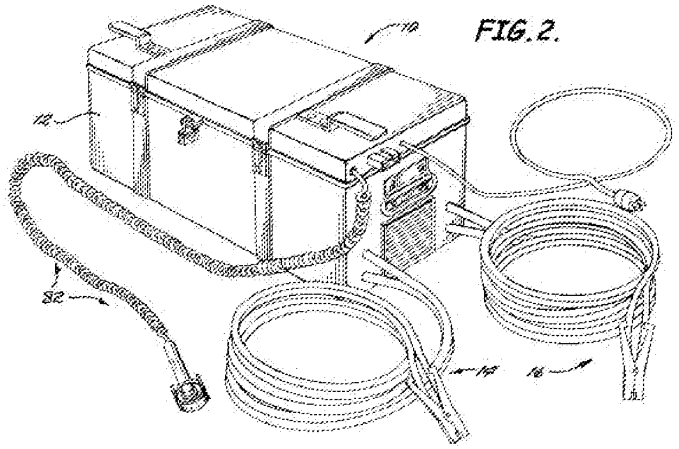
EXHIBIT C

'015 Patent Claims	**Disclosure in Purkey and Xinfang**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Purkey discloses an apparatus for jump starting a vehicle engine. *See, e.g.*, "Yet a further advantage of the present invention is the ability to perform multiple power boosts, or "jump Starts," between recharging of the power Source." Purkey at 6:63-65. *See also* Purkey, Fig. 2.

DELTRAN EX1002
IPR2024-01219

	 The jump starter apparatus includes an internal power supply. "Again, in the context of boosting the disabled battery of a heavy-duty vehicle, sufficient energy is provided by a power Source combining a high-density capacitor and battery as to turn a large engine to thereby efficiently and rapidly start the vehicle." Purkey at 4:66-5:3.

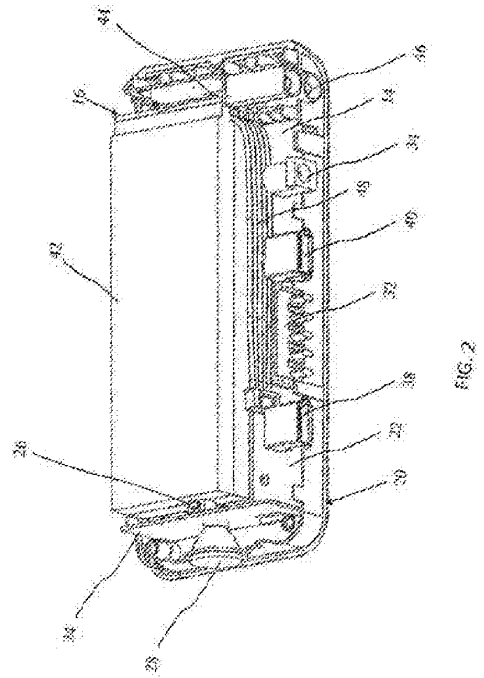
DELTRAN EX1002
IPR2024-01219

1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Purkey discloses "the first and second electrical conductors 14, 16 extending outwardly from the housing 12 are used to establish a power Supply connection between the power booster 10 and the respective positive and negative terminals 64, 66 of the discharged battery 62 of the electrical system of the vehicle 60." Purkey at ¶ 9:2-7; *see also* Purkey, Fig. 2.  FIG. 2. Thus, according to Plaintiff's construction of this limitation, Krieger discloses an output port having positive and negative polarity outputs. Additionally, Purkey shows positive and negative polarity outputs (*i.e.*, first and second electrical conductors 14 and 16) without explicitly depicting an output port. The portable jump starter disclosed in Xinfang, however, clearly teaches such an output port (*i.e.*, the ignition output port), which simply combines the positive and negative polarity outputs of the internal battery as disclosed in Purkey.

DELTRAN EX1002
IPR2024-01219

	"In an embodiment, the ignition output port outputs power at a voltage higher than about 13.6 volts. The ignition output port may further comprise a positive and negative barrel jack." Xinfang at 1:64-67. "The first and second electrical conductors 14, 16 extending outwardly from the housing 12, as already described, are electrically connected to the power source 20 and the electrical system to establish a power supply connection between the power source 20 and the electrical system to selectively exchange power between the power Source and the electrical system." Purkey at 14:55-61. *See also* the ignition output port 46 in Fig. 2 in Xinfang.

DELTRAN EX1002
IPR2024-01219

	 Xinfang, Fig. 2
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected	Purkey discloses a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs. For example, Purkey discloses a voltage detecting circuit, defined as a voltage sensor 32 (*i.e.*, vehicle battery isolation sensor) connected to the first electrical

DELTRAN EX1002
IPR2024-01219

between said positive and negative polarity outputs;	conductor 14 (*i.e.*, polarity output) and configured to detect the presence of a vehicle battery. "In an alternative embodiment, the voltage detection circuit and isolation circuit include a processor and timer. The voltage within the electrical system is detected after the connection is made between the power booster and the electrical System." Purkey at 5:55-59. "The processor 34 preferably includes a detecting circuit, defining a voltage sensor 32, connected to the first electrical conductor 14 to thereby sense the voltage of the electrical System and to provide numerical indicator S X, Y, Z corresponding to sequentially sensed voltage levels of the electrical system." Purkey at 9:25-30.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive	Purkey discloses a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. For example, Purkey discloses a built-in reverse polarity protection (*i.e.*, reverse polarity sensor) to detect polarity of a connected vehicle battery. "There is, thus, a built-in reverse polarity protection. Relatedly, there is Same polarity protection in the Sense that an accidental connection of power Source conductors to the same terminal of the electrical System battery causing a direct

DELTRAN EX1002
IPR2024-01219

and negative polarity outputs of said output port;	short will be 'sensed' before power delivery is initiated, thereby reducing risk of damage to the invention and the electrical System." Purkey at 5:29-35.
1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. As shown above, Purkey discloses an output port consisting of positive and negative cables. *See* disclosures in 1[B]. As such, Purkey discloses a power switch connected between said internal power supply and said output port under Plaintiff's construction. Additionally, Purkey discloses an isolation circuit 40 (*i.e.*, the power switch) between the internal battery and the output port. "The isolation circuit 40 can be provided by a set of magnetic Switches or alternatively by at least one field effect transistor (FET) as understood by those skilled in the art (see FIGS. 8, 10, and 11). For example, four magnetic switches 41, 42, 43, 44 can be combined as specifically illustrated in FIG. 11. Alternatively, the isolation circuit can comprise a high-current, solid state on/off switch with very low on-resistance such as that provided by the Solid State On/Off Switch, Part No. 13014, manufactured by The IntralJSA Group, Inc. and incorporating Intra's proprietary metallic oxide semi-conductor FET (MOSFET) switches as will also be understood by those skilled in the art." Purkey at 11:54-65. "In response, the processor 34 signals the isolation circuit 40 to permit an initial delivery of current-borne power to the electrical system (Block 105); otherwise current is blocked and the physical power Supply connection must be rechecked (Block 106)." Purkey at 11:20-25.

1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Purkey discloses a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. For example, Purkey discloses a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. "The processor 34 specifically includes voltage detecting circuitry 32a, 32b for sensing the initial and subsequent voltages. The sensed voltages are conveyed to a microcontroller 35, which can include an analog to digital signal conversion capability that interfaces with the voltage detecting circuitry. The microcontroller 35 stores the initial voltage value in a register 36 and the microcontroller determiner 38 determines when the appropriate conditions for power exchange exist. Accordingly, the microcontroller determines whether the isolation circuit 40 is to be open or closed." Purkey at 12:18-28.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of	Purkey discloses that a power switch is turned on to cause the internal power supply to be connected to the vehicle battery only when signals from sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

DELTRAN EX1002
IPR2024-01219

positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	*See* same disclosure above for claim 1[F].
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.	Purkey does not explicitly disclose the type of battery it uses, the portable jump starter disclosed in Xinfang, however, discloses an internal power supply comprises a lithium ion battery. For example, Xinfang states, "[t]he battery may comprise a lithium iron phosphate battery cell or a lithium cobalt oxide battery cell." Xinfang at 1:67-2:1.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Purkey does not explicitly disclose the use of a battery pack of multiple lithium ion batteries, the portable jump starter disclosed in Xinfang, however, discloses wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries. "The battery cell 42 may have a multi-cell structure. In an embodiment of the present invention, the 10 battery cell 42 has four battery cells." Xinfang at 5:9-11.

DELTRAN EX1002
IPR2024-01219

CLAIM 9	
9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus.	Purkey discloses a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus. **"A voltage regulator 35 is included as part of the processor 34 to regulate the amount** of power delivered to thereby ensure that only as much as needed to drive the **microcontroller 35 is delivered." Purkey at** 12:35-39.
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device.	Purkey does not explicitly disclose a USB output port. The portable jump starter disclosed in Xinfang, however, clearly teaches such a USB output port. **"The USB output module 36 is connectable via a USB cable to support USB** charging of electronic devices where the battery module 16 provides power to the **electronic devices." Xinfang at** 4:59-62.
CLAIM 11	
11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from an external power source to said internal power supply.	Purkey does not explicitly disclose a USB charging port. The portable jump starter disclosed in Xinfang, however, discloses a USB charging port configured to provide charging power from an external power source to said internal power supply. **"Optionally, the charging port, the at least one Universal Serial Bus interface, Light** Emitting Diode indicator module, and ignition output port are sequentially arranged **on a side of the housing." Xinfang at** 2:22-25.

DELTRAN EX1002
IPR2024-01219

CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Purkey does not explicitly disclose a flashlight circuit. The portable jump starter disclosed in Xinfang, however, discloses a flashlight circuit configured to provide a source of light to a user. "For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED **indicator module 32 so that one LED is lit and another LED is flashing."** Xinfang at 7:12-18.
CLAIM 13	
13. The apparatus of claim 12, wherein said source of light is at least one LED.	Purkey does not explicitly disclose source of light is at least one LED. The portable jump starter disclosed in Xinfang, however, discloses source of light comprising at least one LED; *See* same disclosure above for claim 12.
CLAIM 14	
14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	Purkey does not explicitly disclose a microcontroller configured to control said at least one LED to provide a visual alarm indicating an emergency situation. The portable jump starter disclosed in Xinfang, however, discloses a microcontroller configured to control said at least one LED to provide a visual alarm indicating an emergency situation; *See* same disclosure above for claim 12.

DELTRAN EX1002
IPR2024-01219

CLAIM 15	
15. The apparatus of claim 1, further comprising a plurality of visual indicators configured to display remaining capacity status of said internal power supply.	Purkey discloses a plurality of visual indicators configured to display remaining capacity status of said internal power supply. "As already noted, the processor 34 preferably further includes a timer 39 positioned to measure elapsed time t between discrete changes in the numerical indicator of electrical system or power source voltages and to measure elapsed time t, during which current is passed between the power source 20 and the electrical system." Purkey at 10:42-47. "As further illustrated in FIG. 5, the microcontroller 35 is also electrically connected to status indicator circuitry 56. The status indicator circuitry 56 can provide numerical or other visual display indicators for indicating the condition of the electrical system at a given moment during the process of providing a power boost. For example, the status indicator can be composed of a set of light emitting diodes (LEDs) that indicate Voltage conditions." Purkey at 12:44-51.
CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.	Purkey discloses a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity. "There is, thus, a built-in reverse polarity protection. Relatedly, there is same polarity protection in the sense that an accidental connection of power Source conductors to the same terminal of the electrical system battery causing a direct short will be 'sensed' before power delivery is initiated, thereby reducing risk of damage to the invention and the electrical System." Purkey at 5:29-35.

DELTRAN EX1002
IPR2024-01219

CLAIM 19	
19. The apparatus of claim 1, further comprising a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery.	Purkey discloses a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery. "The microcontroller 35 is also connected to power override circuitry 55. The power override function allows manual intervention in the event that the electrical system has insufficient residual power to provide even a minimum sensed voltage that would automatically initiate a power boost." Purkey at 12:52-57.
CLAIM 20	
20. The apparatus of claim 19, wherein said microcontroller is configured to detect actuation of said manual override switch for at least a predetermined period of time before activation of said manual override mode.	Purkey discloses wherein said microcontroller is configured to delay actuation of said manual override switch for at least a predetermined period of time before activation of said manual override mode. For example, Purkey disclose before actuating a manual switch, delay is implemented as additional tests have to be performed by the sensing circuit and microcontroller. "In one specific embodiment of the invention, a manually actuated switch prevents any current exchange until the operator has connected the power booster and the electrical system and is safely situated to remotely control power delivery. Even after the switch is actuated, the sensing circuit operates to detect whether the proper voltages exist at power supply connection (i.e., a 0.7V Voltage across the terminals of a disabled battery). If not, the isolation circuit, which can be an arrangement of magnetic Switches, prevents any electrical current to pass between the power source and the electrical system." Purkey at 5:40-51.

DELTRAN EX1002
IPR2024-01219

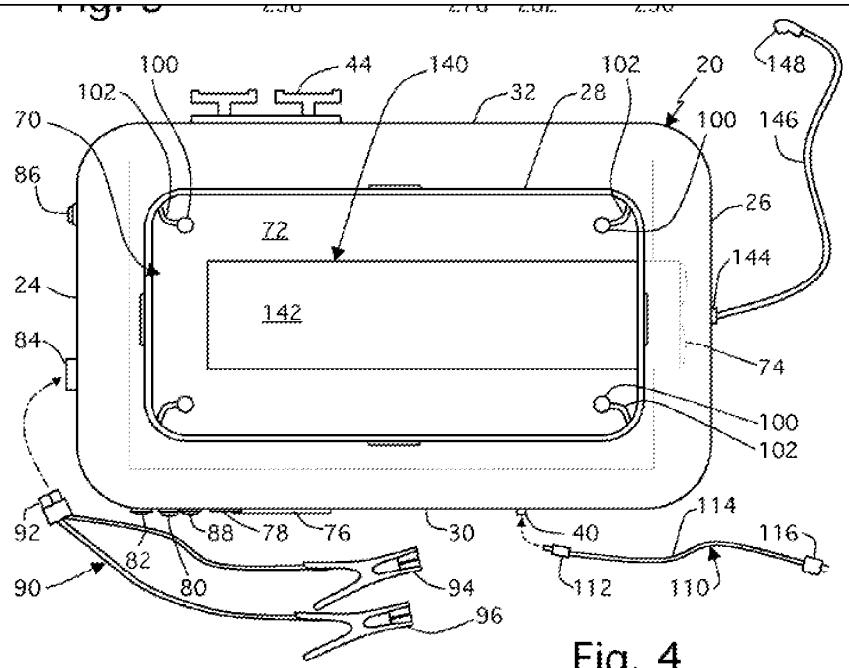
	It is also natural for a person of ordinary skill in the art ("POSITA") to implement such a delay before forcing the charging of a battery in a potentially dangerous situation.

DELTRAN EX1002
IPR2024-01219

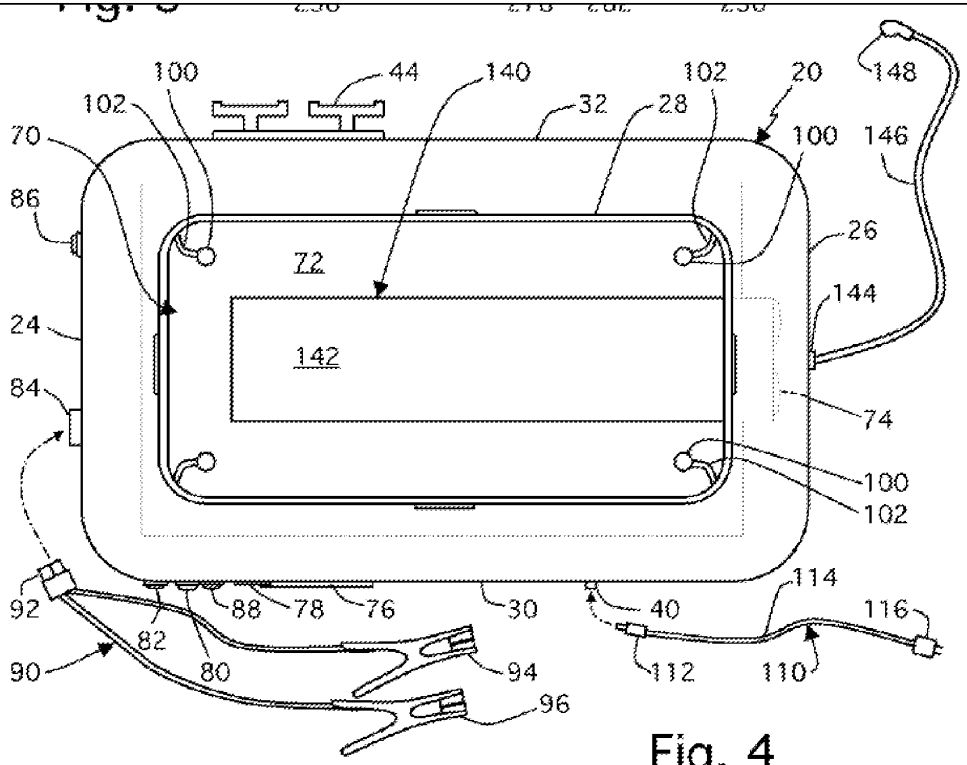
EXHIBIT D

'015 Patent Claims	**Disclosure in Brown, Wang, and Xinfang**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Brown discloses an apparatus for jump starting a vehicle engine. *See, e.g.*, "It is therefore one of the main objects of the present invention to provide a portable battery charger for jump-starting an engine of a disabled vehicle." Brown at 3:28-30. The jump starter apparatus includes an internal power supply. "Electrical system 70 comprises rechargeable battery 72." *Id.* at 4:22-23. *See also* Fig. 4.

DELTRAN EX1002
IPR2024-01219

	 Fig. 4
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Brown discloses an output port having positive and negative polarity outputs. *See* Brown at 4:24-30 (*i.e.*, boost cable port 84, which connects to booster cable assembly 90, with includes positive claim 94 and negative claim 96. *See also* Fig. 4

DELTRAN EX1002
IPR2024-01219

	 Fig. 4
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected	Brown does not disclose a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs. However, Wang does disclose this element.

between said positive and negative polarity outputs;	**For example, Wang discloses a "automatic detection module" which "automatically** detects whether the load is connected, whether the electrode is connected with the automobile battery reversely, whether the automobile engine or the storage battery has reverse current, whether the battery state is suitable for heavy current power **generation, thereby protecting the load and the circuit and thus complete functions."** Wang at 2:40-47.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Brown does not disclose a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. However, Wang does disclose this element. **For example, Wang discloses a "automatic detection module" which "automatically** detects whether the load is connected, whether the electrode is connected with the automobile battery reversely, whether the automobile engine or the storage battery has reverse current, whether the battery state is suitable for heavy current power **generation, thereby protecting the load and the circuit and thus complete functions."** Wang at 2:40-47.
1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Brown discloses a power switch connected between said internal power supply and said output port.

DELTRAN EX1002
IPR2024-01219

	For example, Brown discloses switch 90 (*i.e.*, the power switch) between the internal battery and the output port. **"Switch 80 is an "on/off** switch to operate rechargeable **battery 72." Brown at 4:52-53.**
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Brown does not disclose a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. However, Wang does disclose this element. For example, Wang discloses a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. **"The micro controller in the present disclosure d**etermines whether the automobile storage battery is connected with the automobile engine through the load detection module, wherein the automobile start control model is automatically activated and the battery starts to supply power to the load module when the load is correctly connected; the automobile start control model is automatically deactivated and the battery stops supplying power to the load module when assuming that the load is not connected or the positive and negative polarities are reversely **connected." Wang at 4:14-23.**
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle	Brown does not disclose that a power switch is turned on to cause the internal power supply to be connected to the vehicle battery only when signals from sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of

DELTRAN EX1002
IPR2024-01219

battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	positive and negative terminals of said vehicle battery with said positive and negative polarity outputs. However, Wang does disclose this element *See* same disclosure above for claim 1[F].
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.	Brown does not explicitly disclose the type of battery it uses, the portable jump starter disclosed in Xinfang, however, discloses an internal power supply comprises a lithium ion battery. For example, Xinfang states, "[t]he battery may comprise a lithium iron phosphate battery cell or a lithium cobalt oxide battery cell." Xinfang at 1:67-2:1.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Brown does not explicitly disclose the use of a battery pack of multiple lithium ion batteries, the portable jump starter disclosed in Xinfang, however, discloses wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.

DELTRAN EX1002
IPR2024-01219

	"The battery cell 42 may have a multi-cell structure. In an embodiment of the present **invention, the 10 battery cell 42 has four battery cells."** Xinfang at 5:9-11.
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device.	Brown does not explicitly disclose a USB output port. The portable jump starter disclosed in Xinfang, however, clearly teaches such a USB output port. **"The USB output module 36 is connectable via a USB cable to support USB charging** of electronic devices where the battery module 16 provides power to the electronic **devices." Xinfang at 4:59**-62.
CLAIM 11	
11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from an external power source to said internal power supply.	Brown does not explicitly disclose a USB charging port. The portable jump starter disclosed in Xinfang, however, discloses a USB charging port configured to provide charging power from an external power source to said internal power supply. **"Optionally, the charging port, the at least one Universal Serial Bus interface, Light** Emitting Diode indicator module, and ignition output port are sequentially arranged **on a side of the housing." Xinfang at 2:22**-25.
CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured	Brown does not explicitly disclose a flashlight circuit. The portable jump starter disclosed in Xinfang, however, discloses a flashlight circuit configured to provide a source of light to a user.

DELTRAN EX1002
IPR2024-01219

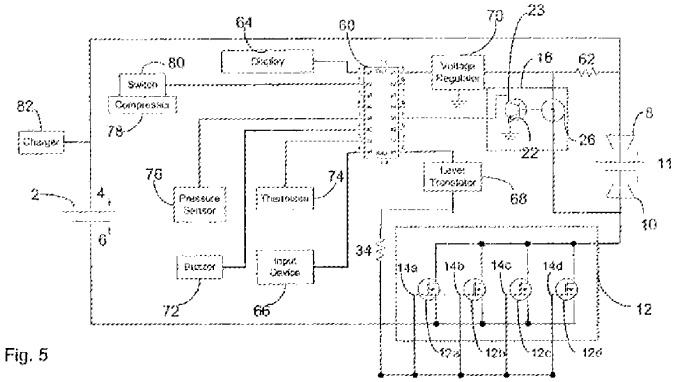
to provide a source of light to a user.	"For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator **module 32 so that one LED is lit and another LED is flashing."** Xinfang at 7:12-18.
CLAIM 13	
13. The apparatus of claim 12, wherein said source of light is at least one LED.	Brown does not explicitly disclose source of light is at least one LED. The portable jump starter disclosed in Xinfang, however, discloses source of light comprising at least one LED; *See* same disclosure above for claim 12.
CLAIM 14	
14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	Brown does not explicitly disclose a microcontroller configured to control said at least one LED to provide a visual alarm indicating an emergency situation. The portable jump starter disclosed in Xinfang, however, discloses a microcontroller configured to control said at least one LED to provide a visual alarm indicating an emergency situation; *See* same disclosure above for claim 12.
CLAIM 15	
15. The apparatus of claim 1, further comprising a plurality of visual indicators configured to display	Brown does not disclose a plurality of visual indicators configured to display remaining capacity status of said internal power supply. However, Xinfang does disclose this element.

DELTRAN EX1002
IPR2024-01219

remaining capacity status of said internal power supply.	"The LED indicator module 32 may include a plurality of LED's . . . to indicate available power and the charging status of the battery module 16." Xinfang at 4:48-51.

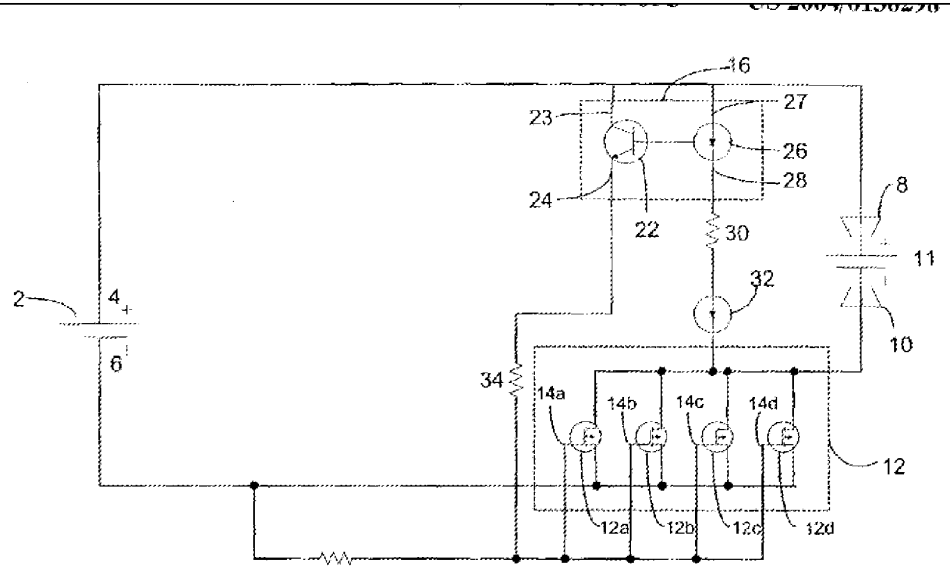
DELTRAN EX1002
IPR2024-01219

EXHIBIT E

'015 Patent Claims	**Disclosure in Krieger and/or Yoshimura**
	CLAIM 1
1. Apparatus for jump starting a vehicle engine, comprising:	Krieger discloses an apparatus for jump starting a vehicle engine. Krieger at 8:40-42 ("Referring now to FIG. 5, an example of a jump starter System according to an embodiment of the invention is described."); 6:45-47 ("Once a proper polarity connection is made between the batteries, the depleted battery 11 is charged or the vehicle is jump started."). *See also* Fig. 5.  Fig. 5
1[A] an internal power supply;	Krieger discloses an internal power supply. Krieger at 5:11-15 ("FIG. 1 illustrates a battery boosting devices including a polarity protection circuit according to an exemplary embodiment of the invention. A boosting battery 2 with a positive terminal 4 and a negative terminal 6 is provided in the booster device."); 2:33-38 ("Typically, a battery booster device comprises a pair of cables connected at one end

	to a built-in battery or other power source arranged in a portable box. . . The built-in battery **provides a DC power source for boosting a depleted battery.**"); 5:13-15 ("A boosting battery 2 with a positive terminal 4 and a negative terminal 6 is provided in **the booster device.**"); 2:64-3:4 ("**In another exemplary embodiment, a booster** apparatus is provided. The apparatus comprises: a boosting battery having a positive terminal and a negative terminal; a first cable coupled to the positive terminal of the boosting battery and having a clamp for connection to a terminal of a depleted battery; a second cable coupled to the negative terminal of the boosting battery and **having a clamp for connection to another terminal of the depleted battery**"); 3:22-23 ("**In another embodiment, a jump starter system comprises: a boosting battery having** positive and negative **terminals**"). *See also*, Fig. 1

DELTRAN EX1002
IPR2024-01219

	 Fig. 1
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. **Krieger discloses** "a first cable coupled to the positive terminal of the boosting battery and having a clamp for connection to a terminal of a depleted battery; a second cable coupled to the negative terminal of the boosting battery and having a clamp for connection to another terminal of the depleted battery". **Krieger** at ¶ 2:66-3:5. Thus, according to Plaintiff's **construction of this** limitation, Krieger discloses an output port having positive and negative polarity outputs. Additionally, Yoshimura discloses an output with positive and negative polarity. **Yoshimura at ¶28 ("A boosting battery 2 with a positive terminal 4 and a negative** terminal 6 is provided in the booster device. The positive terminal 4 of the boosting

	battery 2 is coupled to one of a pair of alligator clamps 8, 10 to be connected to a battery to be charged 11 (depleted battery) via a wire or battery cable. The negative terminal 6 of the boosting battery 2 is connected to the other of the alligator clamps 8, 10 to be connected to the battery to be charged 11 via a wire or battery cable.").
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Krieger discloses a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs. Kreiger at 9:33-34 ("Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected."), 8:48-53 ("By way of a feedback circuit or other means, the microprocessor 60 can monitor the voltage and/or current being supplied to the depleted battery 11 from the booster battery 2, the voltage and/or current of the battery 11 and can detect short circuits or other faults, as described in more detail below."). Krieger discloses a vehicle battery isolation sensor which is configured to detect the presence of a vehicle battery connected between said positive and negative polarity outputs. Kreiger at 9:33-42 ("Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting State. If a battery is present, the jump starting process continues."), 10:55-11:8 ("The microprocessor 60 can also be programmed to detect a bad battery or a battery whose voltage is too low to be jump started. . . This type of fault may also be detected if there is no battery connected to clamps 8,10 or a poor connection is made to the depleted battery 11 and the jump starter is activated. When the fault occurs, the

DELTRAN EX1002
IPR2024-01219

	microprocessor 60 can be programmed to terminate the jump starting process and to display a suggestion to a user that the battery be reconditioned before jump starting is attempted or to check if the clamps 8, 10 are properly connected to the battery 11.); 6:48-61 ("When the claims are disconnected, diode 26 is now longer forward biases and no current flows therethrough, turning phototransistor 22 in the opto-isolator off, which in turn, turns the FETS 12a-12d off. The boosting circuit is then, in effect, reset, preventing short-circuits or a reverse polarity connection being made after a proper polarity connection is made. … or a microprocessor or other circuitry can be programmed to detect when the depleted battery is disconnected."); 6:67-7:3 ("The frequency generator and frequency detectors are used to detect disconnections of the claims 8, 10 from the depleted battery 11 or other interruption of the boosting circuit."). In addition, the mere fact that proper or improper connection is detected is tantamount to detecting the presence of the vehicle battery. Claims 38 also confirms that a sensor (*i.e.*, a vehicle isolation sensor) will produce a signal representing the presence of a vehicle battery when connected with the jump starter disclosed in Krieger. "The booster apparatus of claim 37, further comprising at least **one Sensor connected to an input of the microprocessor for producing a measured signal representing the presence of the depleted battery at the means for connecting** and wherein the means for interrupting comprises a microprocessor programmed to place the FET in a non-conducting state if no depleted battery is present." ('emphasis added") Krieger, Claim 38. Yoshimura also discloses a battery isolation sensor which is configured to detect the presence of a battery. *See* Yoshimura Abstract ("In response to the signal from main battery presence sensor block for sensing the presence of the first batter BAT 1 and

	the signal from the voltage comparator 5, the memory 3 is backed up to retain data by the external power supply voltage when it is supplied, and further, the second battery BAT 2 is charged by a charging circuit 6 driven by the external power supply voltage."); 12:12-41 ("As shown in FIG. 2, the main battery presence sensor block 11A according to the second embodiment includes a main battery reference voltage generator circuit 21 serving as a reference voltage generator portion for generating a reference voltage Vref1. Two resistors R4 and R5 are connected between the main battery power supply voltage node 102 and the ground node, with the connection node 121 of the resistors R4 and R5 connected to one input node of a later-described main battery voltage comparator 22. The main battery voltage comparator 22 serves as a first battery voltage comparator portion, which has one input node connected to the connection node 121 where the voltage dependent on the voltage supplied at the main battery power supply node 102, namely, the voltage divided by the two resistors R4 and R5, appears. The main battery voltage comparator 22 has another input node supplied with the reference voltage Vref1 outputted by the main battery reference voltage generator circuit 21, in order to compare the voltage level of the first battery BAT 1 with the reference voltage Vref1 so as to output a signal MBOUT indicative of the comparison result. The main-battery presence signal MBOUT is at an L-level when the voltage at the connection node 121, namely the voltage level divided by resistors R4 and R5, is higher than the reference voltage Vref1 and the main-battery presence MBOUT is at a H-level when the voltage at the connection node 121 is lower than the reference voltage Vref1. Hysteresis is imparted to the main-battery voltage comparator 22 so that power supplied to the memory 3 may not be interrupted in the course of switching between the first battery BAT 1 and the second battery BAT 2.").

DELTRAN EX1002
IPR2024-01219

	Yoshimura is analogous art directed to power supply control integrated circuits. Therefore it would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to have incorporated the presence block detector into the apparatus of Krieger for the advantages of lessening power consumption for both main and auxiliary batteries, as per the teachings of Yoshimura. Yoshimura, Abstract.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Krieger discloses a reverse polarity sensor connected in circuit with said positive and negative polarity outputs. Krieger at 4:55-58 ("FIG. 1 is a circuit schematic that illustrates a polarity protection circuit according to a preferred embodiment of the invention"), 5:47-52 ("The switch 12 is activated by a polarity sensing circuit 16 to allow current flow from the boosting battery 2 to the depleted battery 11. The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11.") The reverse polarity sensor disclosed in Krieger is also configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. Krieger at 2:54-60 ("In another embodiment of the invention, a polarity detection circuit is provided. The circuit comprises: cables for connecting a boosting battery to a depleted batter; a polarity sensing circuit coupled to the boosting battery for providing an enable signal when correct polarity connection is made between the boosting battery and the depleted battery"), Krieger at 5:49-55 ("The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11. The polarity sensing circuit 16 senses the polarity of the connection between the

boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection." *See also* Fig. 2

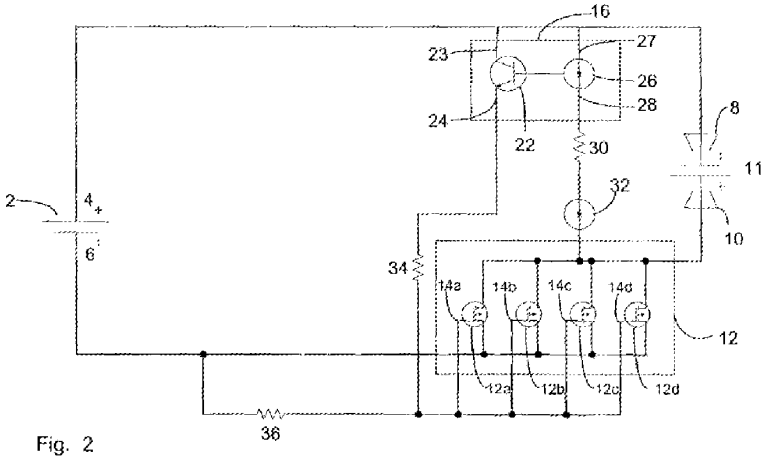


Fig. 2

See also Krieger, Fig. 5.

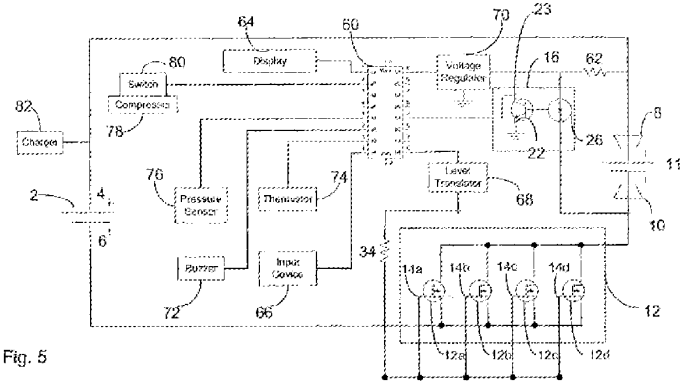


Fig. 5

1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. As shown above, Krieger discloses an output port consisting of positive and negative cables. *See d*isclosures in 1[B]. As such, Krieger discloses a power switch connected between said internal power supply and said output port. For example, Krieger discloses a power switch 12 between the internal battery and the output port. For example, Krieger discloses a power switch 12 between the internal battery and the output port. Krieger at 5:22-26 **("A switch 12 is coupled to one of the wires or** battery cables to be connected to the depleted battery 11. The switch 12 is activated to complete a boosting circuit between the boosting battery 2 and the depleted battery **11 only when a correct polarity connection between the batteries is attained.").** Switch 12 is a power switch. Krieger at 5:34-38 **("The switch 12 is pre**ferable a solid state device, such as a transistor, diode, field effect transistor (FET), etc. FIG. 1 represents the switch 12 as a number FETs 12a-12d connected in parallel with each other. The FETs 12a-12d are preferably high power, very low on-resistance **types.").**
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and	Krieger discloses a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch.

DELTRAN EX1002
IPR2024-01219

to provide an output signal to said power switch,	For example, Krieger discloses a microprocessor with embedded memory (*i.e.*, microcontroller) configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. *See,* Krieger at 5:52-55 ("The polarity sensing circuit 16 senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection."); 9:4-10 ("The microprocessor 60 provides output signals to activate the switch 12 into a conducting State when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second signal. Additionally, the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected."). Kreiger at 9:33-42 ("Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting State. If a battery is present, the jump-starting process continues."), 10:55-11:8 ("The microprocessor 60 can also be programmed to detect a bad battery or a battery whose voltage is too low to be jump started. . . This type of fault may also be detected if there is no battery connected to clamps 8,10 or a poor connection is made to the depleted battery 11 and the jump starter is activated. When the fault occurs, the microprocessor 60 can be programmed to terminate the jump starting process and to display a suggestion to a user that the battery be reconditioned before jump starting is attempted or to check if the clamps 8, 10 are properly connected to the battery 11."); 6:59-7:22 "[O]r a microprocessor or other circuitry can be

	programmed to detect when the depleted battery is disconnected….The frequency generator and frequency detector are used to detect disconnection of claims 8, 19 from the depleted battery 11 or other interruption of the boosting circuit. The frequency generator 37 is adapted to inject a signal into the boosting circuit. A frequency detector 38 is adapted to detect the frequency injected into the boosting circuit by the frequency generator 37. … The frequency detector 38 detects the injected frequency, and the battery boosting proceeds normally. When the claims 8, 10 are removed from the depleted battery 11 or the circuit is otherwise interrupted, current flow is stopped, and the frequency detector no longer detects the frequency injected by the frequency generator 37. The frequency detector us adapted to then turn FETs 12a-12d to a non-conductive state, resetting the boosting circuit. This prevents short circuits or a reverse polarity connection being made after a proper polarity connection has been established."). Although Applicant in Krieger refers to a "microprocessor," Krieger discloses the "microcontroller" of the '105 Patent. Kreiger states "Memory inside the microprocessor 60 can be used for storing data that is used for later review and analysis." Krieger at 11:61-63. The major difference between a microprocessor and microcontroller is a microcontroller usually includes both a microprocessor and some peripheral device such as memory. *See* https://www.electronicshub.org/difference-between-microprocessor-and-microcontroller/. The microprocessor in Krieger incorporates both a microprocessor and memory. It fully discloses the microcontroller of the '015 Patent. Krieger at 11:61-63.

1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	Krieger discloses that a power switch is turned on to cause the internal power supply to be connected to the vehicle battery only when signals from sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs. For example, Krieger disclose a feedback circuit or other means (*i.e.*, vehicle battery isolation sensor) to detect the presence of a vehicle battery; and a polarity sensing circuit 16 (*i.e.*, reverse polarity sensor) to detect polarity of a connected vehicle battery. The polarity circuit 16 also provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. It is inherent that each of the two distinct circuits (*i.e.*, feedback circuit and reverse polarity sensor) must send a signal to the microcontroller after their respective detections. The switch is only turned on when a proper connection with a depleted vehicle battery is made. *See, e.g.*, Krieger at 9:33-42 ("Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the Switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the Switch 12 is placed in a non-conducting State, that is, all the FETs 12a-12d are placed in a non-conducting State. If a battery is present, the jump starting process continues."); 6:59-7:22 "[O]r a microprocessor or other circuitry can be programmed to detect when the depleted battery is disconnected….The frequency generator and frequency detector

DELTRAN EX1002
IPR2024-01219

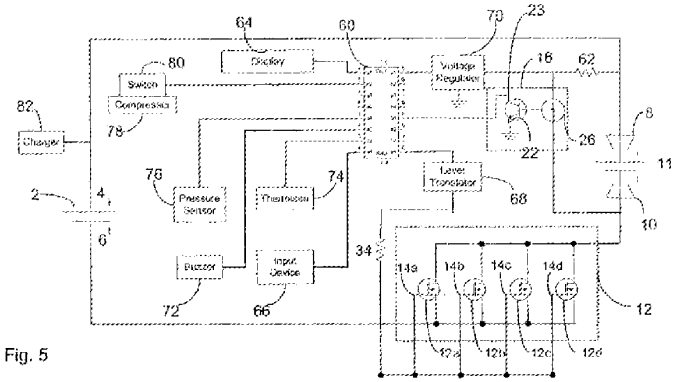
	are used to detect disconnection of claims 8, 19 from the depleted battery 11 or other interruption of the boosting circuit. The frequency generator 37 is adapted to inject a signal into the boosting circuit. A frequency detector 38 is adapted to detect the frequency injected into the boosting circuit by the frequency generator 37. … The frequency detector 38 detects the injected frequency, and the battery boosting proceeds normally. When the claims 8, 10 are removed from the depleted battery 11 or the circuit is otherwise interrupted, current flow is stopped, and the frequency detector no longer detects the frequency injected by the frequency generator 37. The frequency detector us adapted to then turn FETs 12a-12d to a non-conductive state, resetting the boosting circuit. This prevents short circuits or a reverse polarity connection being made after a proper polarity connection has been established."); 5:49-55 ("The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11. The polarity sensing circuit 16 senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection."); 9:4-10 ("The microprocessor 60 provides output signals to activate the switch 12 into a conducting state when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second signal. Additionally, the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected.").
CLAIM 9	
9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a	Krieger discloses a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus. Krieger at 10:32-35 ("The voltage regulator then produces a voltage proportional to the Voltage of the boosting battery 2, and which is within the operating range of the microprocessor 60.").

DELTRAN EX1002
IPR2024-01219

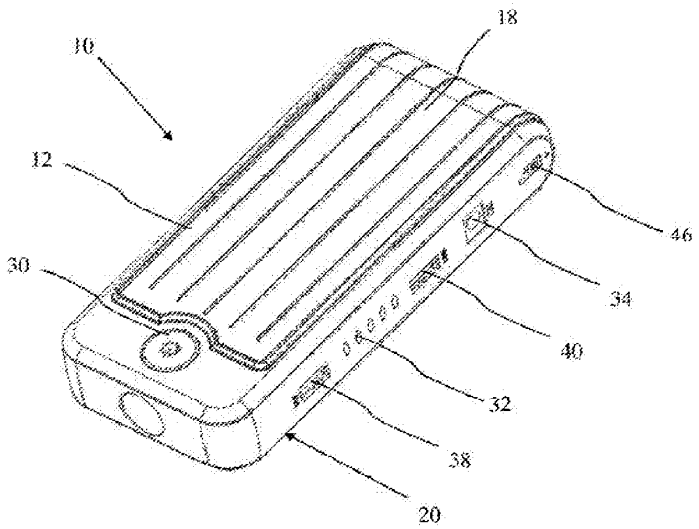
voltage level appropriate to provide operating power to internal components of the apparatus.	
CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.	Krieger discloses a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity. Krieger at 9:27-32 ("If the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off. The display 64 may be controlled by the microprocessor 60 to display a message indicating reverse polarity. The microprocessor 60 may additionally activate an alarm such as buzzer 72 in response to the incorrect polarity connection.").

DELTRAN EX1002
IPR2024-01219

EXHIBIT F

'015 Patent Claims	Disclosure in Krieger and/or Xinfang and/or Yoshimura
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising:	Krieger discloses an apparatus for jump starting a vehicle engine. Krieger at 8:40-42 ("Referring now to FIG. 5, an example of a jump starter System according to an embodiment of the invention is described."); 6:45-47 ("Once a proper polarity connection is made between the batteries, the depleted battery 11 is charged or the vehicle is jump started."). *See also* Fig. 5.  Fig. 5 Xingang discloses an apparatus for jump starting a vehicle engine. Xinfang at 4:2-5 ("The mobile power bank 10 functions as a mobile power bank, vehicle battery jump starter, and a flashlight. The mobile power bank 10 may be used to start a vehicle."). *see also* Fig. 1.

DELTRAN EX1002
IPR2024-01219

	 FIG. 1
1[A] an internal power supply;	Krieger discloses an internal power supply. Krieger at 5:11-15 **("FIG. 1 illustrates** a battery boosting devices including a polarity protection circuit according to an exemplary embodiment of the invention. A boosting battery 2 with a positive **terminal 4 and a negative terminal 6 is provided in the booster device.")**; 2:33-38 **("Typically, a battery booster device comprises a pair of cables** connected at one end to a built-in battery or other power source arranged in a portable box. . . The **built-in battery provides a DC power source for boosting a depleted battery.")**; 5:13-

15 ("A boosting battery 2 with a positive terminal 4 and a negative terminal 6 is provided in the booster device."); 2:64-3:4 ("In another exemplary embodiment, a booster apparatus is provided. The apparatus comprises: a boosting battery having a positive terminal and a negative terminal; a first cable coupled to the positive terminal of the boosting battery and having a clamp for connection to a terminal of a depleted battery; a second cable coupled to the negative terminal of the boosting battery and having a clamp for connection to another terminal of the depleted battery"); 3:22-23 ("In another embodiment, a jump starter system comprises: a boosting battery having positive and negative terminals").

See also, Fig. 1

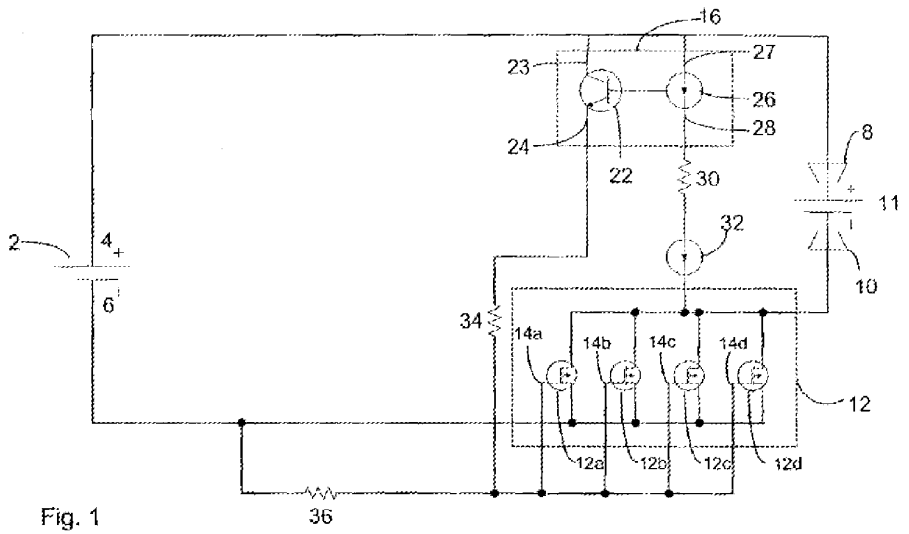
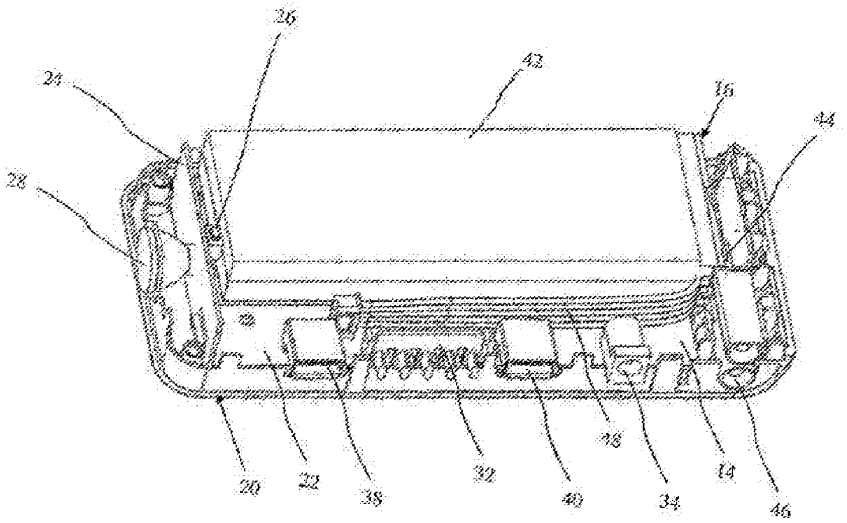
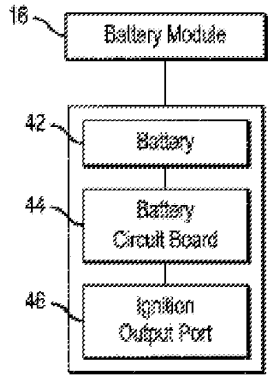


Fig. 1

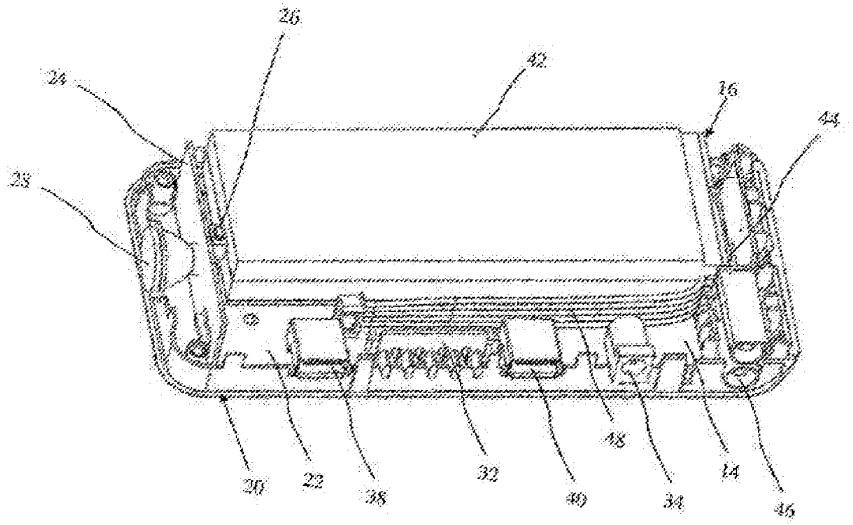
	Xinfang discloses an internal power supply. Xinfang 1:50-55 (Accordingly, the present invention according to an embodiment is directed to an apparatus for providing power comprising: a housing; a battery module positioned inside of the housing, the battery module further comprising: a battery, a battery circuit board coupled to the battery and an ignition output port coupled to the battery circuit board."); 4:8-9 ("The mobile power bank 10 includes a housing 12, a control circuit board 14, and a battery module 16."). *See also* Xinfang Figs. 2 and 3A.  FIG. 2

DELTRAN EX1002
IPR2024-01219

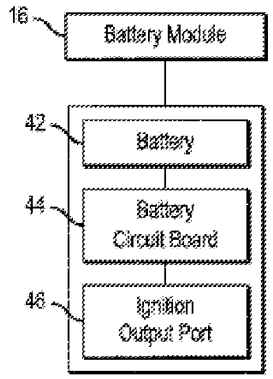
	 FIG. 3A
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Krieger discloses "a first cable coupled to the positive terminal of the boosting battery and having a clamp for connection to a terminal of a depleted battery; a second cable coupled to the negative terminal of the boosting battery and having a clamp for connection to another terminal of the depleted battery". Krieger at ¶ 2:66-3:5. Thus, according to Plaintiff's construction of this limitation, Krieger discloses an output port having positive and negative polarity outputs. Additionally, Krieger discloses an output with positive and negative polarity. Krieger at 5:13-21 ("A boosting battery 2 with a positive terminal 4 and a negative

	terminal 6 is provided in the booster device. The positive terminal 4 of the boosting battery 2 is coupled to one of a pair of alligator clamps 8, 10 to be connected to a battery to be charged 11 (depleted battery) via a wire or battery cable. The negative terminal 6 of the boosting battery 2 is connected to the other of the alligator clamps **8, 10 to be connected to the battery to be charged 11 via a wire or battery cable.").** In the alternative, to the extent Krieger does not explicitly disclose an output port combining the positive and negative polarity outputs, the portable jump starter disclosed in Xinfang discloses an output port having positive and negative polarity outputs. Xinfang 5:54-**59 ("In an embodiment, the vehicle ignition cable has a first** end with a connector configured to fit into the ignition output port 46 and a second end with positive and negative connectors, such as clamps or clips, that are connectable to vehicle battery terminals. The output port 46 may be a positive and negative barrel socket."); 1:64-67. **("In an embodiment, the ignition output port** outputs power at a voltage higher than about 13.6 volts. The ignition output port may further comprise a positive and negative barrel jack."). *See also* Xinfang Figs. 2 and 3A.

DELTRAN EX1002
IPR2024-01219

	 FIG. 2

DELTRAN EX1002
IPR2024-01219

	 *FIG. 3A* It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to combine the design of a joint output port in Xinfang with the apparatus of Kreiger for the advantage of providing a pocket-sized portable jump starter that is more compact and easy to carry.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Krieger discloses a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs. Kreiger at 9:33-34 **("Microprocessor 60 can** be programmed to detect if clamps 8, 10 are connected to a battery or have been **disconnected."), 8:48-53 ("By way of a feedback circuit or other means, the** microprocessor 60 can monitor the voltage and/or current being supplied to the depleted battery 11 from the booster battery 2, the voltage and/or current of the battery 11 and can detect short circuits or other faults, as described in more detail **below.").**

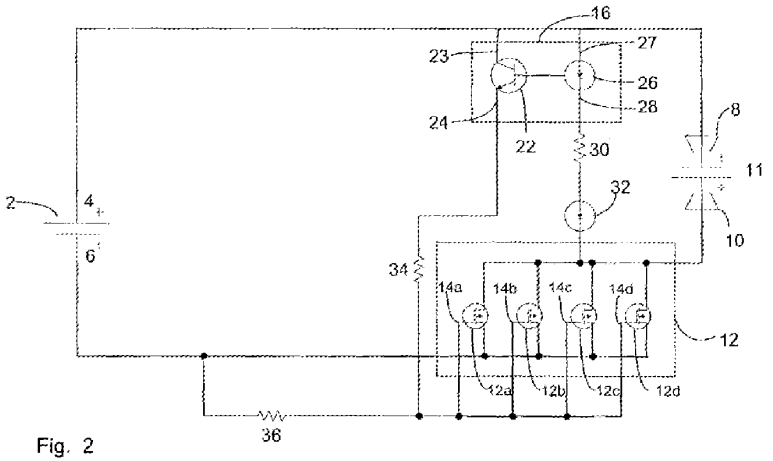
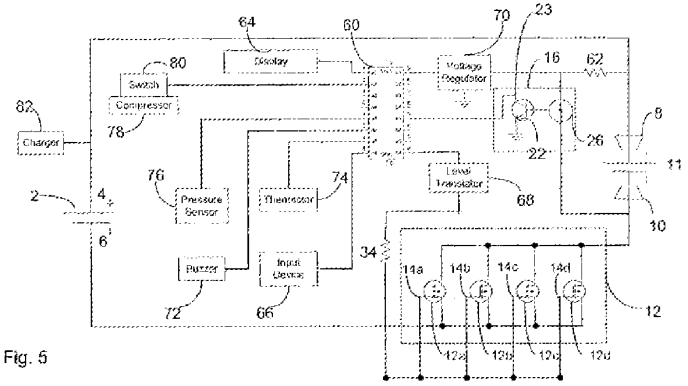
	Krieger discloses a vehicle battery isolation sensor which is configured to detect the presence of a vehicle battery connected between said positive and negative polarity outputs. Kreiger at 9:33-**42 ("Microprocessor 60 can be programmed to detect if** clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting **State. If a battery is present, the jump starting process continues."),** 10:55-**11:8 ("The microprocessor 60 can also be programmed to detect a bad battery** or a battery whose voltage is too low to be jump started. . . This type of fault may also be detected if there is no battery connected to clamps 8,10 or a poor connection is made to the depleted battery 11 and the jump starter is activated. When the fault occurs, the microprocessor 60 can be programmed to terminate the jump starting process and to display a suggestion to a user that the battery be reconditioned before jump starting is attempted or to check if the clamps 8, 10 are properly connected to the battery 11.); 6:48-**61 ("When the claims are disconnected, diode 26 is now longer** forward biases and no current flows therethrough, turning phototransistor 22 in the opto-isolator off, which in turn, turns the FETS 12a-12d off. The boosting circuit is then, in effect, reset, preventing short-circuits or a reverse polarity connection being made after a proper polarity connection is made. … or a microprocessor or other **circuitry can be programmed to detect when the depleted battery is disconnected.");** 6:67-**7:3 ("The frequency generator and frequency detectors are used to detect** disconnections of the claims 8, 10 from the depleted battery 11 or other interruption **of the boosting circuit."). In addition, the mere fact that proper or improper** connection is detected is tantamount to detecting the presence of the vehicle battery.

	Claims 38 also confirms that a sensor (*i.e.*, a vehicle isolation sensor) will produce a signal representing the presence of a vehicle battery when connected with the jump starter disclosed in Krieger. "The booster apparatus of claim 37, further comprising at least **one Sensor connected to an input of the microprocessor for producing a measured signal representing the presence of the depleted battery at the means for connecting** and wherein the means for interrupting comprises a microprocessor programmed to place the FET in a non-conducting state if no depleted battery is present." ('emphasis added") Claim 38. Yoshimura also discloses a battery isolation sensor which is configured to detect the presence of a battery. *See* Yoshimura Abstract ("In response to the signal from main battery presence sensor block for sensing the presence of the first batter BAT 1 and the signal from the voltage comparator 5, the memory 3 is backed up to retain data by the external power supply voltage when it is supplied, and further, the second battery BAT 2 is charged by a charging circuit 6 driven by the external power supply voltage."); 12:12-41 ("As shown in FIG. 2, the main battery presence sensor block 11A according to the second embodiment includes a main battery reference voltage generator circuit 21 serving as a reference voltage generator portion for generating a reference voltage Vref1. Two resistors R4 and R5 are connected between the main battery power supply voltage node 102 and the ground node, with the connection node 121 of the resistors R4 and R5 connected to one input node of a later-described main battery voltage comparator 22. The main battery voltage comparator 22 serves as a first battery voltage comparator portion, which has one input node connected to the connection node 121 where the voltage dependent on the voltage supplied at the main battery power supply node 102, namely, the voltage divided by the two

	resistors R4 and R5, appears. The main battery voltage comparator 22 has another input node supplied with the reference voltage Vref1 outputted by the main battery reference voltage generator circuit 21, in order to compare the voltage level of the first battery BAT 1 with the reference voltage Vref1 so as to output a signal MBOUT indicative of the comparison result. The main-battery presence signal MBOUT is at an L-level when the voltage at the connection node 121, namely the voltage level divided by resistors R4 and R5, is higher than the reference voltage Vref1 and the main-battery presence MBOUT is at a H-level when the voltage at the connection node 121 is lower than the reference voltage Vref1. Hysteresis is imparted to the main-battery voltage comparator 22 so that power supplied to the memory 3 may not be interrupted in the course of switching between the first battery BAT 1 and the **second battery BAT 2.").** Yoshimura is analogous art directed to power supply control integrated circuits. Therefore it would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to have incorporated the presence block detector into the apparatus of Krieger for the advantages of lessening power consumption for both main and auxiliary batteries, as per the teachings of Yoshimura. Yoshimura, Abstract.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity	Krieger discloses a reverse polarity sensor connected in circuit with said positive and negative polarity outputs. Krieger at 4:55-**58 ("FIG. 1 is a circuit schematic that** illustrates a polarity protection circuit according to a preferred embodiment of the **invention"), 5:47-52 ("The switch** 12 **is** activated by a polarity sensing circuit 16 to allow current flow from the boosting battery 2 to the depleted battery 11. The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected **to the depleted battery** 11.**").**

DELTRAN EX1002
IPR2024-01219

outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	The reverse polarity sensor disclosed in Krieger is also configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. Krieger at 2:54-**60 ("In another embodiment of** the invention, a polarity detection circuit is provided. The circuit comprises: cables for connecting a boosting battery to a depleted batter; a polarity sensing circuit coupled to the boosting battery for providing an enable signal when correct polarity connection is made between the boosting battery and the deplet**ed battery"), Krieger** at 5:49-**55 ("The polarity sensing circuit 16 is coupled to the boosting battery 2 and** to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11. The polarity sensing circuit 16 senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal **indicating the state of the connection."** *See also* Fig. 2

	 Fig. 2 *See also* Krieger, Fig. 5.  Fig. 5
1[E] a power switch connected between said	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black

internal power supply and said output port; and	(negative) clamps. Dkt. No. 19 at ¶24. As shown above, Krieger discloses an output port consisting of positive and negative cables. *See d*isclosures in 1[B]. For example, Krieger discloses a power switch 12 between the internal battery and the output port. Krieger at 5:22-**26 ("A switch 12 is** coupled to one of the wires or battery cables to be connected to the depleted battery 11. The switch 12 is activated to complete a boosting circuit between the boosting battery 2 and the depleted battery 11 only when a correct polarity connection between the batteries is **attained.").** Switch 12 is a power switch. Krieger at 5:34-**38 ("The switch 12 is preferable a solid** state device, such as a transistor, diode, field effect transistor (FET), etc. FIG. 1 represents the switch 12 as a number FETs 12a-12d connected in parallel with each other. The FETs 12a-12d are preferably high power, very low on-**resistance types.").**
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Krieger discloses a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. For example, Krieger discloses a microprocessor with embedded memory (*i.e.*, microcontroller) configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. *See,* Krieger at 5:52-**55 ("The polarity sensing circuit 16 senses the polarity of** the connection between the boosting battery 2 and the depleted battery 11 and provides

DELTRAN EX1002
IPR2024-01219

	a signal indicating the state of the connection.); 9:4-10 ("The microprocessor 60 provides output signals to activate the switch 12 into a conducting State when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second signal. Additionally, the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected."). Kreiger at 9:33-42 ("Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting State. If a battery is present, the jump-starting process continues."), 10:55-11:8 ("The microprocessor 60 can also be programmed to detect a bad battery or a battery whose voltage is too low to be jump started. . . This type of fault may also be detected if there is no battery connected to clamps 8,10 or a poor connection is made to the depleted battery 11 and the jump starter is activated. When the fault occurs, the microprocessor 60 can be programmed to terminate the jump starting process and to display a suggestion to a user that the battery be reconditioned before jump starting is attempted or to check if the clamps 8, 10 are properly connected to the battery 11."); 6:59-7:22 "[O]r a microprocessor or other circuitry can be programmed to detect when the depleted battery is disconnected….The frequency generator and frequency detector are used to detect disconnection of claims 8, 19 from the depleted battery 11 or other interruption of the boosting circuit. The frequency generator 37 is adapted to inject a signal into the boosting circuit. A frequency detector 38 is adapted to detect the frequency injected into the boosting circuit by the frequency generator 37. . . . The frequency detector 38 detects the injected frequency, and the battery boosting proceeds normally. When the claims

	8, 10 are removed from the depleted battery 11 or the circuit is otherwise interrupted, current flow is stopped, and the frequency detector no longer detects the frequency injected by the frequency generator 37. The frequency detector us adapted to then turn FETs 12a-12d to a non-conductive state, resetting the boosting circuit. This prevents short circuits or a reverse polarity connection being made after a proper **polarity connection has been established.").** **Although Applicant in Krieger refers to a "microprocessor," Krieger discloses** the **"microcontroller" of the '105 Patent. Kreiger states "Memory inside the** microprocessor 60 can be used for storing data that is used for later review and **analysis." Krieger at** 11:61-63. The major difference between a microprocessor and microcontroller is a microcontroller usually includes both a microprocessor and some peripheral device such as memory. *See* https://www.electronicshub.org/difference-between-microprocessor-and-microcontroller/. The microprocessor in Krieger incorporates **both a microprocessor and memory. It fully discloses the microcontroller of the '015** Patent. Krieger at 11:61-63.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and	Krieger discloses that a power switch is turned on to cause the internal power supply to be connected to the vehicle battery only when signals from sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

DELTRAN EX1002
IPR2024-01219

proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	For example, Krieger disclose a feedback circuit or other means (*i.e.*, vehicle battery isolation sensor) to detect the presence of a vehicle battery; and a polarity sensing circuit 16 (*i.e.*, reverse polarity sensor) to detect polarity of a connected vehicle battery. The polarity circuit 16 also provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port. It is inherent that each of the two distinct circuits (*i.e.*, feedback circuit and reverse polarity sensor) must send a signal to the microcontroller after their respective detections. The switch is only turned on when a proper connection with a depleted vehicle battery is made. *See, e.g.*, Krieger at 9:33-**42 ("Microprocessor 60 can be programmed to detect** if clamps 8, 10 are connected to a battery or have been disconnected. To perform the detection, the microprocessor 60 deactivates the Switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8,10 are connected to a battery. If no battery is present, the Switch 12 is placed in a non-conducting State, that is, all the FETs 12a-12d are placed in a non-**conducting State. If a battery is present, the jump starting process continues."); 6:59-7:22** "[O]r a microprocessor or other circuitry can be programmed to detect when **the depleted battery is disconnected**….**The frequency generator and frequency** detector are used to detect disconnection of claims 8, 19 from the depleted battery 11 or other interruption of the boosting circuit. The frequency generator 37 is adapted to inject a signal into the boosting circuit. A frequency detector 38 is adapted to detect the frequency injected into the boosting circuit by the frequency generator 37. … The frequency detector 38 detects the injected frequency, and the battery boosting proceeds normally. When the claims 8, 10 are removed from the depleted battery 11 or the circuit is otherwise interrupted, current flow is stopped, and the frequency detector no longer detects the frequency injected by the frequency

	generator 37. The frequency detector us adapted to then turn FETs 12a-12d to a non-conductive state, resetting the boosting circuit. This prevents short circuits or a reverse polarity connection being made after a proper polarity connection has been established."); 5:49-55 ("The polarity sensing circuit 16 is coupled to the boosting battery 2 and to the depleted battery 11 when the clamps 8, 10 are connected to the depleted battery 11. The polarity sensing circuit 16 senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection."); 9:4-10 ("The microprocessor 60 provides output signals to activate the switch 12 into a conducting state when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second signal. Additionally, the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected.").
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.	Krieger does not explicitly disclose the type of battery it uses, the portable jump starter disclosed in Xinfang, however, discloses an internal power supply comprises a lithium ion battery. For example, Xinfang states, "[t]he battery may comprise a lithium iron phosphate battery cell or a lithium cobalt oxide battery cell." Xinfang at 1:67-2:1.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Krieger does not explicitly disclose the use of a battery pack of multiple lithium ion batteries, the portable jump starter disclosed in Xinfang, however, discloses the use of multiple lithium ion batteries. Xinfang at 5:9-11. ("The battery cell 42 may have a multi-cell structure. In an embodiment of the present invention, the 10 battery cell 42 has four battery cells.").

CLAIM 9	
9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus.	Krieger discloses a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus. Krieger at 10:32-35 ("The voltage regulator then produces a voltage proportional to the Voltage of the boosting battery 2, and which is within the operating range of the microprocessor 60.").
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device.	Krieger does not explicitly disclose a USB output port, the portable jump starter disclosed in Xinfang, however, teaches such a USB output port. Xinfang at 4:59-62 ("The USB output module 36 is connectable via a USB cable to support USB charging of electronic devices where the battery module 16 provides power to the electronic devices.").
CLAIM 11	
11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from an external power source to said internal power supply.	Krieger does not explicitly disclose a USB charging port, the portable jump starter disclosed in Xinfang, however, discloses a USB charging port configured to provide charging power from an external power source to said internal power supply. Xinfang at 2:22-25 ("Optionally, the charging port, the at least one Universal Serial Bus interface, Light Emitting Diode indicator module, and ignition output port are sequentially arranged on a side of the housing.").
CLAIM 12	

DELTRAN EX1002
IPR2024-01219

12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Krieger does not explicitly disclose a flashlight circuit, the portable jump starter disclosed in Xinfang, however, discloses a flashlight circuit configured to provide a source of light to a user. Xinfang at 7:12-18 ("For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing.").
CLAIM 13	
13. The apparatus of claim 12, wherein said source of light is at least one LED.	Krieger does not explicitly disclose a source of light using at least one LED, the portable jump starter disclosed in Xinfang, however, discloses source of light comprising at least one LED. *See* same disclosure above for claim 12.
CLAIM 14	
14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	Krieger does not explicitly disclose a microcontroller configured to control at least one LED to provide a visual alarm, the portable jump starter disclosed in Xinfang, however, discloses a microcontroller configured to control said at least one LED to provide a visual alarm indicating an emergency situation. *See* same disclosure above for claim 12.
CLAIM 15	
15. The apparatus of claim 1, further comprising a plurality	Krieger does not explicitly disclose a plurality of visual indicators in this claim limitation, the portable jump starter disclosed in Xinfang, however, discloses a

of visual indicators configured to display remaining capacity status of said internal power supply.	plurality of visual indicators configured to display remaining capacity status of said internal power supply. Xinfang at 7:12-18 ("For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing.").
CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.	Krieger discloses a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity. Krieger at 9:27-32 ("If the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off. The display 64 may be controlled by the microprocessor 60 to display a message indicating reverse polarity. The microprocessor 60 may additionally activate an alarm such as buzzer 72 in response to the incorrect polarity connection.").

EXHIBIT G

Chinese Patent No. 202696190 ("Zhang CN") was published in China on January 23, 2013. A certified translation of CN. Pat. No. 202696190 is submitted as a prior art reference (hereinafter, referred to as "Zhang"). For ease of explanation, the discussion herein will refer to this English-language translation.

'015 Patent Claims	Disclosure in Zhang
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising:	Zhang discloses an apparatus for jump starting a vehicle engine. "The present utility model involves a jump starter, particularly involving a smart jump starter with a built-in voice prompt function." Zhang at Abstract, ¶0001-0003, Figs. 1-5.
1[A] an internal power supply;	Zhang's jump starter includes an internal power supply (i.e., the "battery pack.") Zhang at Abstract, ¶¶0005-006, 0014-0015, Fig. 1; Dec. of Hartup at ¶51.
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Zhang has an identical disclosure, which it calls an "output power clip" that comprises both "anode and cathode power clips." Zhang at Abstract, ¶¶0006, 0014, 0019, 0051, 0056, 0058, 0060; Dec. of Hartup at ¶52. Thus, according to Plaintiff's own construction of this limitation, Zhang discloses an output port having positive and negative polarity outputs. *Id.*

DELTRAN EX1002
IPR2024-01219

	While Zhang does not explicitly discuss its output power clip being plugged into the jump starter, a person of ordinary skill in the art would have understood that the output power clip has to be wired into the jump starter in a similar way. Dec. of Hartup at ¶53. **For example, the '015 Patent discloses a "jumper cable device" that has "a plug** configured to plug into an output port of a handheld battery charger booster device having an internal power supply; a pair of cables integrated with the plug at one **respective end."** The **'015 Patent** at 3:40-46. Therefore, Defendant contends that Zhang inherently discloses an output port having positive and negative plurality outputs. Dec. of Hartup at ¶53. Output ports having positive and negative polarity outputs were also widely available long before Zhang. Dec. of Hartup at ¶53. For example, standard EC connectors with positive and negative polarity outputs where a jumper cable device can be plugged in were widely available since at least 2008. *See* EC Connector Instructions.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Zhang discloses that the vehicle battery is sampled to determine that a vehicle battery voltage within range is detected. *Zhang* at ¶ 0050; see also ¶ 0060 and Fig. 5; Dec. of Hartup at ¶54. In so doing, Zhang discloses that its device detects the presence of a vehicle battery. Dec. of Hartup at ¶54. In particular, Zhang discloses that the circuitry comprising either (i) R5, D8, and IC5, or (ii) R19, R20, and C22, is connected in circuit with the positive and negative polarity outputs of a vehicle battery, and detects the voltage (i.e., the presence) of the vehicle battery. Zhang discloses that the vehicle battery is sampled to determine

DELTRAN EX1002
IPR2024-01219

	that a vehicle battery voltage within range is detected. Dec. of Hartup at **¶54. "[T]he** voltage at the two terminals of the 12 V battery is sampled in two ways, where one way is connected to the input terminal of the DC contactor, so that the microcontroller can detect the effective voltage value within the range of the 12 V **gear at the 'BAT+/External' point. The other way is sampled using the small teeth** of the power clip. The internal conductor wire of the power clip wire is connected **to the 'J1' port of the control board, and after the correct connection signal** is **converted by R5, D8 and IC5, the external correct connection signal 'RIGHT-Ctrl' is transmitted to the P13 port of the microcontroller."** Zhang at ¶0050; *see also* ¶0060, 0061, and Fig. 5. Zhang also discloses a change-over switch to accommodate 12V or 24V vehicle batteries. Zhang at ¶0043. If there is mismatch between the detected vehicle voltage and the current voltage gear position, the DC contactor (switch) will not be turned on. Zhang at ¶0046. Zhang further describes several scenarios when there is no vehicle battery detected: (1) there is a short-circuit and no battery is connected between the power clips; (2) when the power clips are disconnected; and (3) the external vehicle battery voltage is too low (e.g., vehicle voltage is 15.5V in a 24V gear connection). Zhang at ¶¶0055, 0057, and 0060.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery	**This element of the '015 Patent describes how a polarity detection circuit performs** the function of ensuring the proper connection (i.e., positive connected to positive, and negative connected to negative) between the jumper cables and the terminals of the battery that requires a jump start. Dec. of Hartup at ¶55.

DELTRAN EX1002
IPR2024-01219

connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Similarly, one of the main functions disclosed in Zhang is "shutdown protection and prompt when the output power clip is connected erroneously in reverse polarity." Zhang at ¶0025. To accomplish this function, Zhang discloses a circuitry comprising R5, D9, and IC6, which are connected in circuit with the positive and negative polarity outputs of the power clip and which detect the polarity of a vehicle battery and provide an output signal indicating whether the jump starter is properly connected. Zhang at ¶¶0051, 00060; Dec. of Hartup at ¶¶55-56.
1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Zhang discloses a power switch (e.g., a DC contactor) connected between the internal power supply (e.g., the battery pack) and its output port (e.g., the power clip). Dec. of Hartup at ¶57. For example, Zhang discloses that "[t]his jump starter utilizes a high-power DC contactor as an automatic control electronic switch and it controls the on and off states through a circuit." Zhang at ¶0017; Dec. of Hartup at ¶57. The microcontroller maintains the DC contactor in an off position until both a chargeable battery and no reverse polarity is detected. Zhang at ¶¶0050-51; Dec. of Hartup at ¶57. The power switch will only be turned on when the microcontroller receives both the "RIGHT-Ctrl" and "Reverse-Ctrl" signals from the vehicle isolation sensor and reverse polarity sensor. *Id.* Further, the battery pack is connected to an output power clip through a change-over switch and DC contactor. Zhang at Abstract, ¶ 0006, 0014, 0060; Dec. of Hartup at ¶57.

DELTRAN EX1002
IPR2024-01219

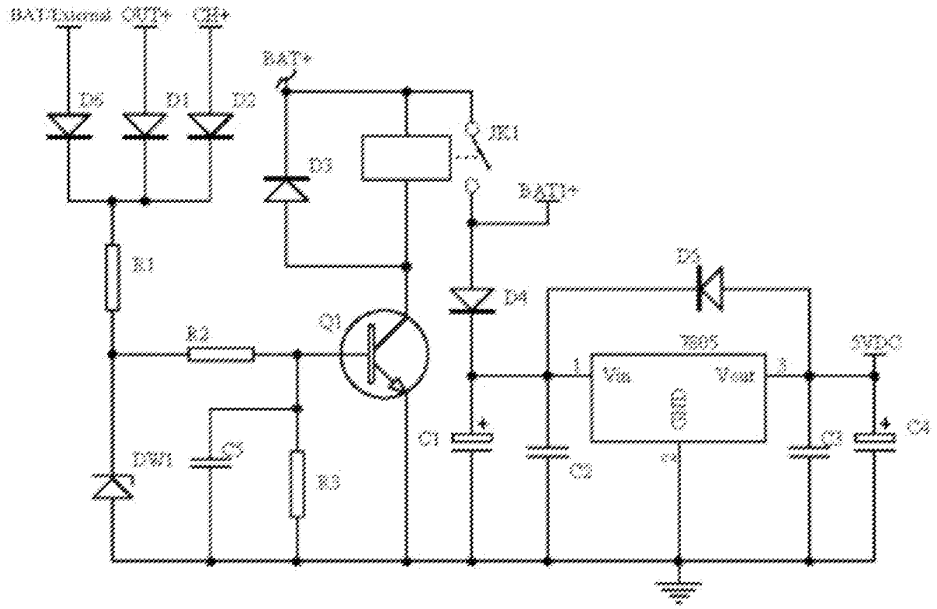
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Zhang discloses a microcontroller that receives input signals from the circuitry comprising R5, D8, and IC5 (i.e., the vehicle isolation sensor) and the circuitry comprising R5, D9, and IC6 (i.e., the reverse polarity sensor). Zhang at ¶0050-0052; Dec. of Hartup at ¶58. That microcontroller also provides an output signal to the DC contactor. *Id.* **For example, Zhang discloses that "after the correct connection signal is converted by R5, D8 and IC5, the external correct connection signal 'RIGHT-Ctrl' is** transmitted to the P13 port of the microcontroller … At this time, the microcontroller once again outputs a high level to the control circuit of the DC contactor for it to carry out pull-**in and conduction."** Zhang at ¶0050. **Similarly, Zhang discloses that "after the** reverse connection signal is converted by **D9, IC6 and R5, the external reverse connection signal 'Reverse-Ctrl' is transmitted** to the P12 port of the microcontroller. The microcontroller determines that the jump starter has been changed over to the 12 V gear, and at the same time, detects that the external battery is connected in reverse polarity. At this time, the DC contactor will maintain its disconnected state …" Zhang at ¶0051.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and	Zhang discloses that the main functions of its jump starter include ensuring correct connection of the power clip, shutdown protection when the power clip is connected erroneously in reverse polarity, and shutdown protection when the power clip is connected to the wrong voltage. Zhang at ¶¶0020-0028; Dec. of Hartup at ¶59. For example, Zhang discloses that its microcontroller detects if there is a safe connection to the vehicle battery, and maintains the DC contactor (e.g., the switch) in the disconnected position unless it determines the battery is safely connected.

DELTRAN EX1002
IPR2024-01219

proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	Zhang at ¶0050; Dec. of Hartup at ¶59. The microcontroller also maintains the DC contactor in the disconnected position if the vehicle battery is connected in reverse polarity. Zhang at ¶0051; Dec. of Hartup at ¶59. **Zhang's microcontroller will only turn on the DC connector if it receives both the "RIGHT-Ctrl" and "Reverse-Ctrl"** signals from the circuitry comprising the claimed vehicle isolation sensor and reverse polarity sensor, respectively. Dec. of Hartup at ¶59. It will not turn on the switch if either a vehicle battery at the output port is not present, or there is improper polarity connection between the vehicle battery and the output port of the jump starter. That is, the power switch (e.g., the DC contactor) is turned on to cause the internal power supply (e.g. the battery pack) to be connected to the output port (e.g., the power clip) only when signals indicate the presence of a vehicle battery and proper polarity connection of positive and negative terminals of the vehicle battery. Dec. of Hartup at ¶59.
CLAIM 8	
8. The apparatus of claim 1, further comprising a voltage measurement circuit configured to measure output voltage of said internal power supply and to provide a Voltage measurement signal to said microcontroller.	Zhang discloses that the microcontroller detects when the voltage of the internal battery pack is lower than a predetermined voltage, in which case the **microcontroller disconnects the jump starter's power** clip automatically. Zhang at ¶¶0023, 0046; Dec. of Hartup at ¶63. For example, resistors R23 and R24, along with capacitor C20, form a circuit that measures the level of the internal battery voltage. *Zhang* at Figure 5; Dec. of Hartup at ¶64. In that circuit, the BAT1+ signal comes from the internal battery output terminal. *Zhang* at Figure 5; Dec. of Hartup at ¶64. The resistors R23 and R24 form a standard voltage division circuit to scale the internal battery voltage to a level compatible with the microcontroller input, and C20 acts to average the signal and reduce the effects of noise. Dec. of Hartup at ¶64. The voltage signal generated

	between R23 and R24 is directly proportional to the internal battery voltage and this signal, BAT1-TEST, is sent to the microcontroller so it can be sampled and the microcontroller thus has a measure of the internal battery voltage. Zhang at Fig. 5; Dec. of Hartup at ¶64. The BAT1-TEST signal is connected to pin 34 of the microcontroller, which can be configured to send the BAT-TEST signal to an internal analog-to-digital converter that allows the microcontroller to determine the internal battery voltage. Zhang at Fig. 3; Dec. of Hartup at ¶ 64. Thus, Zhang discloses a voltage measurement circuit configured to measure the output voltage of the internal power supply (e.g., the battery pack) and to provide a voltage measurement signal to the microcontroller.
CLAIM 9	
9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus.	**Zhang describes that "[t]he voltage of battery BAT+ passes through diode D4 and** is added into the input terminal of the three-terminal integrated voltage regulator 7805 so that the three pins can provide a stable output of 5 V DC voltage to supply **power to the CPU and other circuits."** ***Zhang*** at ¶0043. Further FIG. 2 shown below, demonstrates that the internal battery signal, BAT1+, is input through diode D4 to the pin 1 input terminal of the 7805 voltage regulator, and pin 3 of the 7805 voltage regulator provides the 5 V DC output. Zhang at Fig. 2; Dec. of Hartup at ¶¶66-67. The capacitors filter noise and diode D5 prevents the output of the regulator from being at a higher level than the input. *Id.* This type of voltage regulation circuit, and specifically the 7805 device, is used in a very large number of applications where a stable voltage is needed to power other circuit elements. Dec. of Hartup at ¶67. The 5 V DC is used throughout the circuit, including to power IC3. Zhang at Figure 4; Dec. of Hartup at ¶67.

DELTRAN EX1002
IPR2024-01219



Zhang, Fig. 2

Thus, Zhang discloses a voltage regulator configured to convert output voltage of the internal power supply (e.g., the battery pack) to a voltage level appropriate to provide operating power to internal components of the apparatus.

CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery	Zhang's "shutdown protection" includes lighting up "reverse connection indicator LED7" and flashing an error message on the "Nixie tube" when the output power clip is connected in reverse polarity. Zhang at ¶0025; Dec. of Hartup at ¶69.

is connected with reverse polarity.	
CLAIM 19	
19. The apparatus of claim 1, further comprising a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery.	Zhang discloses a "manual force start": "When there is no external battery voltage input or the input voltage signal is too low, and the jump starter is unable to activate automatic identification, it can be manually determined. After the voltage is connected correctly and reliably, press the force start button to facilitate the jump starter to forcefully activate pull-in and conduction." Zhang at ¶0007, ¶0030; Dec. of Hartup at ¶71. Further, Zhang describes a force start switch connected to J3. Zhang at ¶0058; Dec. of Hartup at ¶71. It would be obvious to a person of ordinary skill in the art that a simple bush button type of switch could be connected to the microcontroller in a manner that allowed the microcontroller to detect when the switch is closed so that the force start process could be initiated. Dec. of Hartup at ¶71.
CLAIM 20	
20. The apparatus of claim 19, wherein said microcontroller is configured to detect actuation of said manual override switch for at least a predetermined period of time before activation of said manual override mode.	Zhang discloses that, after the force start button is pressed, there is a warning voice message and a 10 second countdown, during which the user must continue to press the button. Zhang at ¶0030; Dec. of Hartup at ¶73. "This ensures that the user has sufficient time to re-verify the safety of the connection." Zhang at ¶0030. A person of ordinary skill in the art would find it obvious to implement this function. Dec. of Hartup at ¶74. A switch can be connected to a microcontroller input and the microcontroller can sense the voltage at the input; when the voltage corresponding to a user activating the switch is sensed, the microcontroller can confirm the switch is being held in this position for a preset time, and then after a delay the

	microcontroller can send a signal to the power switch to connect the charger internal battery to the vehicle battery. Dec. of Hartup at ¶74. This type of function is and was very common and would have been known to one skilled in the art before **the '015 Patent.** Dec. of Hartup at ¶74.

DELTRAN EX1002
IPR2024-01219

EXHIBIT H

'015 Patent Claims	**Disclosure in Zhang and/or Xinfang**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Zhang discloses this element. *See* Ex. G.
1[B] an output port having positive and negative polarity outputs;	Zhang discloses this element. *See* Ex. G.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Zhang discloses this element. *See* Ex. G.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an	Zhang discloses this element. *See* Ex. G.

DELTRAN EX1002
IPR2024-01219

output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	
1[E] a power switch connected between said internal power supply and said output port; and	Zhang discloses this element. *See* Ex. G.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Zhang discloses this element. *See* Ex. G.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle	Zhang discloses this element. *See* Ex. G.

DELTRAN EX1002
IPR2024-01219

battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.	Xinfang discloses the use of an internal power supply comprising a lithium ion battery within its jump starter. For example, Xinfang states, "[t]he battery may comprise a lithium iron phosphate battery cell or a lithium cobalt oxide battery cell." Xinfang at 1:67-2:1. It would have been obvious to one of skill in the art to combine the jump starter discloses in Zhang with the lithium ion battery discloses by Xinfang. By the priority date of the '015 Patent, the use of lithium ion batteries had become prevalent along with the increasing popularity of portable devices such as smart phones and tablets.

DELTRAN EX1002
IPR2024-01219

	Dec. of Hartup at ¶80. Thus, it would have been obvious to one of skill in the art to combine the teachings of Zhang with those of Xinfang to include a lithium ion battery **and/or multiple lithium battery packs within Zhang's jump starter, as this** would result in a smaller, more portable product, given the smaller size to energy capacity of lithium ion batteries. Dec. of Hartup at ¶80. Furthermore, **Xinfang's** lithium ion batteries and battery packs are described for the same type of jump starting device as Zhang, and lithium ion battery packs were widely known and used at the time of the priority date. Dec. of Hartup at ¶80. It would have been obvious to a person of ordinary skill in the art to utilize lithium ion batteries such as those disclosed in Xingfang within the portable jump starter disclosed in Zhang. Dec. of Hartup at ¶80.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Xinfang further discloses the use of a pack of multiple lithium ion batteries. **"The battery cell 42 may have a multi-**cell structure. In an embodiment of the present invention, the battery cell 42 **has four battery cells."** Xinfang at 5:9-11 It would have been obvious to one of skill in the art to combine the jump starter discloses in Zhang with the lithium ion battery discloses by Xinfang. By the priority **date of the '015 Patent, the use of lithium ion batteries had become prevalent along** with the increasing popularity of portable devices such as smart phones and tablets. Dec. of Hartup at ¶80. Thus, it would have been obvious to one of skill in the art to combine the teachings of Zhang with those of Xinfang to include a lithium ion battery **and/or multiple lithium battery packs within Zhang's jump starter, as this** would result in a smaller, more portable product, given the smaller size to energy capacity of lithium ion batteries. Dec. of Hartup at ¶80. Furthermore, **Xinfang's**

DELTRAN EX1002
IPR2024-01219

	lithium ion batteries and battery packs are described for the same type of jump starting device as Zhang, and lithium ion battery packs were widely known and used at the time of the priority date. Dec. of Hartup at ¶80. It would have been obvious to a person of ordinary skill in the art to utilize lithium ion batteries such as those disclosed in Xingfang within the portable jump starter disclosed in Zhang. Dec. of Hartup at ¶80.
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device.	Xinfang explicitly discloses that its portable jump starter includes USB output ports. For example, **"The USB** output module 36 is connectable via a USB cable to support USB charging of electronic devices where the battery module 16 provides power to **the electronic devices."** Xinfang at 4:59-62. It would have been obvious to one of skill in the art to combine the portable jump starter disclosed by Zhang with the USB output port disclosed by Xinfang. USB **charging technology was well known at the time of the priority date of the '015** Patent. Dec. of Hartup at ¶77. As such, it would have been obvious for a person of ordinary skill to have combined that known USB technology, such as the USB port of Xinfang, with the battery jump starter of Zhang to allow the device to offer a standardized charging interface for charging other devices without requiring specialized plugs and USB charging ports were widely known at the time of the claimed invention. Xinfang at 4:59-62; Dec. of Hartup at ¶77. Furthermore, **Xinfang's USB port is described for the same type of jump starting device as Zhang,** and USB charging devices were widely known and used at the time of the priority date. Dec. of Hartup at ¶77. It would have been obvious to a person of ordinary skill

	in the art to utilize USB output ports such as those disclosed in Xingfang within the portable jump starter disclosed in Zhang. Dec. of Hartup at ¶¶77, 82.
CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Xingfang discloses a portable jump starter that utilizes a flashlight circuit configured to provide a source of light to a user. For example, "[t]he present invention according to an embodiment provides a mobile power bank, vehicle ignition system jump starter, **and a flashlight.**" Xinfang at 1:45-47. "The second plate 24 may be provided with a master control button 26 and a **flashlight 28.**" Xinfang at 4:24-25. Xinfang also discloses the use of flashlight to provide a S.O.S. signal in an **emergency situation. "After** turning on the flashlight 28, if the control module 58 detects that the master control button 26 is activated, it may control the flashlight in multiple illumination modes, such as a constant light mode, flashing strobe light mode, and flashing S.O.S. (three sequential short flashes, followed by three sequential long flashes, followed again by three sequential short flashes) signal light **mode.**" Xinfang at 8:37-44; *see also* Dec. of Hartup at ¶85. A person of ordinary skill would have found it obvious to combine the disclosures **of Xinfang regarding LEDs and flashlights within a jump starter with Zhang's** disclosure of a jump starter. Dec. of Hartup at ¶88.
CLAIM 13	

13. The apparatus of claim 12, wherein said source of light is at least one LED.	Xinfang discloses extensive use of LEDs for indicators, including flashing LED lights. "For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing." Xinfang at 7:12-18. A person of ordinary skill would have found it obvious to combine the disclosures of Xinfang regarding LEDs and flashlights within a jump starter with Zhang's disclosure of a jump starter. Dec. of Hartup at ¶88.
CLAIM 14	
14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	Xinfang also discloses using the flashlight in emergency situations, such as flashing S.O.S. mode. *See* Xinfang at 8:37-44. A person of ordinary skill would have found it obvious to combine the disclosures of Xinfang regarding LEDs and flashlights within a jump starter with Zhang's disclosure of a jump starter. *See* Dec. of Hartup at ¶88.
CLAIM 15	
15. The apparatus of claim 1, further comprising a plurality of visual indicators configured to display	Zhang discloses a voice prompt and photoelectric indicators for safety prompts regarding low battery voltage warning. For example, Zhang states, "[a]t the same time, the corresponding voice prompt and photoelectric indicators are added to the safety prompts regarding selection of

DELTRAN EX1002
IPR2024-01219

remaining capacity status of said internal power supply.	charging gear position, low battery voltage warning, output overcurrent protection, clip output short circuit protection, manual force start and other areas." Zhang at ¶0007 Xinfang discloses a portable jump starter with a plurality of visual indicators configured to display remaining capacity status of said internal power supply. Xinfang states, "[f]or example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing." Xinfang at 7:12-18. It would have been obvious to one of ordinary skill to combine Zhang with Xinfang to include a plurality of visual indicators configured to display remaining capacity status of the internal battery so that the user can timely recharge the jump starter. The use of LEDs as a visual indicator of internal battery status was in widespread use in devices such as cell phones, detachable batteries for powering tools, and numerous prior art patents deal with this technology. Dec. of Hartup at ¶92.

EXHIBIT I

The USB Battery Charging Specification was first released on March 8, 2007, which predates the filing date of the asserted patent.

'015 Patent Claims	**Disclosure in Zhang and/or USB Battery Charging Specification Version 1.2**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Zhang discloses this element. *See* Ex. G.
1[B] an output port having positive and negative polarity outputs;	Zhang discloses this element. *See* Ex. G.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Zhang discloses this element. *See* Ex. G.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery	Zhang discloses this element. *See* Ex. G.

DELTRAN EX1002
IPR2024-01219

connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	
1[E] a power switch connected between said internal power supply and said output port; and	Zhang discloses this element. *See* Ex. G.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Zhang discloses this element. *See* Ex. G.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output	Zhang discloses this element. *See* Ex. G.

DELTRAN EX1002
IPR2024-01219

port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	
CLAIM 11	
11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from an external power source to said internal power supply.	The USB Charging Specification was introduced by The USB Implementers Forum, **Inc., the cooperative organization that created the USB ("Universal Serial Bus")** technologies. USB Charging Spec. at 2; Dec. of Hartup at ¶ 102. The USB Charging Specification governs the technologies that allow a portable device to use a USB cable to charge from either a personal computer or from a USB charger. *Id.* at 12; Dec. of Hartup at ¶ 102.

DELTRAN EX1002
IPR2024-01219

	It would have been obvious to one of skill in the art to modify Zhang's jump starter with a widely known and available USB charging port at the time of the claimed invention of the '015 Patent. Dec. of Hartup at ¶ 103. This would allow the device to offer a standardized charging interface for both charging other devices and for charging the internal battery itself without requiring specialized plugs. *Id.* Furthermore, it would allow the device to be used with any power source compatible with a USB connection for providing power. Allowing USB charging creates additional mobility for a portable jump starter. *Id.*

DELTRAN EX1002
IPR2024-01219

EXHIBIT J

'015 Patent Claims	**Disclosure in Richardson I**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising:	Richardson I discloses an apparatus for jump starting a vehicle engine. "The present invention relates to a portable power source for a motor vehicle, and more particularly, to a method and apparatus to provide supplemental power to start internal combustion and turbine engines." Richardson I at ¶0001; Dec. of Hartup at ¶107.
1[A] an internal power supply;	Richardson I's jump starter includes an internal power supply, i.e., the "one or more jump starter batteries 22.". Richardson I at ¶0012; Dec. of Hartup at ¶108. For example, Richardson I explicitly teaches an invention that "includes an internal battery . . . to provide the power to the battery of the vehicle to be jump started." Richardson I at ¶0006.

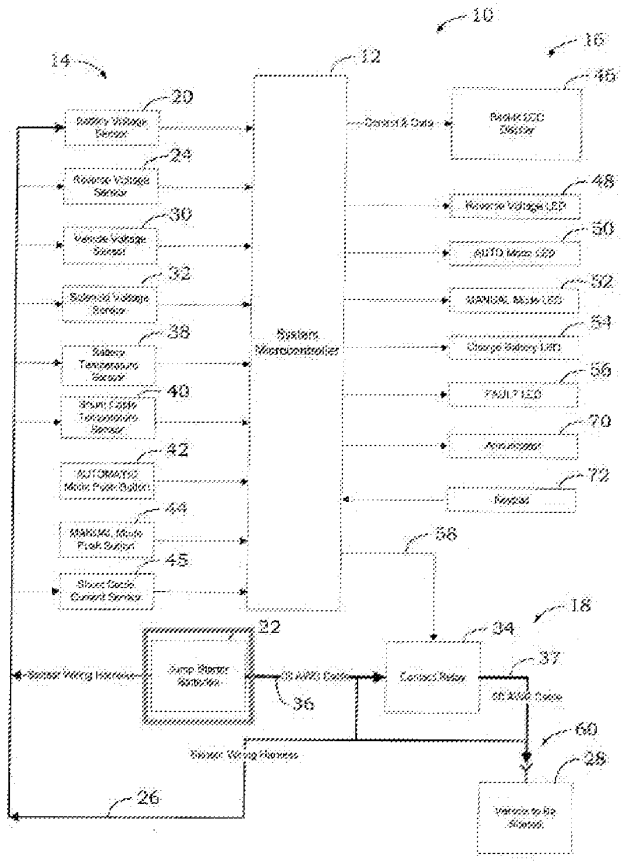


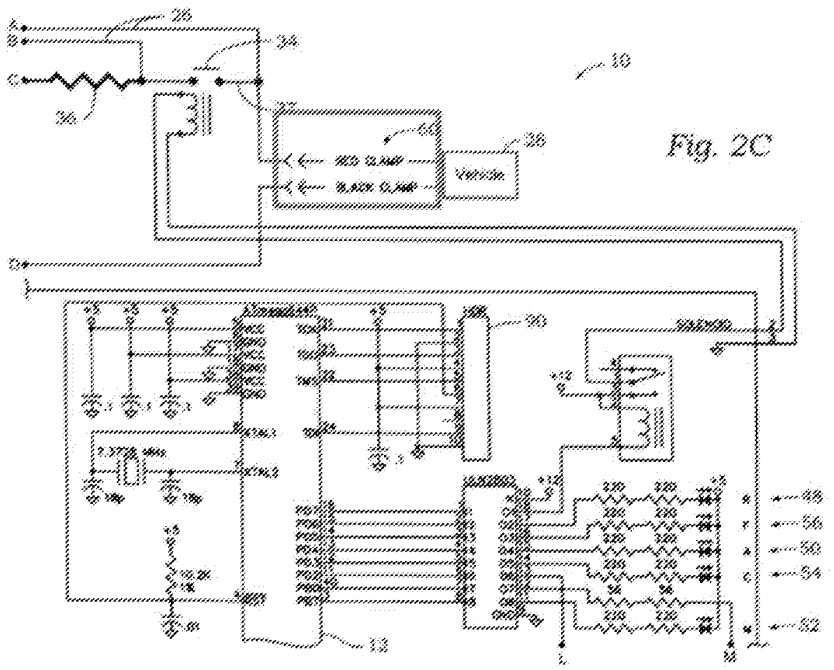
Fig. 1

Richardson I, Fig. 1 (denoting Jump Starter Batteries as 22).

DELTRAN EX1002
IPR2024-01219

1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Richardson I **discloses "a pair of conductive leads for connecting the supplemental power to an engine electrical system."** Richardson I at Abstract, **¶0020 ("[O]nce jumper cables 60 have been connected to the vehicle to be started");** Dec. of Hartup at ¶109. Furthermore, Richardson I discloses that the jumper cables have a positive and negative polarity. Richardson I **at ¶0012 ("A reverse voltage** sensor 24 monitors the polarity **of the jumper cables on line 26").** **FIG. 2C also illustrates that the jumper cables include a "red clamp" and a "black clamp," labeled 60, which connect to the vehicle 28:**

DELTRAN EX1002
IPR2024-01219



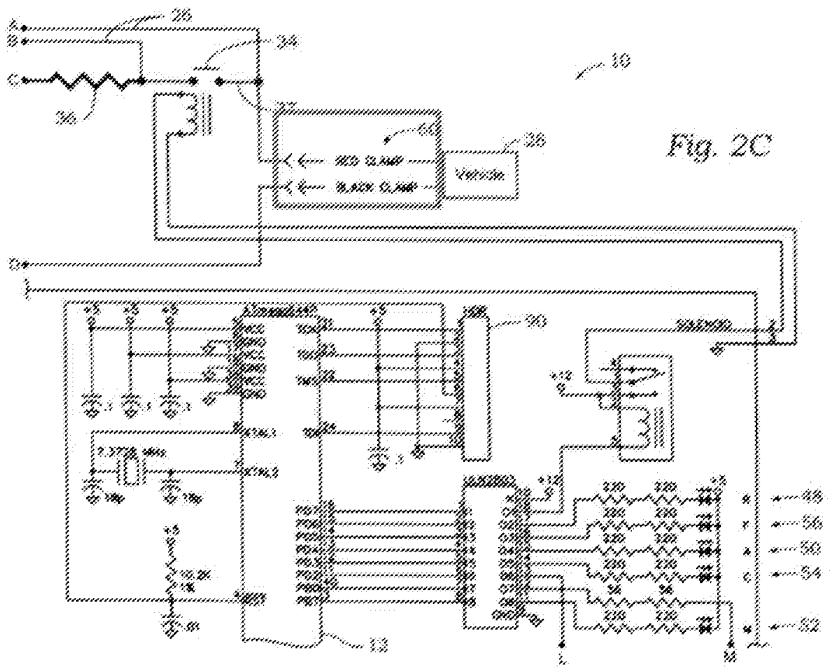
Richardson I, Fig. 2C.

Thus, Richardson I discloses an output port having positive and negative polarity outputs in the same manner as defined by Patent Owner, i.e., jumper cables with a red (positive) and black (negative) clamp. Dec. of Hartup at ¶111.

Richardson I also discloses that a "Jumper Cable unplugged" error message is displayed if a jumper cable is disconnected or unplugged from the starter system. Richardson I at ¶0033. And Figure 2C appears to depict a jumper cable plugged

	into the jump starter. The '015 Patent discloses a "jumper cable device" that has "a plug configured to plug into an output port of a handheld battery charger booster device having an internal power supply; a pair of cables integrated with the plug at **one respective end." The '015 Patent** at 3:40-46. Therefore, Defendant contends that Richardson I inherently discloses an output port having positive and negative polarity outputs. Dec. of Hartup at ¶111. Output ports having positive and negative polarity outputs were also widely available at the time of Richardson I. Dec. of Hartup at ¶111. For example, standard EC connectors with positive and negative polarity outputs where a jumper cable device can be plugged in were widely available since at least 2008. *See* EC Connector Instructions.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Richardson I **discloses that "[a] vehicle voltage sensor 30 monitors the voltage on line 37 (voltage of the vehicle)."** Richardson I at ¶0012; Dec. of Hartup at ¶112.

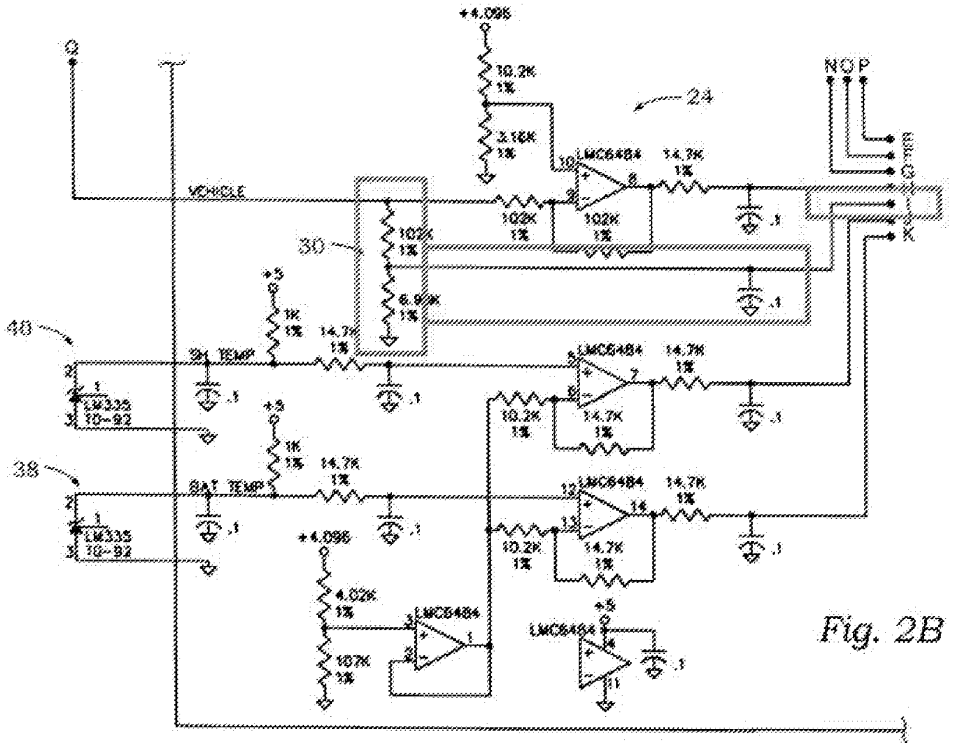
DELTRAN EX1002
IPR2024-01219



Richardson I, Fig. 2C.

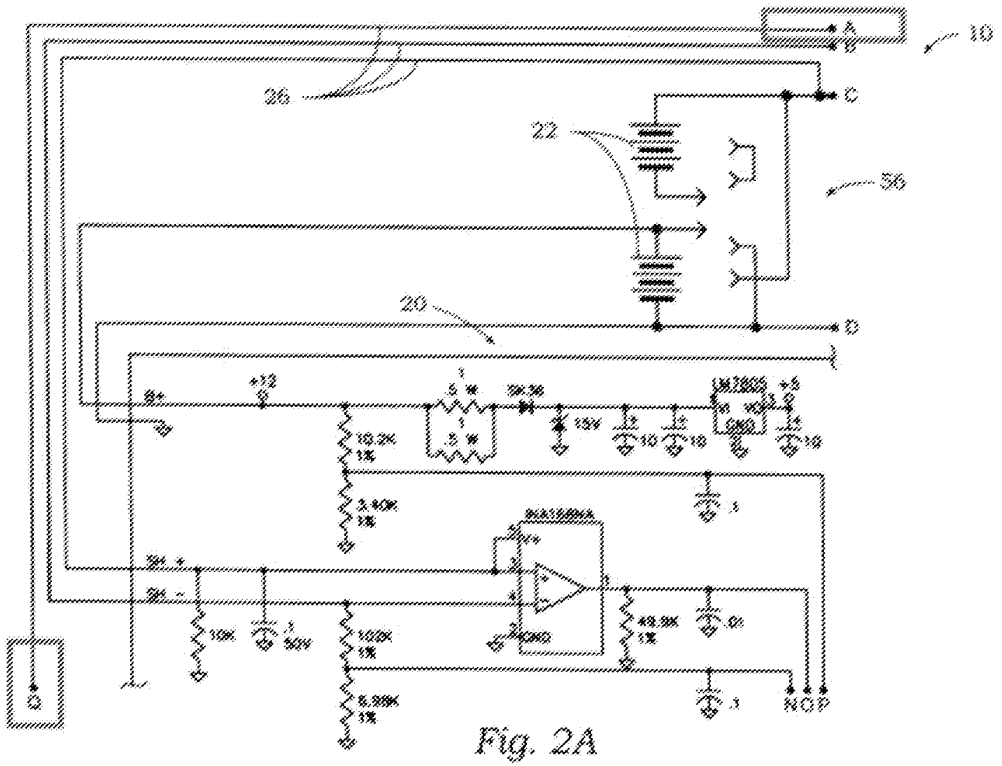
As is shown above in FIG. 2C, line 37 is connected to the vehicle battery 28 via red clamp and black clamp 60. Furthermore, Richardson I discloses that the voltage sensor 30 detects whether the jumper cables are connected to the vehicle battery. Richardson I at ¶0033 ("If the system detects an increase in the difference between the measured jump starter battery voltage 20 and the voltage measured 30 across the contact relay 34 indicating that one of the jumper cables has been disconnected 302 from the vehicle's battery system or starter system 28 then a jumper cable unplugged error count is incremented 304."). Vehicle voltage sensor 30 consists of two

resistors and a capacitor, and the signal from this sensor is sent to the microcontroller via line I, as shown in FIG. 2B below. Richardson I at Fig. 2B; Dec. of Hartup at ¶112.



Richardson I, Fig. 2B.

DELTRAN EX1002
IPR2024-01219

	These resistors are connected to vehicle battery 28 via line Q, which as shown in FIG. 2A below, connects directly to line A, which in turn provides an output signal via line I to microprocessor 12, as shown in Figure 2C. Richardson I at Figs. 2A and 2C; Dec. of Hartup at ¶112.  Fig. 2A Richardson, Fig. 2A.

	Furthermore, voltage sensor 30 is isolated from the jump starter batteries 22, which are connected to line C. Richardson I at Fig. 2A; Dec. of Hartup at ¶114. Line C connects to shunt cable 36, which is isolated from the output port consisting of red clamp and black clamp 60 (and thus vehicle 28) by contact relay 34. Richardson I at Fig. 2C; Dec. of Hartup at ¶114. FIG. 1 below, also clearly shows that contact relay 34 is placed between jump starter batteries 22 and vehicle 28. Richardson I at Fig. 1; Dec. of Hartup at ¶114.

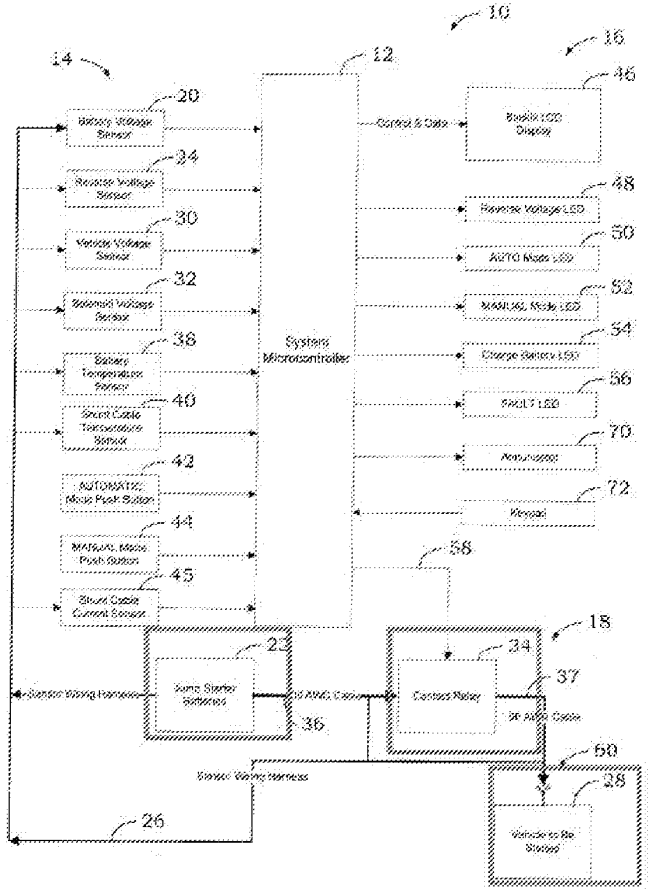


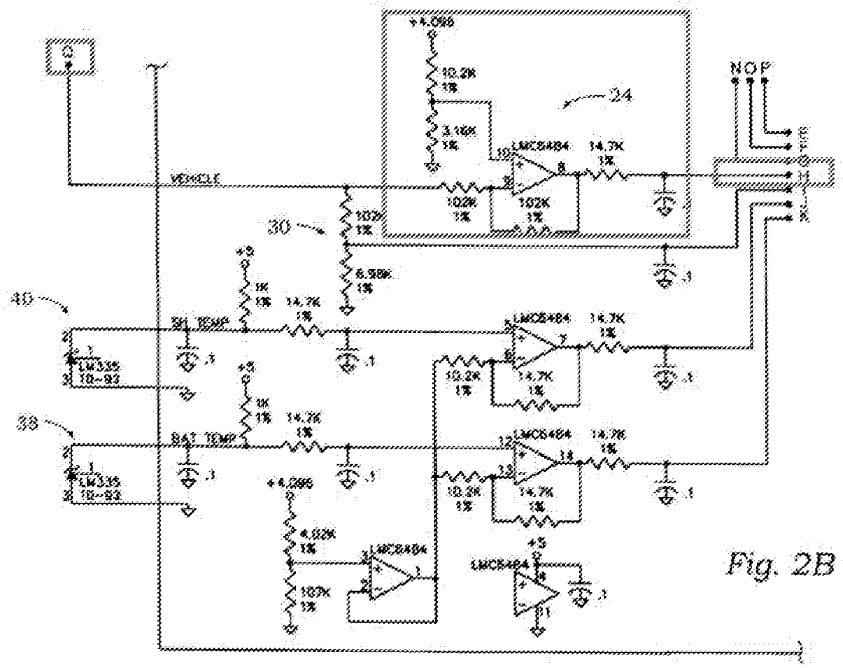
Fig. 1

Richardson I, Fig. 1.

DELTRAN EX1002
IPR2024-01219

	Thus, Richardson I discloses a vehicle battery isolation sensor, i.e., the voltage sensor 30, which is connected in circuit with the positive and negative outputs, shown as plugged in red clamp and black clamp in Figure 2C, and which detects the presence of a vehicle battery. Dec. of Hartup at ¶114.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Richardson I **discloses "[a] reverse voltage sensor 24 [that]** monitors the polarity of **the jumper cables on line 26 which are connected to the** vehicle's **electrical system 28."** Richardson I at ¶0012; *see also* Richardson I **at ¶0020 ("once jumper cables 60** have been connected to the vehicle to be started 28, the voltage is measured by reverse voltage sensor 24 to determine if the cables have been properly connected **to the vehicle 214")**; Dec. of Hartup at ¶116. Reverse voltage sensor 24 consists of 5 resistors connected in sequence, a capacitor, and further connected to component LMC6484, an operational amplifier, which is connected to line Q and which provides an output signal on line H. Richardson I at Fig. 2B; Dec. of Hartup at ¶116.

DELTRAN EX1002
IPR2024-01219



Richardson I, Fig. 2B.

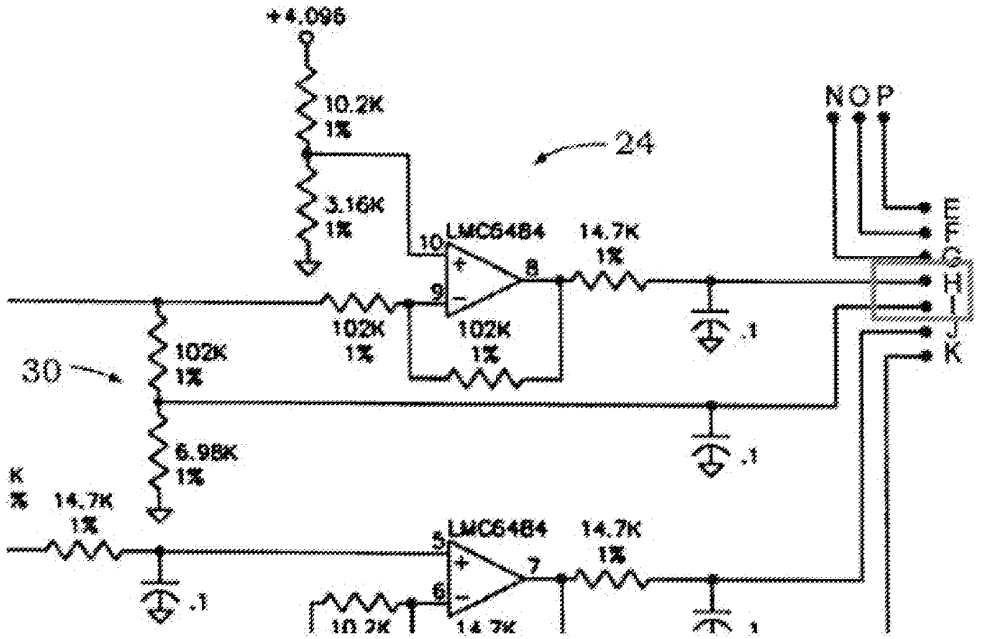
Again, as discussed above in relation to the vehicle battery isolation sensor, line Q is connected directly to line A as shown in FIG. 2A, and line A is connected to the positive and negative polarity output port, shown as plugged in red clamp and black clamp 60 in FIG. 2C. Dec. of Hartup at ¶116. Thus, the reverse voltage sensor 24 is connected in circuit with said positive and negative polarity outputs. Furthermore, it provides an output signal to the microprocessor 12 on line H, which indicates whether positive and negative terminals of the vehicle battery are property

	connected with the positive and negative polarity outputs of the output port. Richardson I at ¶0014 ("A reverse voltage LED 48 is illuminated when the microprocessor 12 determines that a reverse voltage jumper cable voltage is detected by reverse voltage sensor 24."); Dec. of Hartup at ¶116. Importantly, the circuitry that forms reverse voltage sensor 24 is separate and distinct from the circuity forming vehicle voltage sensor 30. Richardson I at Fig. 2B; *see also* Dec. of Hartup at ¶116. Furthermore, reverse voltage sensor 24 and vehicle voltage sensor 30 produce separate and distinct signals that are transmitted to microprocessor 12 on separate and distinct lines H and I, respectively. Richardson I at Fig. 2B; *see also* Dec. of Hartup at ¶116. Thus, Richardson I discloses a reverse polarity sensor that is connected in circuit with the positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between the positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are property connected with the positive and negative polarity outputs of the output port.
1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Richardson I discloses "contact relay 34," which when closed connects the internal batteries to the vehicle. Richardson I at ¶0014 ("When jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter batteries 22 are connected to the starter system or batteries of the vehicle to be started 28.").

DELTRAN EX1002
IPR2024-01219

	Furthermore, FIG. 2C shows that contact relay 34 is connected on one side to shunt cable 36, which is connected to line C, which is shown in FIG. 2A connected to jump starter batteries 22. Richardson I at Fig. 2A and 2C; Dec. of Hartup at ¶117. The other side of contact relay 34 connects to line 37, which is connected directly to the output port, shown as plugged in red clamp and black clamp 60. Richardson I at Fig. 2C; Dec. of Hartup at ¶117. This is further shown in FIG 1, which shows contact relay 34 connected between the jump starter batteries and the 00 AWG cable line 37. Richardson I at Fig. 1; Dec. of Hartup at ¶117. Thus, Richardson I discloses a power switch connected between the internal power supply and the output port. Dec. of Hartup at ¶117.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Richardson I discloses a microcontroller that receives input signals from the vehicle battery isolation sensor, i.e., vehicle voltage sensor 30, and the reverse polarity sensor, i.e., reverse voltage sensor 24, and which provides an output signal to the power switch, i.e., contact relay 34. Dec. of Hartup at ¶118. For example, Richardson I **discloses "a programable microprocessor 12 which receives inputs 14 and produces information outputs 16 and control outputs 18."** Richardson I at ¶0011; Dec. of Hartup at ¶118. Richardson I uses the terms microprocessor and microcontroller interchangeably throughout the specification. *See, e.g.* Richardson I at ¶0015 and FIG. 1. As shown in FIG. 1, inputs 14 include input signals from reverse voltage sensor 24 and vehicle voltage sensor 30, and outputs 18 and 58 which is directed to contact relay. Dec. of Hartup at ¶118; Richardson **at Fig. 1, ¶0014 ("A reverse LED 48 is illuminated when** the microprocessor 12 determines that a reverse voltage jumper cable voltage is detected by reverse polarity sensor 24. … A fault LED 56 is turned on any time the microprocessor 12 detects and operation, sensor or internal fault . . . A contact relay

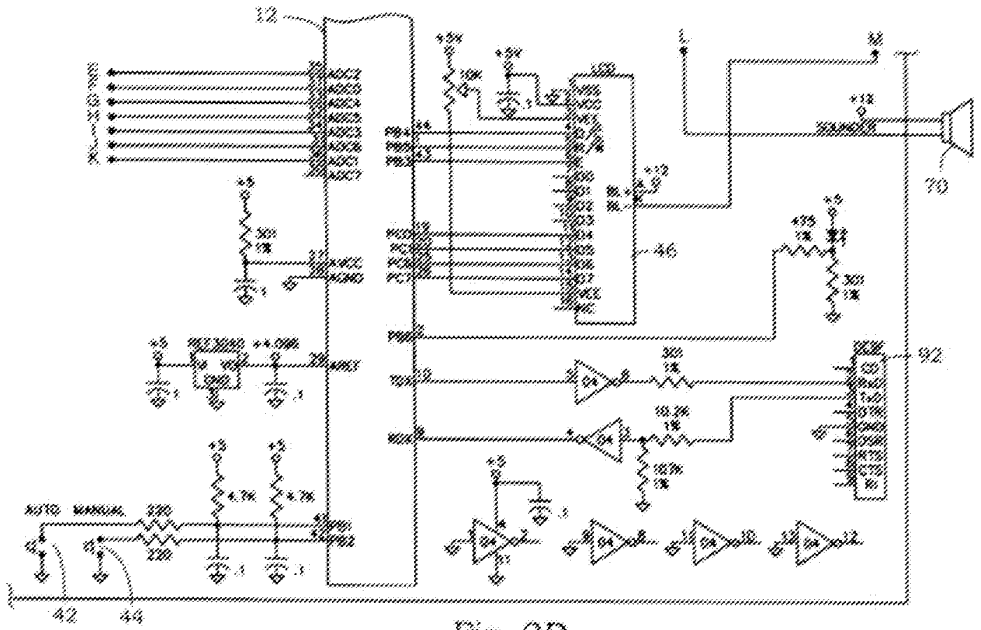
control output 58 operates the contact relay 34. When the jump starter operation has been successfully initiated, the contact relay 34 is closed"). Furthermore, FIG 2C shows that line H carries a signal from reverse voltage sensor 24 and that line I carries a signal from vehicle voltage sensor 30. Richardson at Fig. 2C.



Richardson I, Fig. 2C

Further, FIG. 2D below, shows an image of the inputs to microcontroller 12 which includes inputs H and I. Richardson I at Fig. 2D; Dec. of Hartup at ¶118.

DELTRAN EX1002
IPR2024-01219

	 Fig. 2D Richardson I, Fig. 2D Thus, Richardson I discloses a microcontroller that is configured to receive signals from the vehicle battery isolation sensor and the reverse polarity sensor and which provide an output signal to the power switch. Dec. of Hartup at ¶118.
1[G] such that said power switch is turned on to cause	Richardson I discloses that the microcontroller 12 receives signals from the vehicle voltage sensor 30 and the reverse voltage sensor 24 and that it generates a control

said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	signal 58 that controls the contact relay 34 to connect the jump starter batteries 22 to the vehicle to be started 28. Dec. of Hartup at ¶119. Richardson I also discloses that the microcontroller only closes relay 34 if the reverse polarity sensor 24 and vehicle voltage sensor 30 indicates the presence of a vehicle battery connected with proper polarity. Dec. of Hartup at ¶119. For example, Richardson I **states that "when the jump starter 10 is initially powered** on 200, the microprocessor initializes the hardware … then performs a self-test operation 208 where … all sensors 20, 24, 30, 32, 38, 40 … are tested." **Richardson** I at ¶0015; Dec. of Hartup at ¶119. Furthermore, once the self-test is completed an interrupt service routine (ISR) is started. Provided that the microcontroller does not receive any signals from the sensors, the process continues to the steps shown in Figures 3-8 where several checks are performed prior to the microcontroller sending a signal to close the power switch and thus jump start the vehicle. At step 406 the shunt calibration flag is checked, and if the calibration flag is set, the starter contact relay is closed at step 408. Richardson I at Fig. 4; Dec. of Hartup at ¶119. However, if the flag is not set, the relay is not closed and the process proceeds to step 212 and then to step 214 where the polarity connection to the vehicle battery is tested. Richardson I at Fig. 3; *see also* **¶ 0020 ("If the system does not detect a battery charging voltage 212 . . .** the voltage is measured by the reverse voltage sensor to determine if the cables have been properly connected to the vehicle 214. If the voltage measured is significantly less than the voltage of the system batteries 22, then a reverse polarity connection . . . **is determined")**; Dec. of Hartup at ¶119.

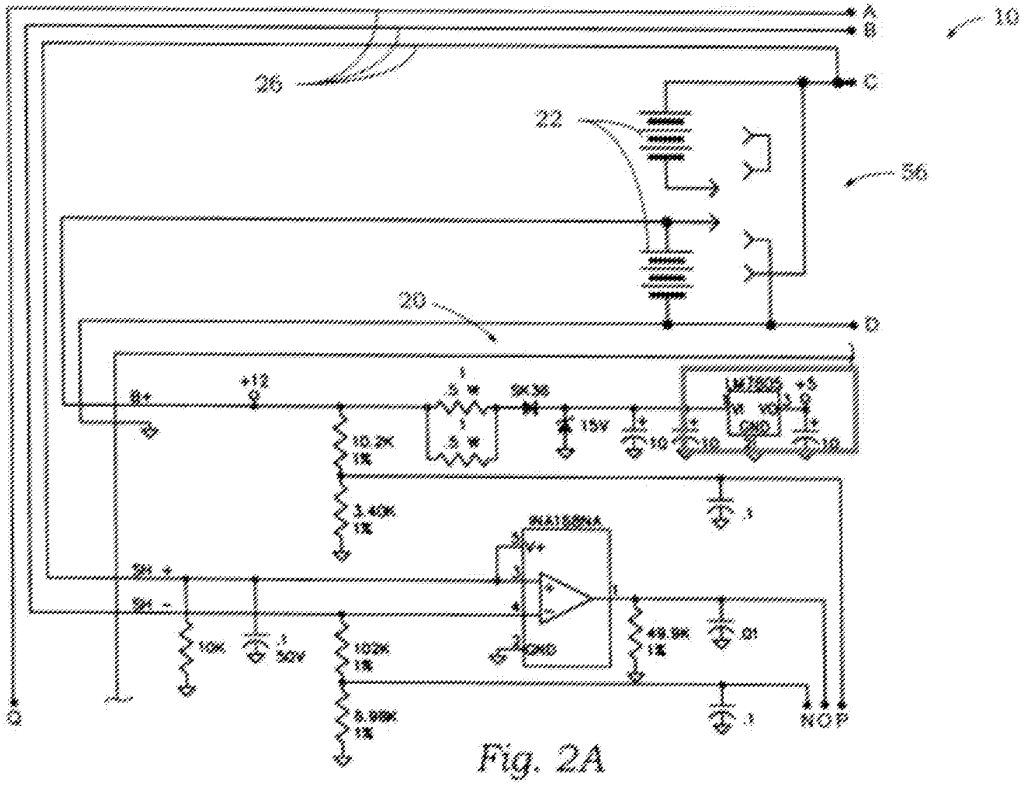
DELTRAN EX1002
IPR2024-01219

	Moreover, Richardson I also discloses that at step 252 a vehicle battery presence test is conducted. Richardson I at Fig. 5; Dec. of Hartup at ¶119. For example, **vehicle voltage sensor 30 "monitors the voltage on line 37 (voltage of the vehicle)"** for detecting the voltage of the vehicle to be started. Richardson I at ¶0012; Dec. of Hartup at ¶119). **"If one of the push buttons 42 or 44 has been selected, the system** will compare the operator-configured starter voltage against the voltage of the vehicle to be started 28. … If the difference between the voltage selected and the voltage measured is not within a predetermined range and tolerance 252 … further operation is prohibited until the correct voltage is selected 256 at which point processing returns to the main processing loop **210.**" Richardson I at ¶0026. The process of measuring the vehicle battery voltage necessarily entails detecting the presence of a vehicle battery connected to the positive and negative output ports, because reading a sufficiently low voltage would indicate either the absence of a vehicle battery or a battery with a voltage below a required threshold for detection. Dec. of Hartup at ¶119. Only after the reverse polarity and battery presence tests have been conducted at steps 214 and 252 does the process proceed to step 268 where microcontroller 12 sends a signal to close contact relay 34. *See* Richardson at Fig. 3, Fig. 6; *see also* Richardson I at ¶¶0014 and 0027; Dec. of Hartup at ¶119. Thus, Richardson I discloses that the microcontroller receives signals from both the vehicle voltage sensor 30 (a vehicle battery isolation sensor) and reverse voltage sensor 24 (a reverse polarity sensor) and the microcontroller 12 only sends a signal to close the contact relay 34 (the power switch) if the received signals indicate both the presence of a vehicle battery and a proper polarity connection to the vehicle battery terminals. Dec. of Hartup at ¶119.

DELTRAN EX1002
IPR2024-01219

CLAIM 8	
8. The apparatus of claim 1, further comprising a voltage measurement circuit configured to measure output voltage of said internal power supply and to provide a Voltage measurement signal to said microcontroller.	Richardson I discloses a voltage measurement circuit configured to measure output voltage of said internal power supply and to provide a voltage measurement signal to said microcontroller as set forth in Claim 8. For example, Richardson I **discloses "[a] battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22."** Richardson I at ¶0016. The battery voltage sensor 20 provides a voltage measurement signal to the microcontroller 12 depicted in FIG. 1. Richardson I at Fig. 1; Dec. of Hartup at ¶¶121-122.
CLAIM 9	
9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus.	Richardson I **discloses "a voltage regulator configured to convert output voltage of** said internal power supply to a voltage level appropriate to provide operating power **to internal components of the apparatus," as required by Claim 9.** Richardson I **discloses a voltage regulator shown as "LM7805" in FIG. 2A below.** Richardson I at Fig. 2A; Dec. of Hartup at ¶124. LM7805 is a commonly used five-volt regulator that provides power to the internal components (microcontroller, operational amplifiers, etc.) of the apparatus. Dec. of Hartup at ¶¶124-126. An exemplary datasheet of an LM7805 voltage regulator from Fairchild Semiconductor **Corporation has a 2006 copyright date, which is before the priority date of the '015** patent. *Id.* at ¶125; LM7805 Datasheet (2008). The voltage regulator LM7805 is connected with several other components and provides +5 volts to the terminal **labeled "+5", a voltage level appropriate to provide operating power to internal** components of the apparatus. *Id.* As is customary in circuit diagrams, power supply

DELTRAN EX1002
IPR2024-01219

	leads are often not shown, but other +5 connections appear in Figures 2C and 2D. These are supplied by the LM7805 of FIG. 2A. *Id.*  Fig. 2A Richardson, Fig. 2A.

DELTRAN EX1002
IPR2024-01219

	A voltage regulator stabilizes the DC voltages used by processors and other elements in electronic devices. Dec. of Hartup at ¶126. Without a voltage regulator, the voltage variation from the internal battery could impair operation of the electronics in the device. *Id.* Therefore, almost every electronic device nowadays includes a voltage regulator. *Id.* A person of ordinary skill in the art would have known to use a voltage regulator to stabilize the power supplied to the microcontroller and other internal components.
CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.	Richardson I **discloses a "reverse voltage LED 48 [which] is illuminated when the** microprocessor determines that a reverse voltage jumper cable voltage is detected **by reverse voltage sensor."** Richardson I at ¶0014; Dec. of Hartup at ¶128. Therefore, Richardson I discloses all the elements of claim 17. Dec. of Hartup at ¶128.
CLAIM 19	
19. The apparatus of claim 1, further comprising a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery.	Richardson I discloses an override switch to enable a user to connect jump starter power to said output port when the vehicle battery isolation sensor is unable to detect the presence of a vehicle battery. Dec. of Hartup at ¶130. For example, Richardson I **discloses that "[i]f in manual mode, the jump starter 10** may be used when the battery voltage of the vehicle is below 10 volts, or if the **vehicle's battery is not connected."** Richardson I at ¶0041. Manual mode is activated **by "manual 44 pushbutton input."** Richardson I at ¶0013. Thus, Richardson I discloses all of the elements of claim 19. Dec. of Hartup at ¶130.

EXHIBIT K

'015 Patent Claims	**Disclosure in Richardson I and/or Xinfang**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising:	Richardson I discloses this element. *See* Ex. J.
1[A] an internal power supply;	Richardson I discloses this element. *See* Ex. J.
1[B] an output port having positive and negative polarity outputs;	Richardson I discloses this element. *See* Ex. J.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Richardson I discloses this element. *See* Ex. J.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity	Richardson I discloses this element. *See* Ex. J.

DELTRAN EX1002
IPR2024-01219

outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Richardson I discloses this element. *See* Ex. J.
1[E] a power switch connected between said internal power supply and said output port; and	Richardson I discloses this element. *See* Ex. J.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Richardson I discloses this element. *See* Ex. J.
1[G] such that said power switch is turned on to cause said internal power supply to	Richardson I discloses this element. *See* Ex. J.

DELTRAN EX1002
IPR2024-01219

be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.	Xinfang discloses the use of an internal power supply comprising a lithium ion battery within its jump starter. Xinfang at 1:67-2:1 **("The battery may comprise a lithium iron phosphate battery cell or a lithium cobalt oxide battery cell."),** *see also* 2:47-51, 5:13-27, claims 4,7. A person of ordinary skill would have found it obvious to combine the lithium ion battery packs disclosed in Xinfang with Richardson I as this would result in a

DELTRAN EX1002
IPR2024-01219

	smaller, more portable product, given the smaller size to energy capacity of lithium ion batteries. Dec. of Hartup at ¶135.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Xinfang further discloses the use of a pack of multiple lithium ion batteries. **"The battery cell 42 may have a multi-**cell structure. In an embodiment of the present **invention, the battery cell 42 has four battery cells."** Xinfang at 5:9-11. A person of ordinary skill would have found it obvious to combine the lithium ion battery packs disclosed in Xinfang with Richardson I as this would result in a smaller, more portable product, given the smaller size to energy capacity of lithium ion batteries. Dec. of Hartup at ¶135.
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device.	**Xinfang's** USB port is described for the same type of jump starting device as Richardson I, and USB charging devices were widely known and used at the time of the priority date. Dec. of Hartup at ¶137. A person of ordinary skill would have found it obvious to combine the USB ports disclosed in Xinfang with Richardson I since these ports were widely known at the time. Dec. of Hartup at ¶137.
CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Xingfang discloses a portable jump starter that utilizes a flashlight circuit configured to provide a source of light to a user. For example, "[t]he present invention according to an embodiment provides a mobile power bank, vehicle ignition system jump starter, **and a flashlight.**" Xinfang

	at 1:45-47. "The second plate 24 may be provided with a master control button 26 and a flashlight 28." Xinfang at 4:24-25. Xinfang also discloses the use of flashlight to provide a S.O.S. signal in an emergency situation. "After turning on the flashlight 28, if the control module 58 detects that the master control button 26 is activated, it may control the flashlight in multiple illumination modes, such as a constant light mode, flashing strobe light mode, and flashing S.O.S. (three sequential short flashes, followed by three sequential long flashes, followed again by three sequential short flashes) signal light mode." Xinfang at 8:37-44; *see also* Dec. of Hartup at ¶85 A person of ordinary skill would have found it obvious to combine the LED flashlight circuits disclosed in Xinfang with the invention disclosed by Richardson I as it provides a portable battery jump starter the ability to better observe connectors in the vehicle and LED flashlights were widely known at the time of the priority date of the '015 Patent. Dec. of Hartup at ¶¶139-14.
CLAIM 13	
13. The apparatus of claim 12, wherein said source of light is at least one LED.	Xinfang discloses extensive use of LEDs for indicators, including flashing LED lights. "For example, when the power test circuit 64 detects battery voltage of the battery module 16 is lower than about 10.8V, the control module 58 may control the LED indicator module 32 to stop all LED's from lighting up. When the detected battery voltage is greater than about 12.6V, the control module may control the LED indicator module 32 so that one LED is lit and another LED is flashing." Xinfang at 7:12-18.

DELTRAN EX1002
IPR2024-01219

	A person of ordinary skill would have found it obvious to combine the LED flashlight circuits disclosed in Xinfang with the invention disclosed by Richardson I as it provides a portable battery jump starter the ability to better observe connectors in the vehicle and LED flashlights were widely known at the time of the priority **date of the '015 Patent.** Dec. of Hartup at ¶¶139-14.
CLAIM 14	
14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	Xinfang also discloses using the flashlight in emergency situations, such as flashing S.O.S. mode. *See* Xinfang at 8:37-44. A person of ordinary skill would have found it obvious to combine the LED flashlight circuits disclosed in Xinfang with the invention disclosed by Richardson I as it provides a portable battery jump starter the ability to better observe connectors in the vehicle and LED flashlights were widely known at the time of the priority **date of the '015 Patent.** Dec. of Hartup at ¶¶139-14.
CLAIM 15	
15. The apparatus of claim 1, further comprising a plurality of visual indicators configured to display remaining capacity status of said internal power supply.	Richardson I discloses an LED which indicates a remaining battery capacity of the internal power supply. Richardson I **at ¶0014 ("If the voltage level of the jump** starter batteries 22 drop below a value of twenty percent of the normal level, a charge **battery LED 54 is illuminated.").** A person of ordinary skill would have found it obvious to combine the teachings of Richardson I with those of Xinfang to include a plurality of visual indicators

DELTRAN EX1002
IPR2024-01219

	configured to display remaining capacity status of the internal battery so that the user can timely recharge the jump starter. Dec. of Hartup at ¶¶143-144.

DELTRAN EX1002
IPR2024-01219

EXHIBIT L

'015 Patent Claims	**Disclosure in Richardson II and/or Lei**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Richardson II discloses an apparatus for jump starting a vehicle engine. "The present invention relates to a portable power source for a motor vehicle and, more particularly, to a method and apparatus to provide supplemental power to start internal combustion and turbine engines." Richardson II at ¶0002. "The system includes one or more internal batteries and capacitors to provide the power to the battery of the vehicle to be jump started." Richardson II at ¶0007. Richardson II's apparatus includes "jump starter batteries" identified by "22" in FIG. 1 below as the internal power supply. "The system includes one or more internal batteries and capacitors to provide the power to the battery of the vehicle to be jump started." Richardson II at ¶0007. "A battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22." Richardson II at ¶0016.

DELTRAN EX1002
IPR2024-01219

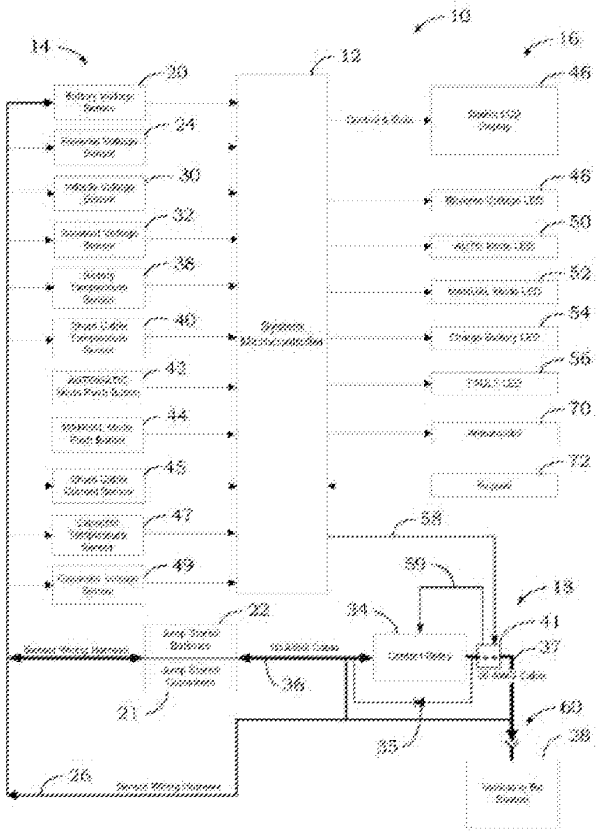


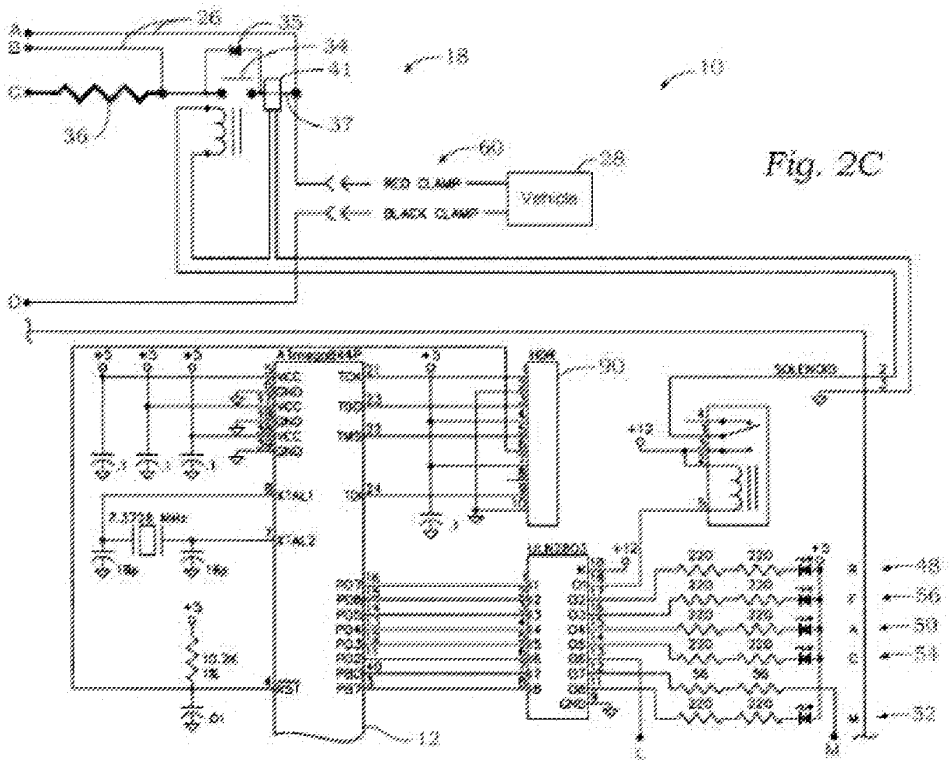
Fig. 1

Richardson II, Fig. 1

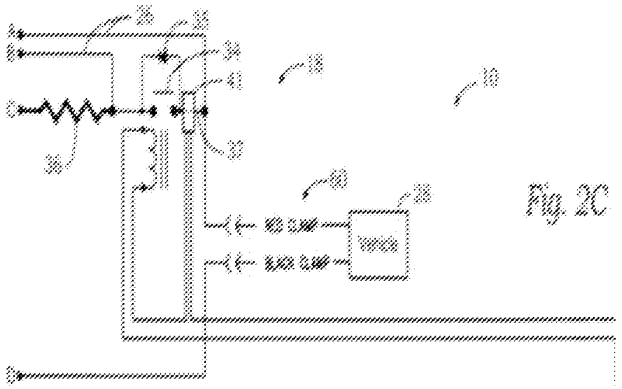
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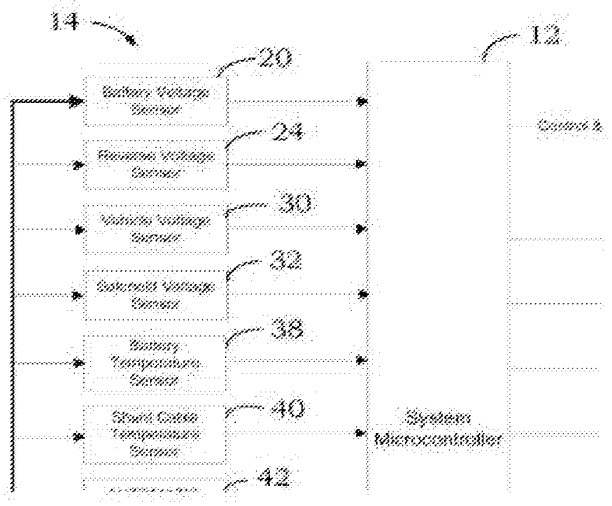
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Richardson II discloses an output port having the positive and negative polarity outputs through which power from the internal power supply is transmitted. Specifically, Richardson II discloses conductive leads connected to jumper cables having positive and negative polarity outputs through which power from the internal **power supply is transmitted. "A method and apparatus provides supplemental power** to an engine. The method and apparatus includes a pair of conductive leads for connecting the supplemental power to an engine electrical system, one or more batteries connected in parallel with one or more capacitors, a relay connected to the conductive leads, a shunt cable connecting the batteries and capacitors to the relay and a processor for controlling the relay to selectively apply electrical power to the **engine electrical system."** Richardson II at Abstract. In addition, claim 1 of Richardson II **specifies "temporar**ily manually connecting conductive leads from **said portable jump starter to the electrical system of the engine."** Richardson II at **Claim 1. Also, a "battery voltage sensor 20 monitors the voltage level of one or more** jump starter batteries 22. A reverse voltage sensor 24 monitors the polarity of the **jumper cables on line 26 which are connected to the vehicle's electrical system 28."** Richardson II at ¶0016. FIG. 2C below shows jumper cables 60 with red (positive) and black (negative) clamps are connected to the output port (line 26) depicting positive and negative polarity outputs.

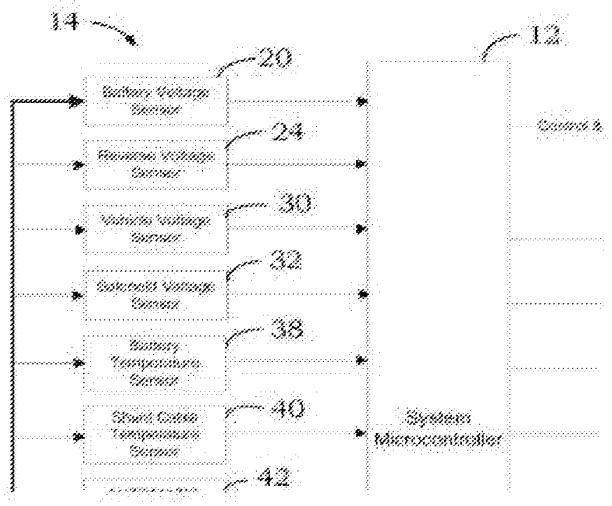
DELTRAN EX1002
IPR2024-01219

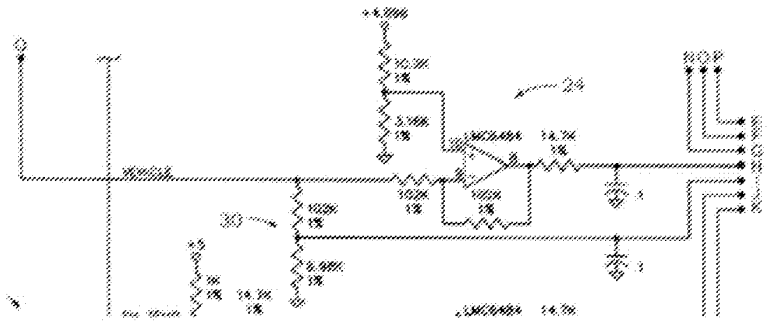
	 Richardson II, Fig. 2C.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence	Richardson II discloses a vehicle battery isolation sensor consistent with this construction. Richardson II **discloses a "vehicle voltage sensor 30 monitors the voltage on line 37 (voltage of the vehicle)."** Richardson II at ¶0016. Shown in FIG. 2C of Richardson II below, the line 37 is connected in series with said positive and negative polarity outputs, such that the vehicle voltage sensor can detect presence

DELTRAN EX1002
IPR2024-01219

of a vehicle battery connected between said positive and negative polarity outputs;	of a vehicle battery connected between said positive and negative polarity outputs. Dec. of Kirtley at ¶65.  Richardson II, Fig. 2C. Also as shown in FIG. 1 of Richardson II below, the vehicle voltage sensor 30 is separate from a reverse voltage sensor 24 (a reverse polarity sensor).

	 Richardson II, Fig. 1.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said	Richardson II discloses a reverse polarity sensor consistent with this construction. FIG. 1 of Richardson II below, shows a reverse polarity sensor, (reverse voltage sensor 24), which is separate from the vehicle battery isolation sensor (vehicle voltage sensor 30).

vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	 Richardson II, Fig. 1. More details on the vehicle sensing and reverse voltage sensing circuits are provided in Richardson II's FIG. 2B below. The vehicle voltage sensor 30 places a signal on line 'I' using a voltage divider. The reverse voltage sensor 24 places a signal on line 'H' using an inverting operational amplifier (LM6484). Thus, the voltage sensor 30 and the reverse voltage sensor 24 comprise separate and distinct sensors. Dec. of Kirtley at ¶68.



Richardson II, Fig. 2B.

Richardson II **states the "reverse voltage sen**sor 24 monitors the polarity of the **jumper cables on line 26 which are connected to the vehicle's electrical system 28."** Richardson II **at ¶0016. "A reverse voltage LED 48 is illuminated when the** microprocessor 12 determines that a reverse voltage jumper cable voltage is detected **by reverse voltage sensor 24."** Richardson II **at ¶0020. "If the system does not detect** a battery charging voltage 212, once jumper cables 60 have been manually connected to the vehicle to be started 28, the voltage is measured by the reverse voltage sensor 24 to determine if the cables have been properly connected to the vehicle 214. If the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set and the event saved in non-**volatile memory 216. A "Reverse Polarity" error message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216."** Richardson II at ¶0027.

DELTRAN EX1002
IPR2024-01219

1[E] a power switch connected between said internal power supply and said output port; and	In its First Amended Complaint against Defendants, Plaintiff contends that the output port limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Richardson II discloses a power switch connected between the internal power supply and the output port. In FIG. 1 shown below, Richardson II discloses a contact relay 34 (power switch) connected between jump starter batteries 22 (internal power supply) and the leads (output port) connected to the vehicle to be started 28.

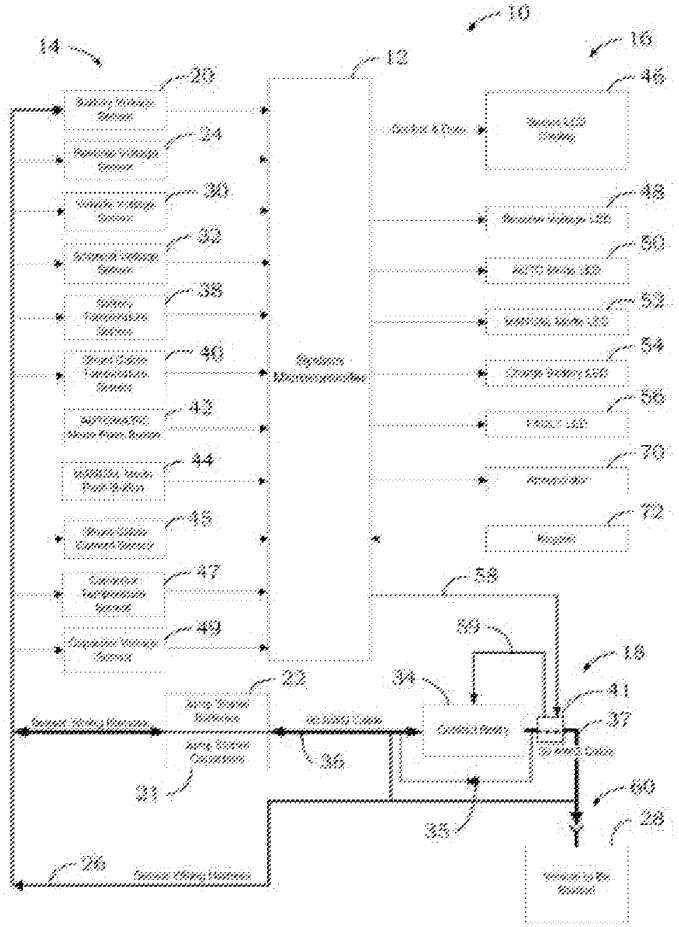
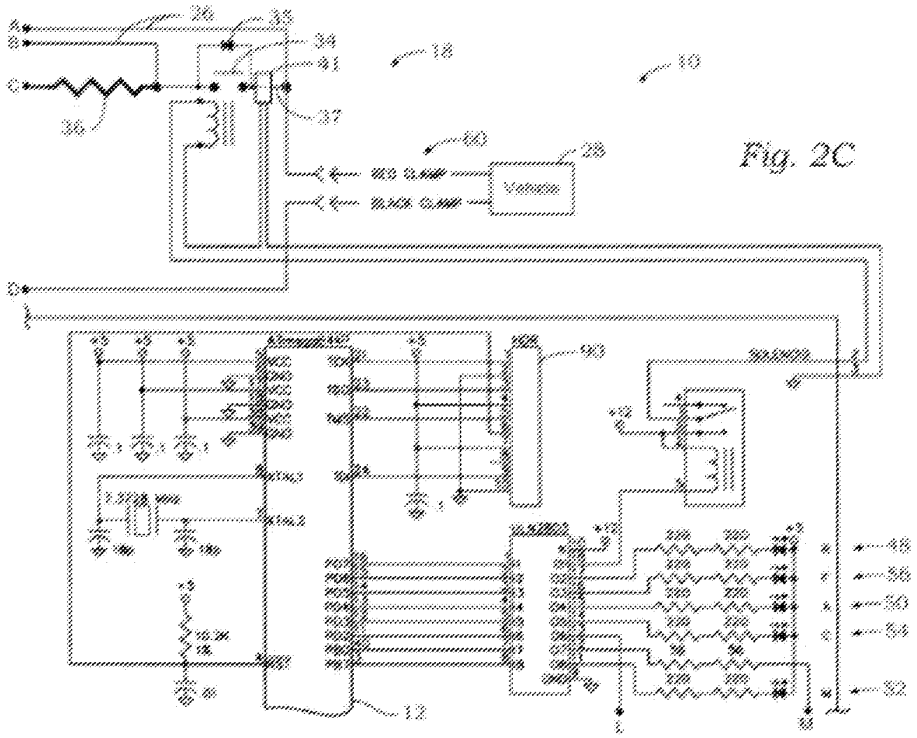


Fig. 1

Richardson II, Fig. 1.

The power switch 34 is shown in more detail in FIG. 2C below.



Richardson II Fig. 2C.

"When the jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter capacitors 21 and batteries 22 are connected to the

DELTRAN EX1002
IPR2024-01219

	starter system or batteries of the vehicle to be started 28. The contact relay 34 is opened when a successful start cycle has been completed, a start fault has occurred or the operator interrupts the jump starter cycle." Richardson II at ¶0021.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Richardson II discloses a microcontroller receiving input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch. Richardson II discloses a system microcontroller 12 in FIG. 1 below receiving input signals from the vehicle voltage sensor 30 (vehicle isolation sensor) and the reverse voltage sensor 24 (reverse polarity sensor) and providing output signals to the contact relay 34 (power switch). "Referring initially to FIG. 1, the portable supplemental power source (jump starter) of the present invention is generally indicated by reference numeral 10. Jump starter 10 includes a programmable microprocessor 12 which receives inputs 14 and produces informational outputs 16 and control outputs 18." Richardson II at ¶0014. (Richardson II uses "microprocessor 12" interchangeably with "microcontroller 12".)

DELTRAN EX1002
IPR2024-01219

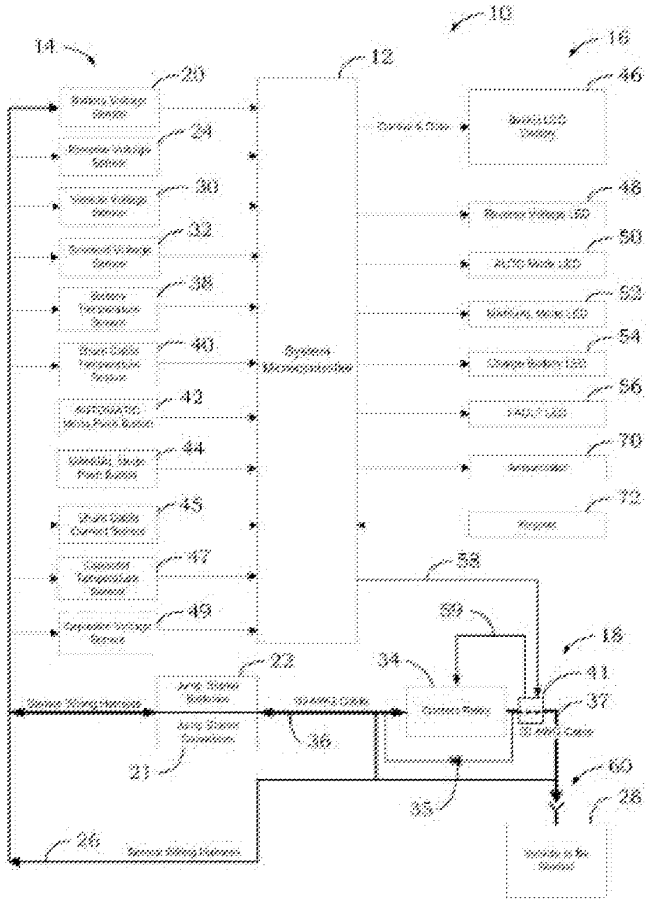


Fig. 1

Richardson II, Fig. 1.

	Richardson II's FIG. 1 shows distinct input signals received by the microcontroller 12 from the vehicle voltage sensor 30 and the reverse voltage sensor 24 consistent with this construction.
1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	Richardson II discloses turning on the power switch to cause the internal power supply to be connected to the output port in response to signals from the sensors indicating (1) the presence of a vehicle battery at the output port and (2) proper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs. Richardson II also discloses the power switch is not turned on when signals from the sensors indicate either the absence of a vehicle battery at the output port or an improper polarity connection of the vehicle battery. Richardson II discloses in FIGS. 3-8 "flow charts of the processing steps of the portable power source of the present invention." Richardson II at ¶0010. This sequence of steps involves several checks performed by the microcontroller before turning on the power switch to jump start the vehicle. As discussed below, these checks include detecting (1) the presence of a vehicle battery at said output port and (2) proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs. Dec. of Kirtley at ¶76. Richardson II discloses the reverse voltage sensor 24 detecting whether jumper cables that have been manually connected to the vehicle battery have been properly connected or if there is a reverse connection. Richardson II discloses that the power switch for charging the vehicle battery cannot be turned on unless there is a proper polarity connection of the cables. Referring to FIG. 3, Richardson II states: "If the system does not detect a battery charging voltage 212, once jumper cables 60 have

DELTRAN EX1002
IPR2024-01219

	been manually connected to the vehicle to be started 28, the voltage is measured by the reverse voltage sensor 24 to determine if the cables have been properly connected to the vehicle 214. If the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set and the event saved in non-**volatile memory 216. A "Reverse Polarity" error** message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216. Any further jump starter action by the operator is ignored until the reverse polarity condition is corrected 220, at which point processing returns to the **start of the main processing loop 210.**" Richardson II at ¶0027.

DELTRAN EX1002
IPR2024-01219

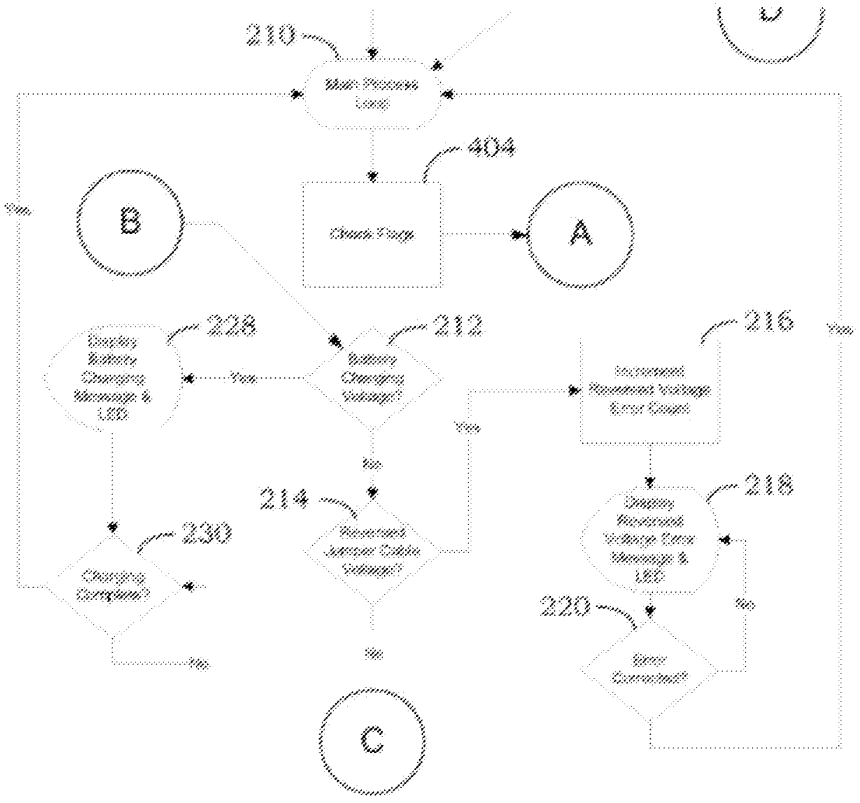
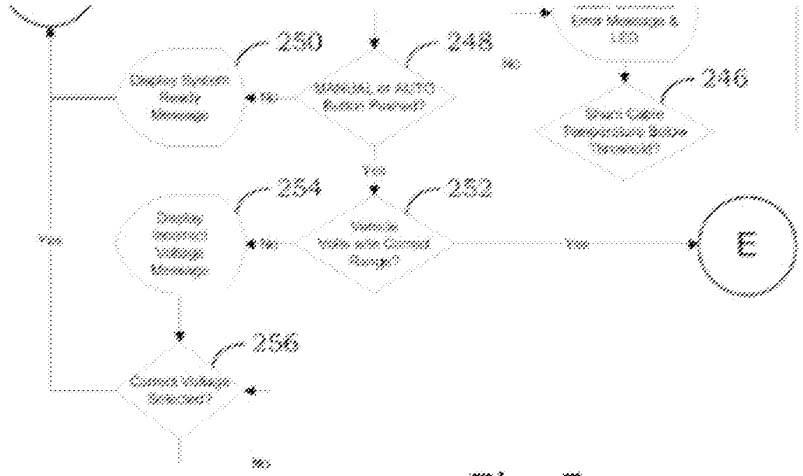


Fig. 3

Richardson II, Fig. 3.

	Additionally, as discussed below, in a separate sequence of steps, Richardson II discloses detecting the presence of a vehicle battery at the output port before turning on the power switch to jump start the vehicle. Specifically, Richardson II discloses detecting the presence of the vehicle battery by detecting the voltage of the battery to determine whether the starter voltage of the jump starter apparatus configured by the operator is consistent with the voltage of the vehicle, depicted in FIG. 5 below.  *Fig. 5* Richardson II, Fig. 5. Richardson II discloses that the starter voltage of the jump starter apparatus can be **configured by the operator "for 12, 18, 24, 30, 36, 42 or 48 volts, for example."** Richardson II at ¶0034. Richardson II discloses a vehicle voltage sensor 30 that

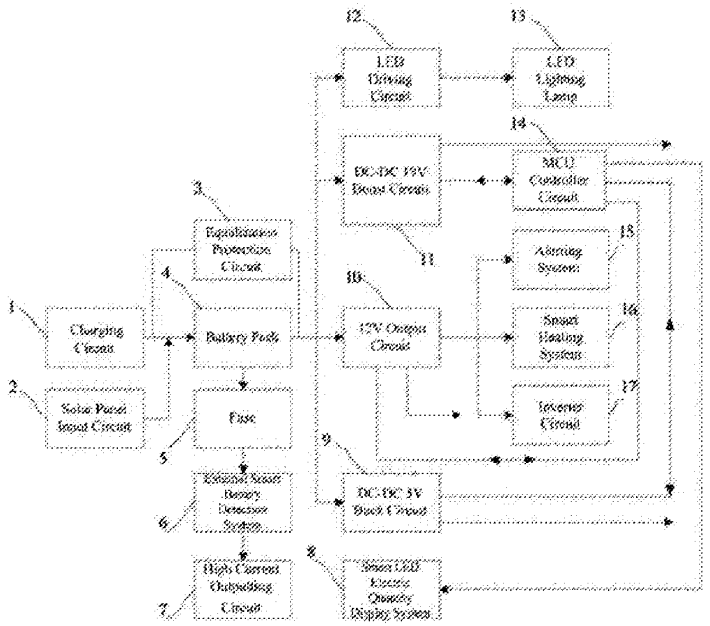
	"monitors the voltage on line 37 (voltage of the vehicle)" for detecting the voltage of the vehicle to be started. Richardson II at ¶0016. **"If one of the push buttons 42** or 44 has been selected, the system will compare the operator-configured starter voltage against the voltage of the vehicle to be started 28. ... If the difference between the voltage selected and the voltage measured is not within a predetermined **range and tolerance 252, a "Wrong Selector Volts" message is displayed 254 on the** LCD 46 and further operation is prohibited until the correct voltage is selected 256 at which point processing returns to the main processing loop 210." Richardson II at ¶0034. In other words, Richardson II discloses that if a vehicle battery with a particular voltage that matches an operator-configured starter voltage is not detected by the vehicle voltage sensor 30, then the charging process cannot occur. The process of sensing the voltage of the vehicle battery by the vehicle voltage sensor 30 necessarily involves detecting the presence or absence of the vehicle battery since a reading of zero volts would indicate the absence of a battery. The system microcontroller turns on the power switch only if the battery were present and furthermore within a particular range (which has to be greater than zero since the operator-configured starter voltage will always be some positive number greater than zero). Thus, the system microcontroller does not turn the power switch on in the absence of a battery. And the system microcontroller turns the power switch on only when a battery is present and the voltage measured is furthermore within a predetermined range and tolerance (which will be true at least some of the time). Dec. of Kirtley at ¶80. Thus, Richardson II discloses that the power switch is turned on to cause the internal power supply to be connected to the output port in response to *distinct* signals from the sensors indicating (1) the presence of a vehicle battery at the output port and (2)

	proper polarity connection of positive and negative terminals of the vehicle battery with said positive and negative polarity outputs. Richardson II also discloses that the power switch is *not* turned on when signals from said sensors indicate either the absence of a vehicle battery at the output port or an improper polarity connection of the vehicle battery.
CLAIM 2	
2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.	Richardson II does not disclose using a lithium ion battery. However, Lei states **the "emergency power source uses lithium-ion batteries as its battery pack."** Lei at 6:50-**51. "In certain embodiments, the battery pack consists of lithium**-ion batteries **connected in series or parallel."** Lei at 2:22-23.
CLAIM 3	
3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.	Richardson II does not disclose using a lithium ion battery. Lei states the **"emergency power source uses lithium-ion batteries as its battery pack." Ex. 1008,** 6:50-**51. "In certain embodiments, the battery pack consists of lithium**-ion batteries **connected in series or parallel."** Lei at 2:22-23. Richardson II discloses **"one or more batteries connected in parallel with one or more capacitors" in a jump starter.** Richardson II, Abstract. While Richardson II does not explicitly state that the batteries are lithium-ion batteries, use of such batteries would have been obvious. One of ordinary skill in the art would have been particularly motivated to use lithium-ion batteries because Lei disclosed several specific benefits of using lithium-**ion batteries in jump starter devices: "The** emergency power source uses lithium-ion batteries as its battery pack, which has the characteristics of light weight, small size, durability, high instantaneous discharge current and rechargeability, which is capable of supplying a high current for starting

DELTRAN EX1002
IPR2024-01219

	a vehicle." Lei at 5:15- 21. This teaching would have provided motivation to one of ordinary skill in the art to use lithium-ion batteries in Richardson II. Dec. of Kirtley at ¶120.
CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Richardson II does not disclose a flashlight circuit. However, Lei discloses a flashlight circuit, configured to provide a light source — specifically, and LED light source. Lei at 6:36- 38.
CLAIM 13	
13. The apparatus of claim 12, wherein said source of light is at least one LED.	Richardson II does not disclose a flashlight circuit. However, Lei discloses a flashlight circuit where the source of light is an LED. Referring to FIG. 1 shown below, **Lei discloses "an output terminal of the LED driving circuit 12 is connected to a LED lighting lamp 13."** Lei at 6:36- **38. Lei explains that the "LED lighting lamp may provide outdoor lighting."** Lei at 5:32-33.

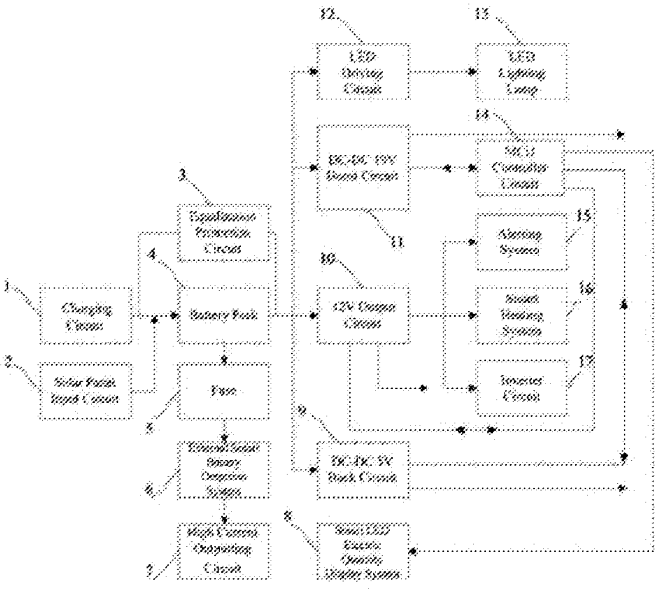
DELTRAN EX1002
IPR2024-01219



Lei, Fig. 1.

One of ordinary skill in the art would have been motivated to incorporate a flashlight circuit having an LED light source in Richardson II's jump starter to provide outdoor lighting for the user, as suggested by Lei.

CLAIM 14	
14. The apparatus of claim 13, wherein said	Richardson II does not disclose a flashlight circuit controlled by a microprocessor to provide a visual alarm. However, Lei states: "[a]n output terminal of the DC-DC

microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.	12V output circuit 10 is connected to an alerting system 15 for transmitting an alerting signal. ... A start button of the alerting system 15 can be pressed by the user when he or she is lost or some condition occurs. The alerting system 15 may notice people around for help by lighting the indicator light or transmitting sounds with the **alerting system 15.**" Lei at 7:3-13. Shown in FIG. 1 of Lei below, the alerting system 15 is operably coupled to the MCU controller circuit 14.  Lei, Fig. 1.

	One of ordinary skill in the art would have been motivated to incorporate a visual alarm feature indicating an emergency situation controlled by the microcontroller in Richardson II's jump starter as a safety feature for the user, as suggested by Lei. Dec. of Kirtley at ¶128.

DELTRAN EX1002
IPR2024-01219

EXHIBIT M

The EPower-20 and EPower-21 Jump Starter Product Brochures were distributed to attendees of the 115th China Import and Export Fair 2014 in Guangzhou, China, on April 15, 2014 – May 5, 2014. Therefore, EPower-20 and EPower-21 Jump Starter Product Brochures are printed publications available to the public at least as early as April 15, 2014, which predates the filing date of the asserted patent, and thus, prior art under 35 U.S.C. §102(a).

'015 Patent Claims	**Disclosure in Richardson II and/or EPower-20 and EPower-21 Jump Starter Product Brochures**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Richardson II discloses this element. *See* Ex. L.
1[B] an output port having positive and negative polarity outputs;	Richardson II discloses this element. *See* Ex. L.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;	Richardson II discloses this element. *See* Ex. L.
1[D] a reverse polarity sensor connected in circuit with said	Richardson II discloses this element. *See* Ex. L.

DELTRAN EX1002
IPR2024-01219

positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	
1[E] a power switch connected between said internal power supply and said output port; and	Richardson II discloses this element. *See* Ex. L.
1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Richardson II discloses this element. *See* Ex. L.

DELTRAN EX1002
IPR2024-01219

1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	Richardson II discloses this element. *See* Ex. L.
CLAIM 10	
10. The apparatus of claim 1, further comprising a USB output port configured to	Richardson II does not disclose a USB output port to provide charging power to external USB devices. However, the Epower-20 brochure provides technical details of Shenzhen Carku Technology Co., Ltd.'s ("Carku") EPower-20 Multifunction

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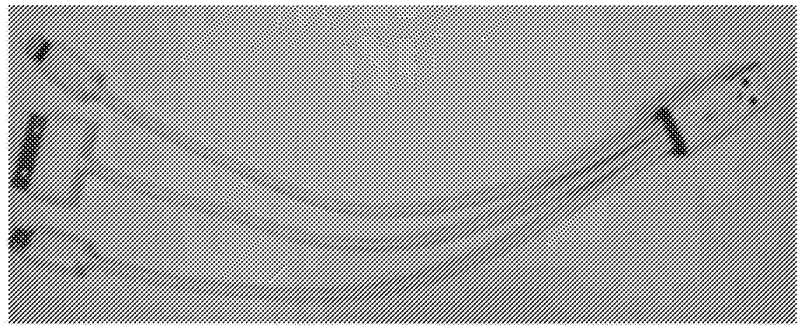
provide charging power from said internal power supply to a USB-chargeable device.	Jump Starter. The Epower-21 brochure similarly provides technical details of Carku's EPower-21 Multifunction Jump Starter. Richardson II and the brochures all disclose portable jump starters for vehicle engines. For instance, the Epower-20 brochure shows packaging below specifying "Carku Multifunction Jump Starter E-Power-20B." The Epower-20 brochure similarly specifies "Carku Multi-Function Jump Starter."

DELTRAN EX1002
IPR2024-01219

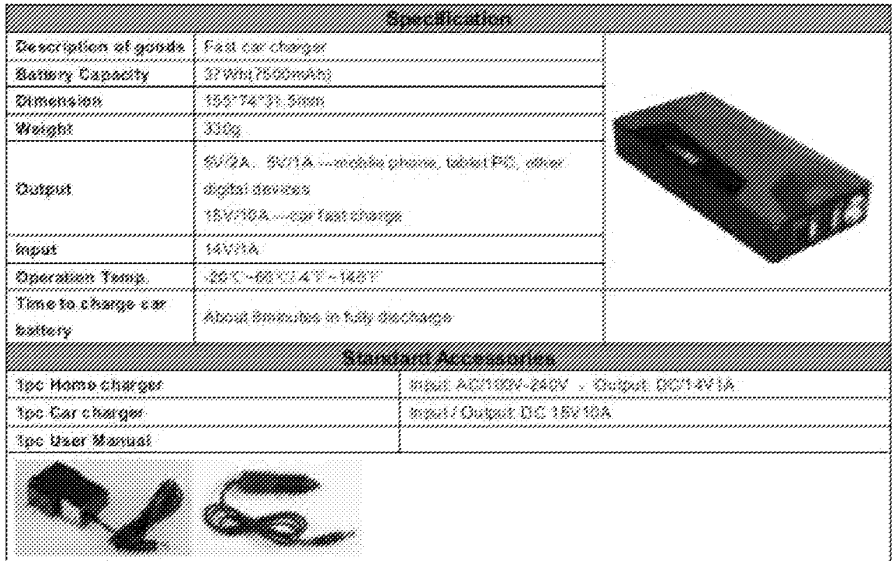
	 Epower-20 brochure at 1. The Epower-20 brochure shows two USB output ports at the front of the device below.

DELTRAN EX1002
IPR2024-01219

	 Epower-20 brochure at 1. The "Specification" of the Epower-20 brochure states the "Output" includes "5V/2A, 5V/1A ---mobile phone, tablet PC, other digital devices." A POSITA would understand that the 5V/2A and 5V/1A outputs described and shown are USB outputs for charging mobile phones and other devices. Dec. of Kirtley at ¶78. Additionally, the Epower-20 brochure discloses a "3-in-1 Mobile Phone Cable" accessory below with "Micro USB, iPhone4, iPhone5" outputs. The right end of the cable is a USB plug, which a POSITA would understand is plugged into a USB port

	shown above. Epower-20 brochure, ¶184. The other end of the cable includes the "Micro USB, iPhone4, iPhone5" outputs described in the brochure.  Epower-20 brochure at 1. The Epower-21 brochure similarly discloses USB output ports. The USB output ports allow users to charge USB-chargeable devices like cell phones. It would have been obvious to one of ordinary skill in the art to incorporate USB output ports in Richardson II as a convenience feature allowing users to also charge electronic devices.
CLAIM 11	
11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from	Richardson II does not disclose a USB port configured to charge the internal power supply, However, while neither the Epower-20 nor the Epower-21 product brochures explicitly discloses a USB charging port providing charging power from an external power source to an internal power supply, the Epower-20 brochure

DELTRAN EX1002
IPR2024-01219

an external power source to said internal power supply.	**shows below a "14V 1A" "Input" port for charging the jump starter with a "Home charger" ("Input: AC/100V240V, Output: DC/14V1A").**  Epower-20 brochure at 1. The Epower-21 brochure makes a similar disclosure. Thus, the Epower-20 and Epower-21 **brochures disclose a "charging port configured to provide charging power from an external power source to said internal power supply."** Epower-20 brochure at 1. Epower-21 brochure at 1. Further, the brochures disclose a USB port incorporated in the devices to provide charging power to other electronic devices like cell phones as explained above. Epower-20 at 1.

	It would be readily apparent from the references that a USB port, which is simply a different physical plug and socket combination from the round plug and socket used in the Epower-20 and 21 products, could also be incorporated into portable jump starters in place of or in addition to the 14V 1 A input port to charge the internal batteries of jump starter devices. One of ordinary skill in the art would be motivated to provide such a USB charging port to provide the added convenience to users of using another commonly used power input for charging the jump starter device. Dec. of Kirtley at ¶190.
CLAIM 12	
12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.	Richardson II does not disclose a flashlight circuit. However, The Epower-20 and Epower-21 product brochures show a flashlight at the front of the devices in the images below.  Epower-20 brochure at 1.

DELTRAN EX1002
IPR2024-01219

	 Epower-21 brochure at 1. The Epower-20 brochure also shows the flashlight in operation.

	 Epower-20 brochure at 1.
CLAIM 13	
13. The apparatus of claim 12, wherein said source of light is at least one LED.	Richardson II does not disclose a LED light. However, as noted above, The Epower-20 and Epower-21 jump start products include a flashlight at the front of the devices, as shown in the images from the product brochures below.

DELTRAN EX1002
IPR2024-01219

	 Epower-20 brochure at 1.  Epower-21 brochure at 1.

DELTRAN EX1002
IPR2024-01219

	It would be obvious for a person of ordinary skill in the art to use an LED lamp in the flashlight as LED lamps have high energy efficiency. Dec. of Kirtley at ¶195. Further, A POSITA would have been motivated to incorporate a flashlight circuit having an LED light source in Richardson II to provide lighting for the user, as suggested by the brochures.

DELTRAN EX1002
IPR2024-01219

EXHIBIT N

'015 Patent Claims	**Disclosure in Klang**
CLAIM 1	
1. Apparatus for jump starting a vehicle engine, comprising: 1[A] an internal power supply;	Klang **discloses systems for rapidly charging vehicle batteries. "A more specific** object of this invention lies in the provision of a diagnostic test unit which includes an interactive charging unit capable of rapidly and reliably recharging lead-acid batteries." Klang at 2:64-67. Klang discloses charging stand-alone batteries and in-vehicle batteries. Klang at 7:31-37. While Klang does not explicitly state jump starting a vehicle engine, one of ordinary skill in the art would recognize that jump starter devices and devices for rapidly charging batteries like Klang function in a similar way and would both involve similar components and safety features. Dec. of Kirtley at ¶210. **Klang discloses an internal power supply in FIG. 1, shown below. "Turning to the** drawings and referring first to FIG. 1, a diagnostic tester and charging system 10 according to the invention comprises a system controller 12, a variable programmable DC power supply and load 14, DC sensors 24, conducting cables 18 and a battery 16. The system controller 12 is coupled to the power supply 14 and **includes control circuitry for regulating the output of the power supply 14."** Klang at 5:9-17.

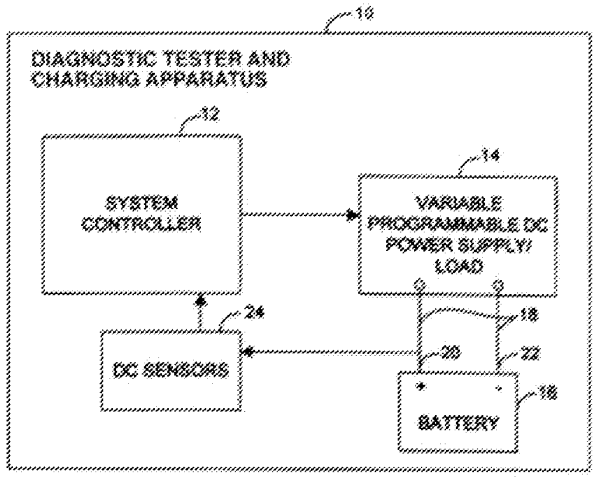
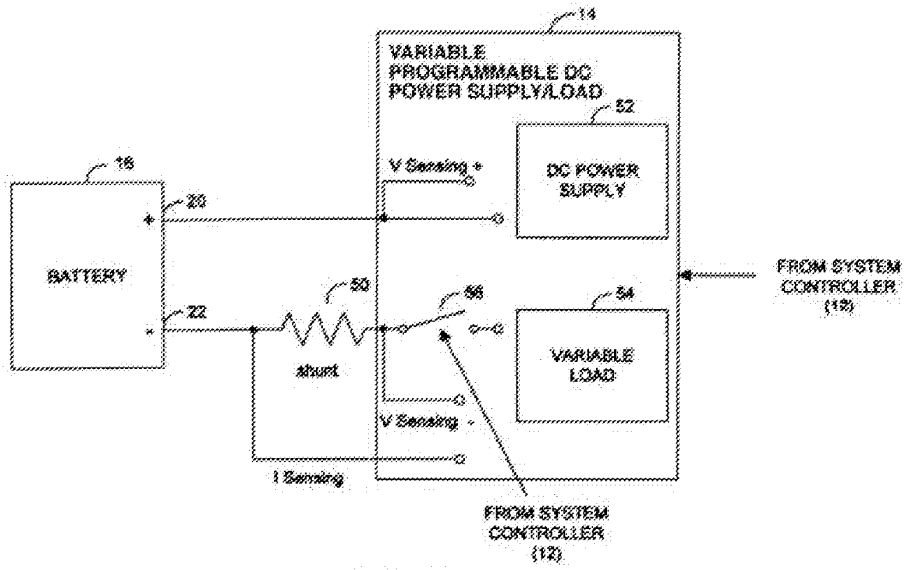


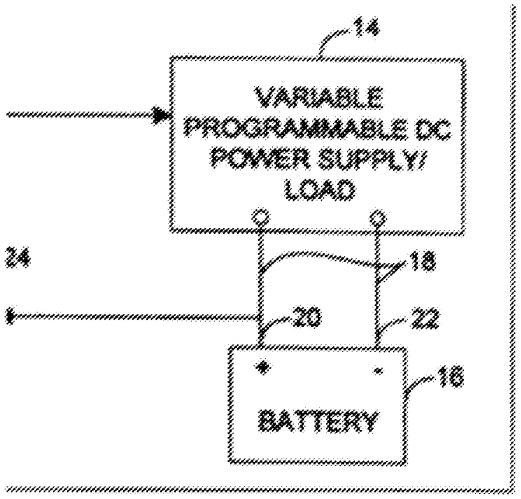
FIG._1

Klang, Fig. 1.

Klang discloses an internal power supply in FIG. 4, shown below. **Klang states "[a]s shown in FIG. 4, the variable programmable DC power supply and load 14 includes a DC power supply 52 and a variable load 54. According to the invention, the power supply 14 is capable of providing an electrical charge output at either a variable voltage level or a variable current level (or both)."** Klang at 6:48-53.

	 FIG._4 Klang, Fig. 4.
1[B] an output port having positive and negative polarity outputs;	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Klang discloses an output port having the positive and negative polarity outputs through which power from the internal power supply is transmitted. Specifically, referring to FIG. 1, Klang states "[t]he power supply and load 14 are coupled in a conventional manner to a battery 16 using conducting cables 18 which link the power supply and load 14 to the charging terminals 20, 22 of the battery 16."

DELTRAN EX1002
IPR2024-01219

	Klang at 5:17-19. Thus, according to Plaintiff's construction of this limitation, Klang discloses an output port having positive and negative polarity outputs.  FIG._1 Klang, Fig. 1.
1[C] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected	Klang discloses a vehicle battery isolation sensor that is separate from a reverse polarity sensor and connected in circuit with the positive and negative polarity outputs, and detects presence of a vehicle battery connected between the positive and negative polarity outputs.

between said positive and negative polarity outputs;	Klang discloses a voltage sensor 46 shown in FIG. 3 below, connected in circuit with the positive and negative polarity outputs of the output port (the leads 18 connected **to the charging terminals 20, 22 of the battery 16). "As represented in FIG. 3, the** exemplary diagnostic tester and charger is comprised of four DC sensors: a charging current sensor 42, a discharging current sensor 44, a voltage sensor 46, and a reverse polarity sensor 48.

DELTRAN EX1002
IPR2024-01219

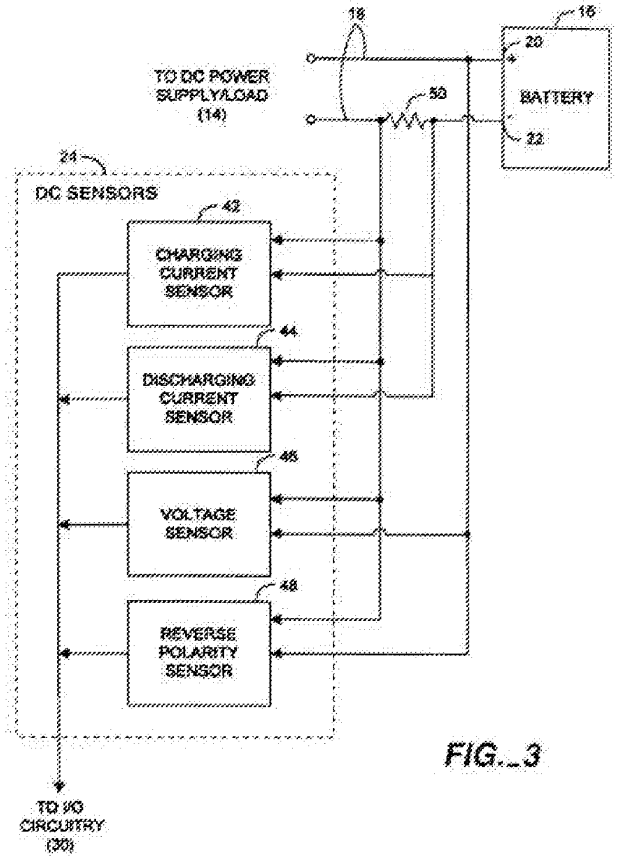


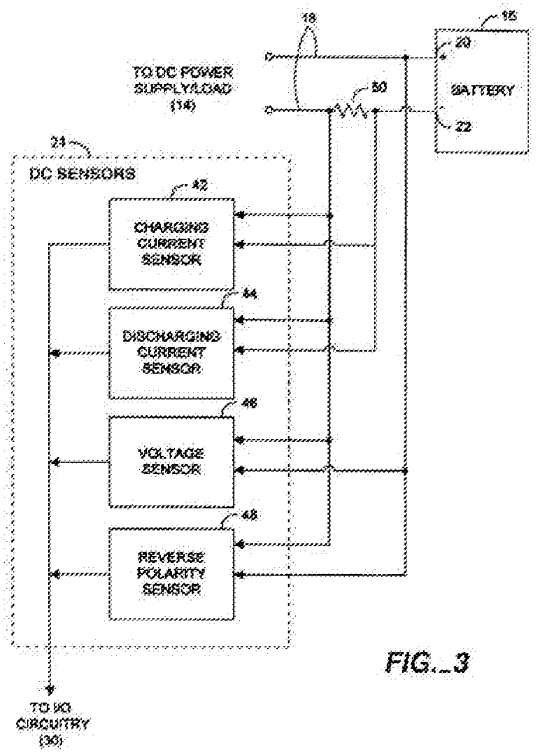
FIG._3

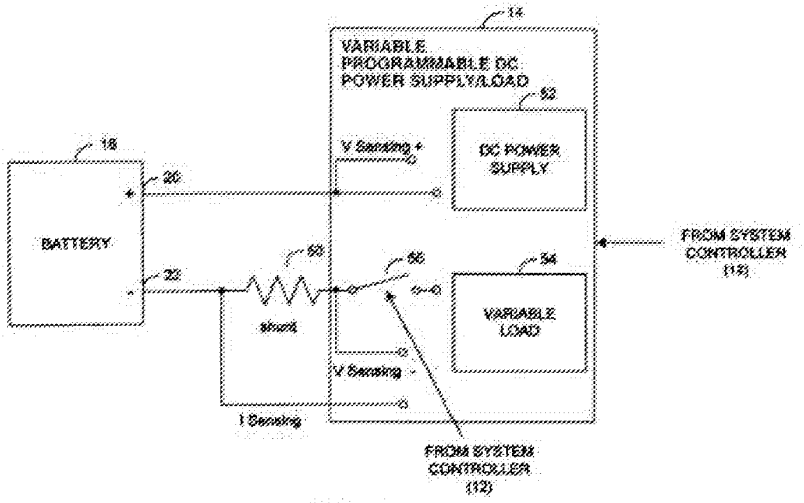
Klang, Fig. 3.

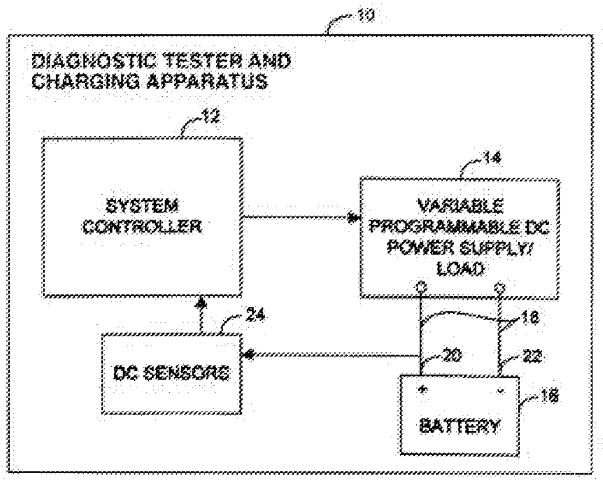
As illustrated, the voltage sensor 46 is connected in a conventional manner to measure the voltage across the terminals 20, 22 of the battery 16. The voltage across the battery terminals is read and attenuated by a voltage attenuator in order to match

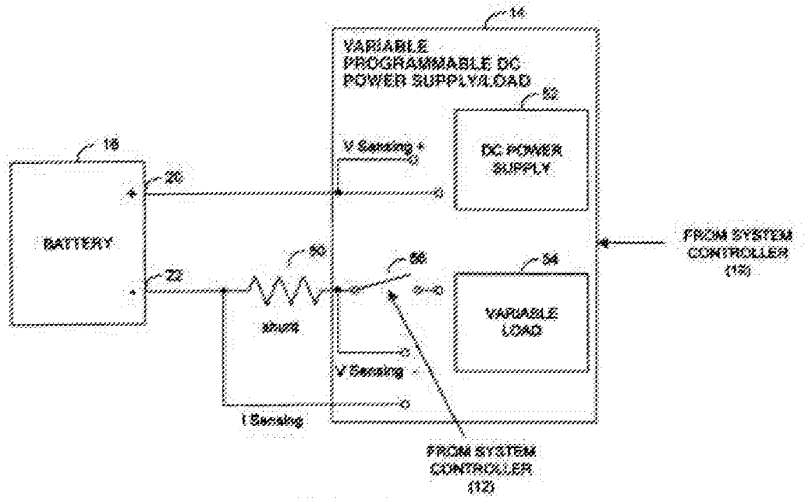
	the input range of the analog-to-digital converters 38 residing in the system controller 12. The voltage sensor 46 is selected so as to be sensitive enough to reflect critical **voltage changes with 0.01V accuracy."** Klang at 6:8-19. The voltage sensor 46 detects the presence of the battery 16 by detecting whether it **is connected. "If the OCV is greater than −0.5V, at step 148, the OCV is compared to an extremely low voltage to determine whether a battery is connected."** Klang at 8:55-58. FIG. 3 of Klang shown above, shows the vehicle voltage sensor 46 as separate from a reverse polarity sensor 48.
1[D] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;	Klang discloses a reverse polarity sensor that is separate from a vehicle battery isolation sensor and is connected in circuit with the positive and negative polarity outputs, and detects polarity of a vehicle battery connected between the positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with the positive and negative polarity outputs of the output port. **"**The reverse polarity sensor 48, connected in a like manner across the battery terminals 20, 22, senses negative voltage indicating that the battery leads are **connected backwards."** Klang at 6:20-**23. Klang's reverse polarity sensor provides** an output signal (sensed negative voltage) indicating whether the battery has a proper **polarity connection. Klang states: "**[i]f **the start button has not been pressed, at step** 144, the OCV [battery open circuit voltage] is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery 16. **If the OCV is less than −0.5V, the method proceeds at step 146 to notify the operator that the leads are reversed."** Klang at 8:55-60.

DELTRAN EX1002
IPR2024-01219

	FIG. 3 shows the reverse polarity sensor 48 of Klang as separate from the vehicle battery isolation sensor (the voltage sensor 46).  FIG._3 Klang, Fig. 3.
1[E] a power switch connected between said	In its First Amended Complaint against Defendants, Plaintiff contends that this limitation is met by a jumper cable with red (positive) and black (negative) clamps. Dkt. No. 19 at ¶24. Klang discloses a power switch connected between the internal

internal power supply and said output port; and	power supply and the output port. In FIG. 4 below, Klang discloses a switch 56 connected between the power supply 52 and the leads (output port) connected to the battery 16. As such, Klang discloses a power switch connected between said internal power supply and said output port.  FIG._4 Klang, Fig. 4 Klang explains: "[d]uring the diagnostic test or charge, the system controller 12 may control means 56 such as a relay, a switch or the like to automatically connect the battery 16 to the circuit. For example, the switch 56 is open while measuring the open circuit voltage of the system. Conversely, the switch 56 is closed allowing current to flow across a shunt resistor 50 to enable charging, discharging and current measurements to be taken." Klang at 7:7-14.

1[F] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,	Klang discloses a microcontroller receiving input signals from the vehicle isolation sensor and the reverse polarity sensor, and to provide an output signal to the power switch. Klang discloses a controller 12 in FIG. 1 receiving input signals from DC sensors 24 (which includes the voltage sensor 46 (a vehicle isolation sensor) and the reverse polarity sensor 48) and providing output signals to the variable programmable DC power supply/load 14 (containing the switch 56 in FIG. 4).  FIG._1 Klang, Fig. 1.

	See also, Klang, Fig. 4.  FIG._4 For example, "[t]urning to the drawings and referring first to FIG. 1 [shown above], a diagnostic tester and charging system 10 according to the invention comprises a system controller 12, a variable programmable DC power supply and load 14, DC sensors 24, conducting cables 18 and a battery 16. The system controller 12 is coupled to the power supply 14 and includes control circuitry for regulating the output of the power supply 14. The power supply and load 14 are coupled in a conventional manner to a battery 16 using conducting cables 18 which link the power supply and load 14 to the charging terminals 20, 22 of the battery 16. Depending on the amount of charge to be conveyed, the conducting cables 18 may comprise heavy-gauge copper wires or cabling compliant with National Electrical Code requirements.

	The DC sensors, which sense current and voltage across the battery terminals 20, 22, **return the values thereof to the system controller 12 to which they are coupled."** Klang at 5:10-25. Referring to FIG. 2 below, Klang states: **"Shown in FIG. 2, the system controller 12** comprises a microprocessor 26, a memory 28, and input/output (I/O) circuitry 30 connected in a conventional manner. The memory 28 is comprised of random access memory (RAM), read-only memory (ROM) and the like. The I/O circuitry 30 is coupled to an operator input 32 that comprises the means to input relevant operator commands and data, such as the rated CCA (Cold Cranking Amps) of the battery. The I/O circuitry 30 is also coupled to a display 34 that comprises the means to display relevant output messages, such as messages informing the operator on the status of diagnostic testing or charging, or messages prompting the operator to enter commands or data. The I/O circuitry 30 is further coupled to the power supply and load 14 and comprises the means to send commands originating in the microprocessor 26 to the power supply and load 14 and to send messages originating in the power supply and load 14 to the microprocessor 26. Klang at 5:27-**44.**" *See also*, Klang, Fig. 2.

DELTRAN EX1002
IPR2024-01219

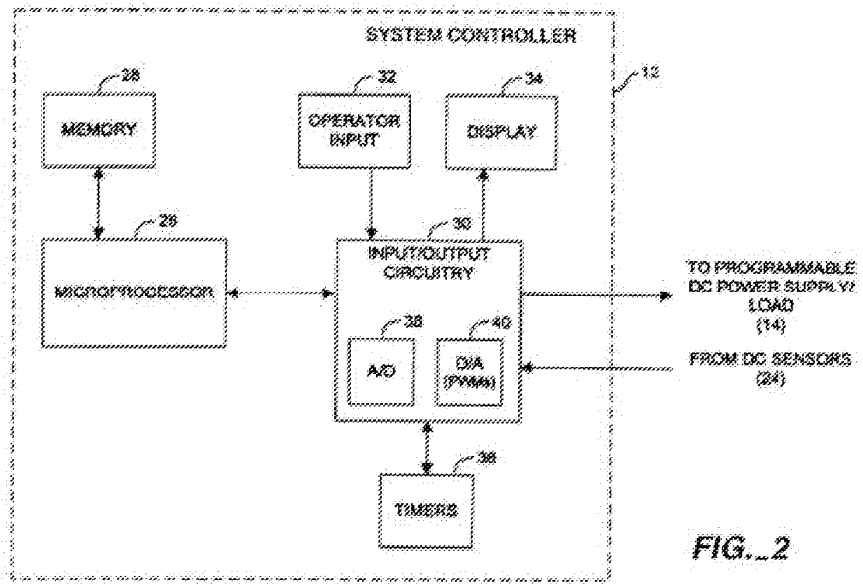


FIG._2

Further, FIG. 3 of Klang shown below, shows distinct input signals sent to I/O circuitry 30 of the controller 12 from the voltage sensor 46 and the reverse polarity sensor 48.

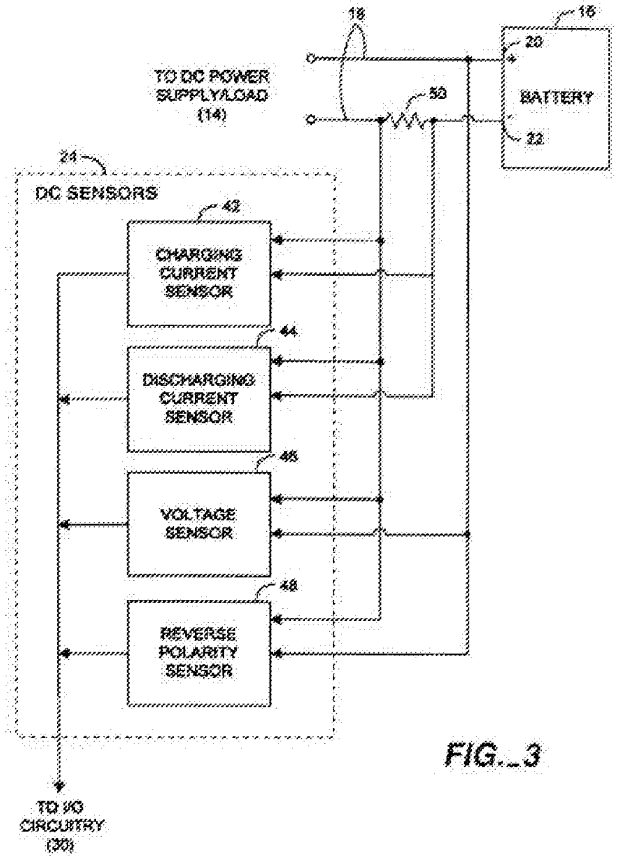


FIG._3

Klang, Fig. 3.

DELTRAN EX1002
IPR2024-01219

1[G] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.	Klang discloses the power switch being turned on to cause the internal power supply to be connected to the output port in response to signals from the sensors indicating (1) the presence of a vehicle battery at said output port and (2) proper polarity connection of positive and negative terminals of said vehicle battery with the positive and negative polarity outputs. Klang also discloses that the power switch is not turned on when signals from the sensors indicate either the absence of a vehicle battery at the output port or improper polarity connection of positive and negative terminals of the vehicle battery. **For example, Klang discloses in FIG. 5 "a logic flow diagram illustrating the steps** involved in performing the diagnostic battery test and battery charge procedures **according to the present invention."** Klang at 4:10-13. *See also*, Klang, Fig. 5.

DELTRAN EX1002
IPR2024-01219

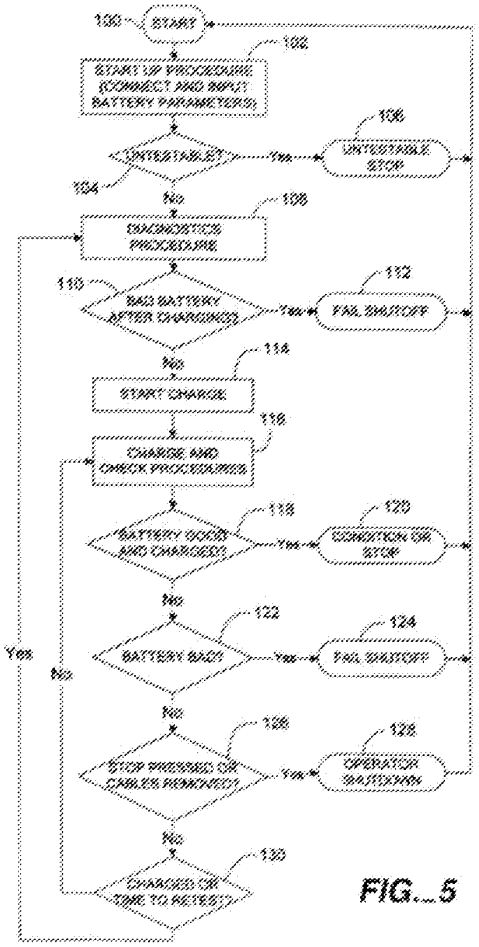


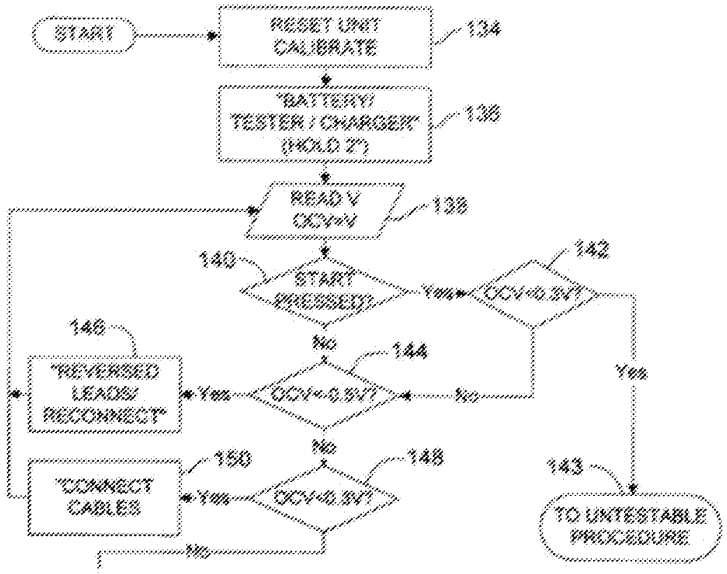
FIG._5

"FIG. 5 illustrates the overall procedure used to implement the current invention. The exemplary testing/charging procedure begins in step 100 by connecting, in a

DELTRAN EX1002
IPR2024-01219

	conventional manner, the lead-acid battery to the diagnostic unit as illustrated in FIGS. 1-4. In step 102, the start-up procedure is invoked wherein proper connection of the battery to the diagnostic unit is verified, critical data is input by the operator **via appropriate buttons and keys, and the voltage is measured."** Klang at 7:49- 57. Once the start-up process has been successfully completed and other steps such as **checking if the battery is bad have been performed, the battery is charged. "If the battery is not judged "bad," however, at step 114 the charger will be turned on and** the battery will be charged and checked in accordance with the rapid interactive **stepping procedure at step 116."** Klang at 8:5-8. **FIG. 6 shown below, "is a logic flow diagram illustrating the particular steps** involved in starting up the diagnostic tester and **charging system."** Klang at 4:14-16. FIG. 6 depicts the start-up process, which includes detecting (1) the presence of a vehicle battery at the output port and (2) proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

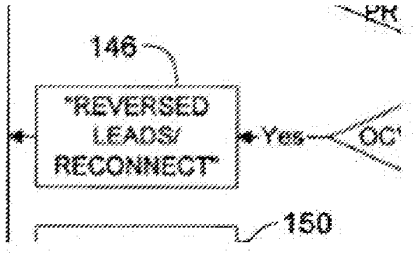
DELTRAN EX1002
IPR2024-01219



Klang, Fig. 6.

"After the short delay, at step 138 the diagnostic tester measures the battery open circuit voltage (OCV) with a switch 56 such that the voltage sensor 46 and reverse polarity sensor 48 read the voltage across the battery terminals 20, 22 without any load or charge. In all, steps 138 through 150 determine whether the battery to be tested is properly connected to the diagnostic unit. For example, at step 140, the diagnostic unit determines if the operator has pressed the start button. If the start button has been pressed, at step 142, the OCV is compared to an extremely low voltage to determine whether the battery is testable. If the battery's OCV is less than 0.3V, the method proceeds at step 143 to run the untestable procedure which notifies the operator that the battery is untestable. (See FIG. 17). If the start button has not

	been pressed, at step 144, the OCV is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery 16. **If the OCV is less than −0.5V, the method proceeds at step 146 to notify the operator that the leads are reversed. If the OCV is greater than −0.5V, at step 148, the OCV is** compared to an extremely low voltage to determine whether a battery is connected. If the OCV is less than 0.3V, indicating that a battery is not connected, the method proceeds at step 150 to display a message instructing the operator to connect the cables. Klang at 8:41-**65."** Thus, Klang discloses unless the voltage measurement made by the voltage sensor 46 at step 148 indicates the presence of the battery (i.e., it is connected) and the voltage measurement made by the reverse polarity sensor 48 at step 144 indicates that the battery is connected with proper polarity, the charging process cannot occur, i.e., the power switch cannot be turned on. Dec. of Kirtley at ¶230.
CLAIM 17	
17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.	Klang **states "[i]f the start button has not been pressed, at step 144, the OCV is** compared to a low negative voltage to determine whether the conducting cables 18 **are properly connected to the battery 16. If the OCV is less than −0.5V, the method** proceeds at **step 146 to notify the operator that the leads are reversed."** Klang at 8:55-60. Thus, Klang warns a user when a vehicle battery is connected with reverse polarity. A visual indicator provides this warning. Klang discloses outputting messages on a display 34. **"The I/O circuitry 30 is also** coupled to a display 34 that comprises the means to display relevant output messages, such as messages informing the operator on the status of diagnostic testing or

	charging, or messages prompting the operator to enter commands or data." Klang at 5:34-39. Regarding FIG. 6 shown below, Klang states: "the method proceeds at step 146 to notify the operator that the leads are reversed." Klang at 8:59-60. Step 146 in the figure identifies text ("REVERSED LEADS / RECONNECT") in quotations, which indicates that the text is displayed to the operator. Thus, Klang discloses a visual indicator warning a user when a vehicle battery is connected with reverse polarity, as recited in claim 17.  Klang, Fig. 6.

MACA13	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_FLOAT} when nothing is connected to its charger port, and an A-device not supplying V_{BUS} is connected to its accessory port? If the UUT has a combined charger, does the UUT pull the ID pin to ground through R_{ID_FLOAT} when the unit is not connected to a power source, and an A-device not supplying V_{BUS} is connected to its accessory port?	Yes ☐ No ☐	12.10	4.5.3
MACA14	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_FLOAT} when an SDP is connected to its charger port, and an A-device not supplying V_{BUS} is connected to its accessory port? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.4	4.5.3
MACA15	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_FLOAT} when nothing is connected to its charger port, and an A-device supplying V_{BUS} is connected to its accessory port? If the UUT has a combined charger, does the UUT pull the ID pin to ground through R_{ID_FLOAT} when the unit is not connected to a power source, and an A-device supplying V_{BUS} is connected to its accessory port?	Yes ☐ No ☐	12.10	4.5.3
MACA16	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_FLOAT} when an SDP is connected to its charger port, and an A-device supplying V_{BUS} is connected to its accessory port? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.4	4.5.3
MACA17	Does the UUT directly connect the data pins of the OTG port directly to the data pins of the accessory port?	Yes ☐ No ☐	Vendor Declaration	4.5.3
MACA18	Does the UUT have a captive cable terminated with a Micro-A plug on its OTG port?	Yes ☐ No ☐	Inspection	4.5.4
MACA19	Does the Micro-A plug have a valid TID?	Yes ☐ No ☐	Vendor Declaration	

CAR-RPA-ITC-05161
DELTRAN EX1002
IPR2024-01219

MACA20	Does the UUT have a Micro-AB receptacle on its OTG port?	Yes ☐ No ☐	Inspection	6.1
MACA21	Does the Micro-AB receptacle have a valid TID?		Vendor Declaration	
MACA22	Does the UUT Charger Port have a Micro-B receptacle, a captive cable terminated with a Standard-A plug, or a captive cable terminated with a Charger?	Micro-B ☐ Standard-A ☐ Charger ☐ No ☐	Inspection	6.2.1
MACA23	If the Charger Port has a Micro-B receptacle or a Standard-A plug, does this have a valid TID?	Yes ☐ No ☐ N/A ☐	Vendor Declaration	
MACA24	Does the UUT charger port draw less than I_{SUSP} when anything other than a charging port is attached to it? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.3, 12.4, 12.5	6.2.6
MACA25	Does the UUT charger port draw less than I_{SUSP} when a charging port is attached to it, and nothing is attached to the OTG port or accessory port? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.6	6.2.6
MACA26	Is the resistance between the V_{BUS_CHG} and V_{BUS_OTG} pins of the UUT, $R_{ACA\_CHG\_OTG}$ when the charger switch is closed, and the voltage on V_{BUS_CHG} is V_{ACA_OPR}? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.6	6.2.6
MACA27	Is the resistance between the V_{BUS_CHG} and V_{BUS_ACC} pins of the UUT, $R_{ACA\_CHG\_ACC}$ when the accessory switch is closed, and the voltage on V_{BUS_CHG} is V_{ACA_OPR}? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.8	6.2.6
MACA28	Is the resistance between the V_{BUS_OTG} and V_{BUS_ACC} pins of the UUT, $R_{ACA\_OTG\_ACC}$ when the accessory switch is closed, and the voltage on V_{BUS_OTG} is V_{ACA_OPR}?	Yes ☐ No ☐	12.8	6.2.6
MACA29	Is the resistance between the internal ground of the UUT and the ground pin of the Micro-AB receptacle attached to the OTG port of the UUT, $R_{OTG\_ACA\_GND}$?	Yes ☐ No ☐	Vendor Declaration	6.2.6

CAR-RPA-ITC-05162
DELTRAN EX1002
IPR2024-01219

MACA30	Does the UUT output V_{DP_SRC} on DP_CHG when it detects V_{BUS_CHG}? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.8	6.2.6
MACA31	Does the UUT close its charger switch when it detects DN_CHG greater than V_{DAT_REF} and V_{BUS_CHG} remains above $V_{OTG\_SESS\_VLD}$? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.8	6.2.6
Questions specific to Micro-ACAs with Combined Charger				
MACC1	Is the output voltage of the UUT less than V_{CHG_OVRSHT} max for any step change in load current, and also when powering on or off? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4.1.1
MACC2	Is the output current of the UUT prevented from exceeding I_{CDP} max under any condition? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐	Vendor Declaration	4.1.2
MACC3	Has it has been shown, using schematics or by some other explanation, that in the case of a single failure in the UUT, the output voltage on V_{BUS} will not exceed V_{CHG_FAIL}? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐	Vendor Declaration	4.1.5
MACC4	Is the output voltage of the UUT OTG port greater than V_{CHG_UNDSHT} min for any step change in load current where current is less than I_{CDP} min? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4.5.2
MACC5	Is the output voltage of the UUT Accessory port greater than V_{CHG_UNDSHT} min for any step change in load current where current is less than I_{CFG_MAX}? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4.5.2

CAR-RPA-ITC-05163
DELTRAN EX1002
IPR2024-01219

MACC6	Does the UUT output a voltage of V_{CHG} (averaged over T_{VBUS_AVG}) for all currents less than I_{CDP} min on its OTG port? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4
MACC7	Does the UUT output a voltage of V_{CHG} (averaged over T_{VBUS_AVG}) allowing for a drop across $R_{ACA\_OTG\_ACC}$ for all currents less than 500mA on its ACC port? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4
MACC8	If the UUT goes into shutdown during a current overload condition, does it recover and output a voltage of V_{CHG} within a time of T_{SHTDWN_REC} when the current overload condition has been removed.	Yes ☐ No ☐	Vendor Declaration	4.2.2

CAR-RPA-ITC-05164
DELTRAN EX1002
IPR2024-01219

12.2 PET Cable Calibration

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	This is the first procedure in the Micro-ACA Test Suite.
Purpose	To calibrate the Test Cables, and to prepare the Micro-ACA for the following tests.
Description	The test operator is instructed to connect the test cables in turn, and these are calibrated. The test operator is then instructed to connect up the Micro-ACA in preparation for the tests.

12.2.1 Test procedure

1. Instruct test operator to plug Special Cable C into PET D-type connector, and the Micro-B plug of the Special Cable C into the PET Micro-AB receptacle, and then click on 'OK'.

2. PET passes a current of 500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

3. Instruct test operator to unplug the Micro-B plug of the Special Cable C from the PET Micro-AB receptacle, and then click on 'OK'.

4. If 'Captive Cable' checkbox is checked, skip to step 8.

5. Instruct test operator to plug Special Cable B into the Standard-A receptacle of Special Cable C, and the Micro-B plug of the Special Cable B into the PET Micro-AB receptacle, and then click on 'OK'.

6. PET passes a current of 1500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

7. PET passes a current of 2000mA through the VBUS conductor of the cable, and measures and records the voltage drop.

8. Instruct test operator to unplug the Micro-B plug of the Special Cable B from the PET Micro-AB receptacle, and then click on 'OK'.

9. Instruct test operator to plug the Micro-B plug of Special Cable C into the Accessory Port of the Micro-ACA under test, and then click on 'OK'.

10. Instruct test operator to plug the Micro-B plug of the captive OTG cable of the Micro-ACA under test into the PET Micro-AB receptacle, and then click on 'OK'.

11. **With Captive Charger Cable**
    Instruct test operator to plug the Standard-A plug of the captive Charger cable of the Micro-ACA under test into the Standard-A receptacle of Special Cable C, and then click on 'OK'.

    With No Captive Charger Cable
    Instruct test operator to plug the Micro-B plug of Special Cable B into the Charger port of the Micro-ACA under test, and then click on 'OK'.

CAR-RPA-ITC-05165
DELTRAN EX1002
IPR2024-01219

Check that cables are connected:

12. Connect 10kΩ pull-down resistor to OTG port VBUS.
13. Apply 5V to VBUS on charger port.
14. Connect together D+ and D- on charger port via 200R.
15. Apply ground to ID pin on accessory port.
16. Check that we can sense 5V on VBUS on OTG port.
17. Check that we can sense 5V on VBUS on accessory port.
18. Remove 5V from VBUS on charger port.
19. Disconnect D+ from D- on charger port.
20. Disconnect 10kΩ pull-down resistor from OTG port VBUS.
21. Remove ground from ID pin on accessory port.
22. If test fails report 'Either cables not correctly connected or accessory port ID pin not functioning'.

End of Test

CAR-RPA-ITC-05166
DELTRAN EX1002
IPR2024-01219

12.3 SDP attached to Charger Port, Nothing attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with SDP attached to the Charger Port and Nothing attached to accessory port
Description	The PET simulates an SDP being attached to the Charger Port of the UUT, and nothing to the Accessory Port of the UUT. Check whether VBUS comes from the OTG port or the Accessory Port. Check the resistance to ground of ID pin on OTG port. Check the current drawn by the Charger Port. Check correct functioning of the Indicator.
Parameters	R_{ID_FLOAT}, I_{SUSP}
Checklist	MACA3, MACA12, MACA24
Pass Criteria	Step 3. VBUS is not coming from the Accessory port. Step 4. VBUS is not coming from the OTG port. Step 5. Resistance to ground of ID pin on OTG port is R_{ID_FLOAT}. Step 7. Indicator is off. Step 8. UUT is drawing less than I_{SUSP} from the charger port

12.3.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port V_{BUS}.
2. Apply 5V to V_{BUS} on charger port.
3. Check that V_{BUS} is not coming from the Accessory port. i.e. Check that Accessory port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)
4. Check that V_{BUS} is not coming from the OTG port. i.e. Check that OTG port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)

Check R_{ID_FLOAT}

5. Check that resistance to ground of ID pin on OTG port is R_{ID_FLOAT} (> 220 kΩ). [MACA12]

Check Indicator

6. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
7. Wait for response, if 'Yes', test fails. If 'No' it passes. [MACA3]

CAR-RPA-ITC-05167
DELTRAN EX1002
IPR2024-01219

Check Current Drawn by UUT Charger Port

8. Check that the UUT is drawing less than I_{SUSP} (2.5mA) from the charger port. [MACA24]

9. Remove 5V from V_{BUS} on charger port.

10. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

End of Test

CAR-RPA-ITC-05168
DELTRAN EX1002
IPR2024-01219

12.4 SDP attached to Charger Port, A-device attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with SDP attached to the Charger Port and A-device attached to accessory port
Description	The PET simulates an SDP being attached to the Charger Port of the UUT, and an A-device to the Accessory Port of the UUT. Check whether VBUS comes from the OTG. Check the resistance to ground of ID pin on OTG port. Check the resistance between VBUS on the OTG Port, and on the Accessory Port. Check the current drawn by the Charger Port. Check correct functioning of the Indicator.
Parameters	RID_FLOAT, ISUSP
Checklist	MACA3, MACA9, MACA10, MACA24
Pass Criteria	Step 5. VBUS is coming from the OTG port. Step 8. Indicator is off. Step 9. Resistance to ground of ID pin on OTG port is RID_FLOAT. Step 12. Resistance to ground of ID pin on OTG port is RID_FLOAT. Step 14. Voltage is less than 100mV Step 19. UUT is drawing less than ISUSP from the charger port

12.4.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port VBUS.
2. Connect 5V to VBUS on charger port.
3. Connect 0V to VBUS on accessory port.
4. Check that voltage on VBUS from OTG is less than VOTG_VBUS_LKG (0.7V)
5. Connect 5V to VBUS on accessory port.
6. Check that voltage on VBUS from OTG port is >= 4.75V.

Check Indicator

7. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
8. Wait for response, if 'Yes', test fails. If 'No' it passes. [MACA3]

Check RID_FLOAT

CAR-RPA-ITC-05169
DELTRAN EX1002
IPR2024-01219

9. Connect 0V to V_{BUS} on accessory port.

10. Check that resistance to ground of ID pin on OTG port is R_{ID_FLOAT} (> 220 kΩ). [MACA9]

11. Connect 5V to V_{BUS} on accessory port.

12. Check that resistance to ground of ID pin on OTG port is R_{ID_FLOAT} (> 220 kΩ). [MACA10]

For now skip to step 16 (See note at start of Section 12)

Check $R_{ACA\_OTG\_ACC}$

13. Set OTG Port V_{BUS} current load to 500mA.

14. Check that voltage on Accessory Port V_{BUS} minus OTG V_{BUS} is less than 100mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_OTG\_ACC}$ (200mΩ).

15. Set OTG Port V_{BUS} current load to 0mA.

Check Current Drawn by UUT Charger Port

16. Set OTG Port V_{BUS} current load to 10mA.

17. Measure current drawn from V_{BUS} generator.

18. Disconnect V_{BUS} from Charger Port.

19. Check that current drops by less than I_{SUSP} (2.5mA) [MACA24]

20. Remove 5V from V_{BUS} on OTG port.

21. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

22. Set OTG Port V_{BUS} current load to 0mA.

End of Test

CAR-RPA-ITC-05170
DELTRAN EX1002
IPR2024-01219

12.5 SDP attached to Charger Port, B-device attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with SDP attached to the Charger Port and B-device attached to accessory port
Description	The PET simulates an SDP being attached to the Charger Port of the UUT, and a B-device to the Accessory Port of the UUT. Check whether V_{BUS} comes from the OTG port or the Accessory Port. Check the resistance to ground of the ID pin on OTG port. Check the current drawn by the Charger Port. Check correct functioning of the Indicator.
Parameters	R_{ID_GND}, $R_{ACA\_OTG\_ACC}$, I_{SUSP}
Checklist	MACA3, MACA6, MACA24, MACA28
Pass Criteria	Step 4. V_{BUS} is not coming from the Accessory port. Step 5. V_{BUS} is not coming from the OTG port. Step 6. Resistance to ground of ID pin on OTG port is R_{ID_GND}. Step 8. Indicator is off. Step 11. Voltage is less than 100mV Step 16. UUT is drawing less than I_{SUSP} from the charger port

12.5.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port V_{BUS}.
2. Apply 5V to V_{BUS} on charger port.
3. Apply ground to ID pin on accessory port.
4. Check that V_{BUS} is not coming from the Accessory port. i.e. Check that Accessory port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V).
5. Check that V_{BUS} is not coming from the OTG port. i.e. Check that OTG port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)

Check R_{ID_GND}

6. Check that resistance to ground of ID pin on OTG port is R_{ID_GND} (< 1kΩ). [MACA6]

Check Indicator

7. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
8. Wait for response, if 'Yes', test fails. If 'No' it passes. [MACA3]

CAR-RPA-ITC-05171
DELTRAN EX1002
IPR2024-01219

For now skip to step 13 (See note at start of Section 12)

Check $R_{ACA\_OTG\_ACC}$

9. Apply V_{BUS} to OTG port
10. Connect 10Ω load to Accessory Port V_{BUS} line
11. Check that voltage on OTG V_{BUS} minus Accessory Port V_{BUS} is less than 100mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_OTG\_ACC}$ (200mΩ). [MACA28]
12. Remove 10Ω load from accessory port V_{BUS} line

Check Current Drawn by UUT Charger Port

13. Connect 625Ω load to Accessory Port V_{BUS} line.
14. Measure current drawn from V_{BUS} generator.
15. Disconnect V_{BUS} from Charger Port.
16. Check that current drops by less than I_{SUSP} (2.5mA) [MACA24]
17. Remove 5V from V_{BUS} on OTG port.
18. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.
19. Disconnect 625Ω load from Accessory Port V_{BUS} line.
20. Disconnect ground from ID pin on accessory port.

End of Test

CAR-RPA-ITC-05172
DELTRAN EX1002
IPR2024-01219

12.6 DCP or CDP attached to Charger Port, Nothing attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Charger attached to the Charger Port and Nothing attached to accessory port
Description	The PET simulates a DCP or CDP being attached to the Charger Port of the UUT, and nothing to the Accessory Port of the UUT. Check whether V_{BUS} comes from the OTG Port or the Accessory Port. Check the resistance to ground of the ID pin on OTG Port. Check the resistance between V_{BUS} on the Charger Port, and on the OTG Port. Check correct functioning of the Indicator. Check UUT outputs V_{DP_SRC} on Charger Port D+.
Parameters	R_{ID_B}, $R_{ACA\_CHG\_OTG}$, V_{DP_SRC}
Checklist	MACA3, MACA8, MACA24, MACA26
Pass Criteria	Step 4. V_{BUS} is not coming from the Accessory port. Step 5. V_{BUS} is coming from the OTG port. Step 6. Less than 2.5mA is being drawn by the charger port. Step 8. Voltage is less than 300mV Step 10. Resistance to ground of ID pin on OTG port is R_{ID_B}. Step 12. Indicator is on. Step 13. Voltage is 0.5V-0.7V.

12.6.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port V_{BUS}.
2. Apply 5V to V_{BUS} on charger port.
3. Connect together D+ and D- on charger port via 200R.
4. Check that V_{BUS} is not coming from the Accessory port, i.e. Check that Accessory port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)
5. Check that V_{BUS} is coming from the OTG port. i.e. Check that OTG port V_{BUS} is greater than 4.75V.
6. Check that less than I_{SUSP} max (2.5mA) is being drawn by charger port. [MACA24]

Check $R_{ACA\_CHG\_OTG}$

7. Set OTG Port V_{BUS} current load to 1500mA.

CAR-RPA-ITC-05173
DELTRAN EX1002
IPR2024-01219

8. Check that voltage on Charger V_{BUS} minus OTG Port V_{BUS} is less than 300mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_CHG\_OTG}$ (200mΩ). [MACA26]

9. Set OTG Port V_{BUS} current load to 0mA.

Check R_{ID_B}

10. Check that resistance to ground of ID pin on OTG port is R_{ID_B} (67-69 kΩ). [MACA8]

Check Indicator

11. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

12. Wait for response, if 'Yes', test passes. If 'No' it fails. [MACA3]

Check V_{DP_SRC}

13. Check that voltage on D+ of charger port is V_{DP_SRC} (0.5V-0.7V).

14. Remove 5V from V_{BUS} on charger port.

15. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

16. Disconnect D+ from D- on charger port.

End of Test

CAR-RPA-ITC-05174
DELTRAN EX1002
IPR2024-01219

12.7 DCP or CDP attached to Charger Port, A-device attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with DCP or CDP attached to the Charger Port and A-device attached to accessory port
Description	The PET simulates a DCP or CDP being attached to the Charger Port of the UUT, and an A-device to the Accessory Port of the UUT. Check whether VBUS comes from the OTG. Check the resistance to ground of ID pin on OTG Port. Check correct functioning of the Indicator. Check UUT outputs V_{DP_SRC} on Charger Port D+.
Parameters	R_{ID_C}, I_{SUSP}, V_{DP_SRC}
Checklist	MACA3, MACA9, MACA10
Pass Criteria	Step 5. V_{BUS} is coming from the OTG port. Step 6. Resistance to ground of ID pin on OTG port is R_{ID_B}. Step 8. Resistance to ground of ID pin on OTG port is R_{ID_C}. Step 10. Indicator is on. Step 15. Current is < 2.5mA Step 17. Voltage is 0.5V-0.7V.

12.7.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port V_{BUS}.
2. Apply 0V to V_{BUS} on Accessory Port.
3. Apply 5V to V_{BUS} on Charger Port.
4. Connect together D+ and D- on charger port via 200Ω.
5. Check that V_{BUS} is coming from the OTG port. i.e. Check that OTG port V_{BUS} is greater than 4.75V.

Check R_{ID_B} and R_{ID_C}

6. Check that resistance to ground of ID pin on OTG port is R_{ID_B} (67-69 kΩ). [MACA9]
7. Apply 5V to V_{BUS} on Accessory Port.
8. Check that resistance to ground of ID pin on OTG port is R_{ID_C} (36-37 kΩ). [MACA10]

Check Indicator

CAR-RPA-ITC-05175
DELTRAN EX1002
IPR2024-01219

9. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

10. Wait for response, if 'Yes', test passes. If 'No' it fails. [MACA3]

Check Current From Accessory Port

11. Set OTG Port V_{BUS} current load to 10 mA.

12. Measure current from V_{BUS} generator.

13. Disconnect V_{BUS} from Accessory Port.

14. Measure current from V_{BUS} generator and subtract from previous measurement.

15. Check that difference is less than I_{SUSP} (2.5mA).

16. Set OTG Port V_{BUS} current load to zero.

Check V_{DP_SRC}

17. Check that voltage on D+ of charger port is V_{DP_SRC} (0.5V-0.7V).

18. Remove 5V from V_{BUS} on Charger Port.

19. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

20. Disconnect D+ from D- on charger port.

End of Test

CAR-RPA-ITC-05176
DELTRAN EX1002
IPR2024-01219

12.8 DCP or CDP attached to Charger Port, B-device attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with DCP or CDP attached to the Charger Port and B-device attached to accessory port
Description	The PET simulates a DCP or CDP being attached to the Charger Port of the UUT, and a B-device to the Accessory Port of the UUT. Check whether VBUS comes from the OTG Port or the Accessory Port. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the Charger Port, and on the OTG Port. Check the resistance between VBUS on the Charger Port, and on the Accessory Port. Check correct functioning of the Indicator. Check UUT outputs VDP_SRC on Charger Port D+.
Parameters	RID_A, VACA_OPR, VACA_DIS, RACA_CHG_ACC, RACA_CHG_OTG, VDP_SRC
Checklist	MACA3, MACA7, MACA26, MACA27, MACA30
Pass Criteria	Step 6. VBUS is coming from the Accessory port. Step 7. VBUS is coming from the OTG port. Step 8. Resistance to ground of ID pin on OTG port is RID_A. Steo 10. VBUS is coming from the Accessory port. Step 11. VBUS is coming from the OTG port. Step 15. Voltage is less than 500mV Step 17. Voltage is less than 300mV Step 20. Indicator is on. Step 21. Voltage is 0.5V-0.7V.

12.8.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port VBUS.
2. Connect Accessory Port ID pin to ground.
3. Apply 5V to VBUS on charger port.
4. Connect together D+ and D- on charger port via 200R.
5. Connect 625Ω load on Accessory Port VBUS
6. Check that VBUS is coming from the Accessory port. i.e. Check that Accessory port VBUS is greater than 4.75V.

CAR-RPA-ITC-05177
DELTRAN EX1002
IPR2024-01219

7. Check that V_{BUS} is coming from the OTG port. i.e. Check that OTG port V_{BUS} is greater than 4.75V.

Check R_{ID_A}

8. Check that resistance to ground of ID pin on OTG port is R_{ID_A} (122-126 kΩ). [MACA7]

Check V_{ACA_OPR}

9. Change V_{BUS} generator voltage to V_{ACA_OPR} min (4.1V).

10. Check that V_{BUS} is coming from the Accessory port. i.e. Check that Accessory port V_{BUS} is greater than 3.85V.

11. Check that V_{BUS} is coming from the OTG port. i.e. Check that OTG port V_{BUS} is greater than 3.85V. [MACA27]

Check $R_{ACA\_CHG\_ACC}$

12. Disconnect 625Ω load from Accessory Port V_{BUS}

13. Set OTG Port V_{BUS} current load to 1500mA.

14. Connect 10Ω load to Accessory Port V_{BUS} line.

15. Check that voltage on Charger V_{BUS} minus Accessory Port V_{BUS} is less than 500mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_CHG\_ACC}$ (400mΩ). [MACA27]

Note: The 500mV comprises 400mV across the Charger Switch (2A x 200mΩ), plus 100mV across the Accessory Switch (0.5A x 200mΩ).

Check $R_{ACA\_CHG\_OTG}$

16. Disconnect 10Ω load from Accessory Port V_{BUS} line.

17. Check that voltage on Charger V_{BUS} minus OTG Port V_{BUS} is less than 300mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_CHG\_OTG}$ (200mΩ). [MACA26]

18. Set OTG Port V_{BUS} current load to 0mA.

Check Indicator

19. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

20. Wait for response, if 'Yes', test passes. If 'No' it fails. [MACA3]

Check V_{DP_SRC}

21. Check that voltage on D+ of charger port is V_{DP_SRC} (0.5V-0.7V). [MACA30]

22. Remove 5V from V_{BUS} on charger port.

23. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

CAR-RPA-ITC-05178
DELTRAN EX1002
IPR2024-01219

24. Disconnect Accessory Port ID pin from ground.

25. Disconnect D+ from D- on charger port.

End of Test

CAR-RPA-ITC-05179
DELTRAN EX1002
IPR2024-01219

12.9 Nothing attached to Charger Port, Nothing attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Nothing attached to the Charger Port and an A-device attached to accessory port
Description	The PET simulates nothing being attached to the Charger Port of the UUT, and nothing to the Accessory Port of the UUT. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	RID_FLOAT
Checklist	MACA3, MACA11
Pass Criteria	Step 3. Voltage is less than 20mV. (Not mandatory) Step 6. Resistance to ground of ID pin on OTG port is RID_FLOAT. Step 8. Indicator is off.

12.9.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

For now skip to step 4 (See note at start of Section 12)

Check RACA_OTG_ACC

1. Apply 0.75V to VBUS on OTG Port.

Note: Accessory port has 100kΩ to ground on VBUS.

2. Check that voltage on OTG VBUS minus Accessory Port VBUS is less than 20mV. This confirms ability to transmit ADP probes.

NOTE: Transmission of ADP probes is a desirable feature but it is not the intention of the BC Specification that this be mandatory.

3. Disconnect VBUS from OTG port.

Check RID_FLOAT

4. Check that resistance to ground of ID pin on OTG port is RID_FLOAT (> 220 kΩ). [MACA11]

Check Indicator

5. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

6. Wait for response, if 'No', test passes. If 'Yes' it fails. [MACA3]

CAR-RPA-ITC-05180
DELTRAN EX1002
IPR2024-01219

End of Test

CAR-RPA-ITC-05181
DELTRAN EX1002
IPR2024-01219

12.10 Nothing attached to Charger Port, A-device attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Nothing attached to the Charger Port and A-device attached to accessory port
Description	The PET simulates nothing being attached to the Charger Port of the UUT, and an A-device to the Accessory Port of the UUT. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	RID_FLOAT, RACA_OTG_ACC
Checklist	MACA3, MACA14, MACA15
Pass Criteria	Step 2. Resistance to ground of ID pin on OTG port is RID_FLOAT. Step 5. Voltage is less than 100mV. Step 8. Indicator is not on.

12.10.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

Check RID_ FLOAT

1. Connect 10kΩ pull-down resistor to OTG port VBUS.
2. Check that resistance to ground of ID pin on OTG port is RID_ FLOAT (> 220kΩ). [MACA14]
3. Connect 5V VBUS to Accessory port.
4. Check that resistance to ground of ID pin on OTG port is RID_ FLOAT (> 220kΩ). [MACA15]

For now skip to step 8 (See note at start of Section 12)

Check RACA_OTG_ACC

5. Set OTG Port current load to 500mA.
6. Check that voltage on Accessory VBUS minus OTG Port VBUS is less than 100mV, allowing for the voltage drop in the test cables. This confirms RACA_OTG_ACC (200mΩ)
7. Set OTG Port current load to 0mA.

Check Indicator

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

CAR-RPA-ITC-05182
DELTRAN EX1002
IPR2024-01219

9. Wait for response, if 'No', test passes. If 'Yes' it fails. [MACA3]

10. Disconnect VBUS from Accessory port.

11. Disconnect 10kΩ pull-down resistor from OTG port VBUS.

End of Test

CAR-RPA-ITC-05183
DELTRAN EX1002
IPR2024-01219

12.11 Nothing attached to Charger Port, B-device attached to Accessory Port

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Nothing attached to the Charger Port and a B-device attached to accessory port
Description	The PET simulates nothing being attached to the Charger Port of the UUT, and a B-device to the Accessory Port of the UUT. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	RID_GND, RACA_OTG_ACC
Checklist	MACA3, MACA5
Pass Criteria	Step 2. Resistance to ground of ID pin on OTG port is RID_ GND. Step 5. Voltage is less than 100mV Step 8. Indicator is off.

12.11.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

Check RID_GND

1. Apply ground to ID pin on accessory port.
2. Check that resistance to ground of ID pin on OTG port is RID_GND (< 1kΩ). [MACA5]

For now skip to step 7 (See note at start of Section 12)

Check RACA_OTG_ACC

3. Connect 5V VBUS to OTG port.
4. Connect Accessory Port 10Ω load.
5. Check that voltage on OTG VBUS minus Accessory Port VBUS is less than 100mV, allowing for the voltage drop in the test cables. This confirms RACA_OTG_ACC (200mΩ)
6. Disconnect Accessory Port 10Ω load.

Check Indicator

7. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
8. Wait for response, if 'No', test passes. If 'Yes' it fails. [MACA3]
9. Disconnect VBUS from OTG port.
10. Disconnect ground from ID pin on accessory port.

CAR-RPA-ITC-05184
DELTRAN EX1002
IPR2024-01219

End of Test

CAR-RPA-ITC-05185
DELTRAN EX1002
IPR2024-01219

12.12 Bypass Capacitance

Test Setup	UUT is a Micro-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check presence and values of bypass capacitors C_{MACA_VBUS}. **Note:** If the ACA is capable of passing ADP probes from the OTG port to the accessory port when not powered, the capacitance at the OTG port will be seen as a combined capacitance. Therefore the range of capacitance at the OTG port is valid if it lies between 1 µF and 4 µF (2 x C_{MACA_VBUS} max).
Description	The PET simulates necessary conditions for measuring the bypass capacitors on the OTG port and the Accessory port.
Parameters	C_{MACA_VBUS}
Checklist	MACA1, MACA2
Pass Criteria	Step 6. Capacitance is 1-2 µF Step 10. Capacitance is 1-4 µF

12.12.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

For now skip this test (See note at start of Section 12)

Check Accessory Port Bypass Capacitance:

1. Apply 5V to V_{BUS} on charger port.
2. Connect together D+ and D- on charger port via 200Ω.
3. Check that Accessory port V_{BUS} is less than 0.25V
4. Connect 625R resistor from Accessory port V_{BUS} to ground.
5. Connect 5V to V_{BUS} on Accessory port.
6. Disconnect it and measure fall time as it discharges through the 625R pull-down resistor.
7. Evaluate capacitance from fall time and check it lies within C_{MACA_VBUS} (1 – 2 µF). [MACA2]
8. Disconnect 5V from V_{BUS} on charger port.
9. Disconnect 625R resistor from Accessory port V_{BUS} to ground.
10. Disconnect D+ from D- on charger port.

Check OTG Port Bypass Capacitance:

CAR-RPA-ITC-05186
DELTRAN EX1002
IPR2024-01219

11. Use ADP circuit components in PET to evaluate OTG port capacitance.

12. Check that this capacitance lies within C_{MACA_VBUS} min and 2 x C_{MACA_VBUS} max (1 – 4 µF). [MACA1]

End of Test

CAR-RPA-ITC-05187
DELTRAN EX1002
IPR2024-01219

13 Micro-ACA Compliance, Combined Charger

Note: There are some discrepancies in the BC 1.2 Specification with regard to the Micro-ACA. Essentially, these relate to the requirement in Table 6-2 of that document that the Accessory switch be closed, in rows 1-3 (i.e. have a resistance of less than 200mΩ) at a time when there is no power available to the Micro-ACA. The presence and/or required value of C_{MACA_VBUS} capacitor(s) is also related to this. As some further work will be required to resolve this issue, it was decided to release this Compliance Plan with the appropriate parts of the Micro-ACA tests left out, with the intention of adding them as soon as a resolution is found.

This situation has no effect on the Standard-ACA tests.

13.1 Submission Materials

13.1.1 Device Specific Information

Table 13-1 Device Specific Information for Micro-ACAs with Combined Charger

Item	Function	Value/ Support
1	Schematics or other proof that UUT output current cannot exceed 5.0 amperes	
2	The USB-IF TID for the UUT micro-AB receptacle used for the accessory port	
3	The USB-IF TID for the UUT micro-A plug used for the OTG port captive cable	
4	Schematics or other proof that a single UUT failure will not cause the output voltage on V_{BUS} to exceed V_{CHG_FAIL}?	

13.1.2 Checklists

See previous section for Checklist

CAR-RPA-ITC-05188
DELTRAN EX1002
IPR2024-01219

13.2 PET Cable Calibration

Test Setup	Test Setup 7b. UUT is a Micro-ACA, with combined charger, PET simulates devices on the two ports.
Pre-conditions	This is the first procedure in the Micro-ACA, Combined Charger Test Suite.
Purpose	To calibrate the Test Cables, and to prepare the Micro-ACA for the following tests.
Description	The test operator is instructed to connect the test cables in turn, and these are calibrated. The test operator is then instructed to connect up the Micro-ACA in preparation for the tests.

13.2.1 Test procedure

1. Instruct test operator to plug Special Cable C into PET D-type connector, and the Micro-B plug of the Special Cable C into the PET Micro-AB receptacle, and then click on 'OK'.

2. PET passes a current of 500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

3. Instruct test operator to unplug the Micro-B plug of the Special Cable C from the PET Micro-AB receptacle, and then click on 'OK'.

4. Instruct test operator to plug the Micro-B plug of Special Cable C into the Accessory Port of the Micro-ACA under test, and then click on 'OK'.

5. Instruct test operator to plug the Micro-B plug of the captive OTG cable of the Micro-ACA under test into the PET Micro-AB receptacle, and then click on 'OK'.

Check that cables are connected:

6. Connect 10kΩ pull-down resistor to OTG port VBUS.

7. Instruct test operator to power up the Micro-ACA under test, and then click on 'OK'.

8. Apply ground to ID pin on accessory port.

9. Check that we can sense 5V on VBUS on OTG port.

10. Check that we can sense 5V on VBUS on accessory port.

11. Disconnect 10kΩ pull-down resistor from OTG port VBUS.

12. Remove ground from ID pin on accessory port.

13. If test fails report 'Either cables not correctly connected or UUT is not functioning'.

14. Instruct test operator to perform steps required to bring the Micro-ACA from a powered state to an un-powered one.

15. Wait for operator to click 'OK'.

CAR-RPA-ITC-05189
DELTRAN EX1002
IPR2024-01219

End of Test

CAR-RPA-ITC-05190
DELTRAN EX1002
IPR2024-01219

13.3 Micro-ACA Voltage, Current and Transient Test

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	PET Cable Calibration test has been run.
Purpose	To verify the Micro-ACA meets voltage, current, voltage overshoot and undershoot specifications, for any specified step change in load.
Description	This test measures the VBUS voltage at extremes of load current. It also changes the VBUS current abruptly, and measures the resulting voltage overshoot and undershoot levels.
Parameters	VCHG_OVERSHT, VCHG_UNDSHT, VCHG
Checklist	MACC1, MACC4, MACC5, MACC6, MACC7
Pass Criteria	Step 8 – Latch not triggered Step 10 – Voltage in range Step 14 – Latches not triggered Step 17 – Voltage in range Step 18 – Latches not triggered Step 26 – Latch not triggered Step 28 – Voltage in range Step 32 – Latches not triggered Step 35 – Voltage in range Step 36 – Latches not triggered

13.3.1 Test procedure

Initial State: No load applied.

OTG Port

1. Ensure that Micro-ACA is in an un-powered state.
2. Wait for Micro-ACA OTG port VBUS to fall below VBUS_LKG max (0.7V), in case it has just been switched off. (Speed up fall using 100mA current load.)
3. Connect accessory port ID pin to ground.
4. Set up voltage watch-block ready to capture overshoot of VCHG_OVRSHT (6.0V) on OTG port VBUS.
5. Instruct test operator to perform steps required to bring the Micro-ACA from an un-powered state to a powered one.
6. Wait for operator to click 'OK'.
7. Wait for Micro-ACA OTG port VBUS to rise above VCHG min (4.75V).
8. Check watch-block overshoot detector latch was not triggered. [MACC1]

CAR-RPA-ITC-05191
DELTRAN EX1002
IPR2024-01219

9. Set up voltage watch-block ready to capture undershoot of V_{CHG_UNDSHT} (4.1V), or overshoot of V_{CHG_OVRSHT} (6.0V) on Micro-ACA OTG port V_{BUS}.

10. With no current load applied, check that Micro-ACA OTG port V_{BUS} is within appropriate range V_{CHG} (4.75V to 5.25V). [MACC6]

Load Testing OTG port

11. Apply load of I_{CDP} min (1.5A) to Micro-ACA OTG port V_{BUS}.

12. Wait 10ms.

13. Check that Micro-ACA OTG port V_{BUS}, at Micro-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V).

14. Check watch-block overshoot and undershoot detector latches were not triggered. [MACC1] [MACC4]

15. Remove Current Load.

16. Wait 10ms

17. Check that V_{BUS} voltage from Micro-ACA accessory port V_{BUS}, at Micro-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V). [MACC6]

18. Check watch-block overshoot and undershoot detector latches were not triggered. [MACC1] [MACC4]

19. Instruct test operator to perform steps required to bring the Micro-ACA from a powered state to an un-powered one.

20. Wait for operator to click 'OK'.

Accessory Port

21. Wait for Micro-ACA accessory port V_{BUS} to fall below V_{BUS_LKG} max (0.7V). (Speed up fall using 10R resistive load.)

22. Set up voltage watch-block ready to capture overshoot of V_{CHG_OVRSHT} (6.0V) on accessory port V_{BUS}.

23. Instruct test operator to perform steps required to bring the Micro-ACA from an un-powered state to a powered one.

24. Wait for operator to click 'OK'.

25. Wait for Micro-ACA OTG port V_{BUS} to rise above V_{CHG} min (4.75V).

26. Check watch-block overshoot detector latch was not triggered. [MACC1]

27. Set up voltage watch-block ready to capture undershoot of V_{CHG_UNDSHT} (4.1V), or overshoot of V_{CHG_OVRSHT} (6.0V) on Micro-ACA accessory port V_{BUS}, allowing for voltage drop in cable.

CAR-RPA-ITC-05192
DELTRAN EX1002
IPR2024-01219

28. With no current load applied, check that Micro-ACA accessory port V_{BUS} is within appropriate range V_{CHG} (4.75V to 5.25V). [MACC7]

Load Testing Accessory port

29. Apply load of I_{CFG_MAX} (500mA) to Micro-ACA accessory port V_{BUS}.

30. Wait 10ms.

31. Check that Micro-ACA accessory port V_{BUS}, at Micro-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V), making due allowance for voltage drop in cable.

32. Check watch-block overshoot and undershoot detector latches were not triggered. [MACC1] [MACC5]

33. Remove Current Load.

34. Wait 10ms

35. Check that V_{BUS} voltage from Micro-ACA accessory port V_{BUS}, at Micro-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range $V_{CHG} - R_{ACA\_OTG\_ACC} \times I_{CFG\_MAX}$ (4.65V to 5.25V). [MACC7]

36. Check watch-block overshoot and undershoot detector latches were not triggered. [MACC1] [MACC5]

37. Instruct test operator to perform steps required to bring the Micro-ACA from a powered state to an un-powered one.

38. Wait for operator to click 'OK'.

End of Test

CAR-RPA-ITC-05193
DELTRAN EX1002
IPR2024-01219

13.4 Micro-ACA Not Powered, Nothing attached to Accessory Port

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA not powered and nothing attached to accessory port
Description	The PET simulates nothing being attached to the Accessory Port of the UUT. Checks the resistance to ground of ID pin on OTG Port. Checks the resistance between VBUS on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	RID_FLOAT
Checklist	MACA3, MACA11
Pass Criteria	Step 3. Voltage is less than 20mV. (Not mandatory) Step 6. Resistance to ground of ID pin on OTG port is RID_FLOAT. Step 8. Indicator is off.

13.4.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to any port. ACA is not powered. Accessory port ID pin is floating.

1. Ensure that Micro-ACA is in an un-powered state.

For now skip to step 5 (See note at start of Section 13)

Check RACA_OTG_ACC

2. Apply 0.75V to VBUS on OTG Port.

Note: Accessory port has 100kΩ to ground on VBUS.

3. Check that voltage on OTG VBUS minus Accessory Port VBUS is less than 20mV. This confirms ability to transmit ADP probes.

NOTE: Transmission of ADP probes is a desirable feature but it is not the intention of the BC Specification that this be mandatory.

4. Disconnect VBUS from OTG port.

Check RID_FLOAT

5. Check that resistance to ground of ID pin on OTG port is RID_FLOAT (> 220 kΩ). [MACA11]

Check Indicator

6. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

7. Wait for response, if 'No', test passes. If 'Yes' it fails. [MACA3]

CAR-RPA-ITC-05194
DELTRAN EX1002
IPR2024-01219

End of Test

CAR-RPA-ITC-05195
DELTRAN EX1002
IPR2024-01219

13.5 Micro-ACA Not Powered, A-device attached to Accessory Port

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA not powered and A-device attached to accessory port
Description	The PET simulates an A-device being attached to the Accessory Port of the UUT. Checks the resistance to ground of ID pin on OTG Port. Checks the resistance between VBUS on the OTG Port, and on the Accessory Port. Checks correct functioning of the Indicator.
Parameters	RID_FLOAT, RACA_OTG_ACC
Checklist	MACA3, MACA13, MACA14
Pass Criteria	Step 3. Resistance to ground of ID pin on OTG port is RID_FLOAT. Step 7. Voltage is less than 100mV. Step 10. Indicator is not on.

13.5.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to any port. ACA is not powered. Accessory port ID pin is floating.

1. Ensure that Micro-ACA is in an un-powered state.

Check RID_FLOAT

2. Connect 10kΩ pull-down resistor to OTG port VBUS.
3. Check that resistance to ground of ID pin on OTG port is RID_FLOAT (> 220kΩ). [MACA13]
4. Connect 5V VBUS to Accessory port.
5. Check that resistance to ground of ID pin on OTG port is RID_FLOAT (> 220kΩ). [MACA14]

For now skip to step 9 (See note at start of Section 13)

Check RACA_OTG_ACC

6. Set OTG Port current load to 500mA.
7. Check that voltage on Accessory VBUS minus OTG Port VBUS is less than 100mV, allowing for the voltage drop in the test cables. This confirms RACA_OTG_ACC (200mΩ)
8. Set OTG Port current load to 0mA.

Check Indicator

9. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

CAR-RPA-ITC-05196
DELTRAN EX1002
IPR2024-01219

10. Wait for response, if 'No', test passes. If 'Yes' it fails. [MACA3]

11. Disconnect VBUS from Accessory port.

12. Disconnect 10kΩ pull-down resistor from OTG port VBUS.

End of Test

CAR-RPA-ITC-05197
DELTRAN EX1002
IPR2024-01219

13.6 Micro-ACA Not Powered, B-device attached to Accessory Port

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA not powered and a B-device attached to accessory port
Description	The PET simulates a B-device being attached to the Accessory Port of the UUT. Checks the resistance to ground of ID pin on OTG Port. Checks the resistance between VBUS on the OTG Port, and on the Accessory Port. Checks correct functioning of the Indicator.
Parameters	RID_GND, RACA_OTG_ACC
Checklist	MACA3, MACA5, MACA28
Pass Criteria	Step 2. Resistance to ground of ID pin on OTG port is RID_ GND. Step 5. Voltage is less than 100mV Step 8. Indicator is off.

13.6.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to any port. ACA is not powered. Accessory port ID pin is floating.

1. Ensure that Micro-ACA is in an un-powered state.

Check RID_GND

2. Apply ground to ID pin on accessory port.
3. Check that resistance to ground of ID pin on OTG port is RID_GND (< 1kΩ). [MACA5]

For now skip to step 8 (See note at start of Section 13)

Check RACA_OTG_ACC

4. Connect 5V VBUS to OTG port.
5. Connect Accessory Port 10Ω load.
6. Check that voltage on OTG VBUS minus Accessory Port VBUS is less than 100mV, allowing for the voltage drop in the test cables. This confirms RACA_OTG_ACC (200mΩ). [MACA28]
7. Disconnect Accessory Port 10Ω load.

Check Indicator

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
9. Wait for response, if 'No', test passes. If 'Yes' it fails. [MACA3]

CAR-RPA-ITC-05198
DELTRAN EX1002
IPR2024-01219

10. Disconnect VBUS from OTG port.

11. Disconnect ground from ID pin on accessory port.

End of Test

CAR-RPA-ITC-05199
DELTRAN EX1002
IPR2024-01219

13.7 Micro-ACA Powered Up, Nothing attached to Accessory Port

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA powered and Nothing attached to accessory port
Description	The PET simulates nothing being attached to the Accessory Port of the UUT. Checks whether VBUS comes from the OTG Port or the Accessory Port. Checks the resistance to ground of ID pin on OTG Port. Checks correct functioning of the Indicator.
Parameters	RID_B, RACA_CHG_OTG
Checklist	MACA3, MACA8
Pass Criteria	Step. VBUS is not coming from the Accessory port. Step. VBUS is coming from the OTG port. Step. Less than 2.5mA is being drawn by the charger port. Step. Voltage is less than 300mV Step. Resistance to ground of ID pin on OTG port is RID_B. Step. Indicator is on. Step. Voltage is 0.5V-0.7V.

13.7.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to any port. ACA is not powered. Accessory port ID pin is floating.

1. Instruct test operator to perform steps required to bring the Micro-ACA from an un-powered state to a powered one.
2. Wait for operator to click 'OK'.
3. Ensure that Micro-ACA is in a powered state.

Check Switching Functionality:

4. Connect 10kΩ pull-down resistor to OTG port VBUS.
5. Check that VBUS is not coming from the accessory port. i.e. Check that accessory port VBUS is less than VOTG_VBUS_LKG (0.7V)
6. Check that VBUS is coming from the OTG port. i.e. Check that OTG port VBUS is greater than 4.75V.

Check RID_B

7. Check that resistance to ground of ID pin on OTG port is RID_B (67-69 kΩ). [MACA8]

Check Indicator

CAR-RPA-ITC-05200
DELTRAN EX1002
IPR2024-01219

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

9. Wait for response, if 'Yes', test passes. If 'No' it fails. [MACA3]

10. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

End of Test

CAR-RPA-ITC-05201
DELTRAN EX1002
IPR2024-01219

13.8 Micro-ACA Powered Up, A-device attached to Accessory Port

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA powered and A-device attached to accessory port
Description	The PET simulates an A-device being attached to the Accessory Port of the UUT. Checks whether VBUS comes from the OTG port. Checks the resistance to ground of ID pin on OTG Port. Checks correct functioning of the Indicator.
Parameters	RID_C, ISUSP
Checklist	MACA3, MACA9, MACA10
Pass Criteria	Step. VBUS is coming from the OTG port. Step. Resistance to ground of ID pin on OTG port is RID_B. Step. Resistance to ground of ID pin on OTG port is RID_C. Step. Indicator is on. Step. Current is < 2.5mA Step. Voltage is 0.5V-0.7V.

13.8.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to any port. ACA is powered. Accessory port ID pin is floating.

1. Ensure that Micro-ACA is in a powered state.

Check Switching Functionality:

2. Connect 10kΩ pull-down resistor to OTG port VBUS.
3. Apply 0V to VBUS on Accessory Port.
4. Check that VBUS is coming from the OTG port. i.e. Check that OTG port VBUS is greater than 4.75V.

Check RID_B and RID_C

5. Check that resistance to ground of ID pin on OTG port is RID_B (67-69 kΩ). [MACA9]
6. Apply 5V to VBUS on Accessory Port.
7. Check that resistance to ground of ID pin on OTG port is RID_C (36-37 kΩ). [MACA10]

Check Indicator

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
9. Wait for response, if 'Yes', test passes. If 'No' it fails. [MACA3]

CAR-RPA-ITC-05202
DELTRAN EX1002
IPR2024-01219

Check Current From Accessory Port

10. Set OTG Port V_{BUS} current load to 10 mA.

11. Measure current from V_{BUS} generator.

12. Disconnect V_{BUS} from Accessory Port.

13. Measure current from V_{BUS} generator and subtract from previous measurement.

14. Check that difference is less than I_{SUSP} (2.5mA).

15. Set OTG Port V_{BUS} current load to zero.

16. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

End of Test

CAR-RPA-ITC-05203
DELTRAN EX1002
IPR2024-01219

13.9 Micro-ACA Powered Up, B-device attached to Accessory Port

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA powered and B-device attached to accessory port
Description	The PET simulates a B-device being attached to the Accessory Port of the UUT. Checks whether VBUS comes from the OTG Port or the Accessory Port. Checks the resistance to ground of ID pin on OTG Port. Checks correct functioning of the Indicator.
Parameters	RID_A, VACA_OPR, VACA_DIS, RACA_CHG_ACC, RACA_CHG_OTG
Checklist	MACA3, MACA7
Pass Criteria	Step 5. VBUS is coming from the Accessory port. Step 6. VBUS is coming from the OTG port. Step 7. Resistance to ground of ID pin on OTG port is RID_A. Step 9. Indicator is on.

13.9.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to any port. ACA is powered. Accessory port ID pin is floating.

1. Ensure that Micro-ACA is in a powered state.

Check Switching Functionality:

2. Connect 10kΩ pull-down resistor to OTG port VBUS.
3. Connect Accessory Port ID pin to ground.
4. Connect 625Ω load on Accessory Port VBUS
5. Check that VBUS is coming from the Accessory port. i.e. Check that Accessory port VBUS is greater than 4.75V.
6. Check that VBUS is coming from the OTG port. i.e. Check that OTG port VBUS is greater than 4.75V.

Check RID_A

7. Check that resistance to ground of ID pin on OTG port is RID_A (122-126 kΩ). [MACA7]

Check Indicator

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
9. Wait for response, if 'Yes', test passes. If 'No' it fails. [MACA3]
10. Disconnect 10kΩ pull-down resistor from OTG port VBUS.

CAR-RPA-ITC-05204
DELTRAN EX1002
IPR2024-01219

11. Disconnect Accessory Port ID pin from ground.

End of Test

CAR-RPA-ITC-05205
DELTRAN EX1002
IPR2024-01219

13.10 Bypass Capacitance

Test Setup	Test Setup 7b. UUT is a Micro-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Checks presence and values of bypass capacitors C_{MACA_VBUS}. **Note:** If the ACA is capable of passing ADP probes from the OTG port to the accessory port when not powered, the capacitance at the OTG port will be seen as a combined capacitance. Therefore the range of capacitance at the OTG port is valid if it lies between 1 µF and 4 µF (2 x C_{MACA_VBUS} max).
Description	The PET simulates necessary conditions for measuring the bypass capacitors on the OTG port and the Accessory port.
Parameters	C_{MACA_VBUS}
Checklist	MACA1, MACA2
Pass Criteria	Step 6. Capacitance is 1-2 µF Step 10. Capacitance is 1-4 µF

13.10.1 Test procedure

For now skip this test (See note at start of Section 13)

Initial State: The PET is connected to both ports of ACA. No V_{BUS} voltage applied to any port. ACA is powered. Accessory port ID pin is floating.

1. Ensure that Micro-ACA is in a powered state.

Check Accessory Port Bypass Capacitance:

2. Check that Accessory port VBUS is less than 0.25V
3. Connect 625R resistor from Accessory port VBUS to ground.
4. Connect 5V to V_{BUS} on Accessory port.
5. Disconnect it and measure fall time as it discharges through the 625R pull-down resistor.
6. Evaluate capacitance from fall time and check it lies within C_{MACA_VBUS} (1 – 2 µF). [MACA2]
7. Disconnect 625R resistor from Accessory port V_{BUS} to ground.

Check OTG Port Bypass Capacitance:

8. Instruct test operator to perform steps required to bring the Micro-ACA from a powered state to an un-powered one.
9. Wait for operator to click 'OK'.

CAR-RPA-ITC-05206
DELTRAN EX1002
IPR2024-01219

10. Use ADP circuit components in PET to evaluate OTG port capacitance.

11. Check that this capacitance lies within C_{MACA_VBUS} min and 2 x C_{MACA_VBUS} max (1 – 4 µF). [MACA1]

End of Test

CAR-RPA-ITC-05207
DELTRAN EX1002
IPR2024-01219

14 Standard-ACA Compliance, Separate Charger

14.1 Submission Materials

14.1.1 Device Specific Information

Table 14-1 Device Specific Information for Standard-ACAs with Separate Charger

Item	Function	Value/ Support
1	The USB-IF TID for the UUT standard-A receptacle used for the accessory port	
2	The USB-IF TID for the UUT micro-A plug used for the OTG port captive cable	
3	The USB-IF TID for the UUT standard-A plug or micro-B receptacle used for the charger port	

14.1.2 Checklists

Table 14-2 Checklist for Standard-ACAs

Question		Response	Test Number	BC 1.2 Section Number
Questions relating to all Standard-ACAs				
SACA1	Does the UUT have a capacitance from V_{BUS} to ground of C_{MACA_VBUS} on its OTG or accessory port?	Yes ☐ No ☐	12.12	6.2.6
SACA2	Does the ACA have an indicator showing when the charger port is able to supply power to the other ports?	Yes ☐ No ☐	12.3 - 012.11	6.1
SACA3	Is the Charger Port on the UUT clearly labeled 'Charger Only'? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	Inspection	6.1
SACA4	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_GND} when nothing is connected to its charger port, and a B-device is connected to its accessory port? If the UUT has a combined charger, does the UUT pull the ID pin to ground through R_{ID_GND} when the unit is not connected to a power source and a B-device is connected to its accessory port?	Yes ☐ No ☐	012.11	4.5.3

CAR-RPA-ITC-05208
DELTRAN EX1002
IPR2024-01219

SACA5	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_GND} when an SDP is connected to its charger port, and a B-device is connected to its accessory port? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.5	4.5.3
SACA6	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_A} when a DCP or a CDP is connected to its charger port, and a B-device is connected to its accessory port? If the UUT has a combined charger, does the UUT pull the ID pin to ground through R_{ID_A} when the unit is connected to a power source, and a B-device is connected to its accessory port?	Yes ☐ No ☐	12.8	4.5.3
SACA7	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_A} when a DCP or a CDP is connected to its charger port, and nothing is connected to its accessory port? If the UUT has a combined charger, does the UUT pull the ID pin to ground through R_{ID_A} when the unit is connected to a power source, and nothing is connected to its accessory port?	Yes ☐ No ☐	12.6	4.5.3
SACA8	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_GND} when nothing is connected to its charger port, and nothing is connected to its accessory port? If the UUT has a combined charger, does the UUT pull the ID pin to ground through R_{ID_GND} when the unit is not connected to a power source, and nothing is connected to its accessory port?	Yes ☐ No ☐	12.9	4.5.3

CAR-RPA-ITC-05209
DELTRAN EX1002
IPR2024-01219

SACA9	If the UUT uses a separate charger, does the UUT pull the ID pin to ground through R_{ID_GND} when an SDP is connected to its charger port, and nothing is connected to its accessory port? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.3	4.5.3
SACA10	Does the UUT directly connect the data pins of the OTG port directly to the data pins of the accessory port?	Yes ☐ No ☐	Vendor Declaration	4.5.3
SACA11	Does the UUT directly connect V_{BUS} of the OTG port directly to V_{BUS} of the accessory port?	Yes ☐ No ☐	Vendor Declaration	6.3.3
SACA12	Does the UUT have a captive cable terminated with a Micro-A plug on its OTG port?	Yes ☐ No ☐	Inspection	4.5.4
SACA13	Does the Micro-A plug have a valid TID?	Yes ☐ No ☐	Vendor Declaration	
SACA14	Does the UUT have a Standard-A receptacle on its accessory port?	Yes ☐ No ☐	Inspection	6.1
SACA15	Does the Standard-A receptacle have a valid TID?		Vendor Declaration	
SACA16	Does the UUT Charger Port have a Micro-B receptacle, a captive cable terminated with a Standard-A plug, or a captive cable terminated with a Charger (or combined Charger)?	Micro-B ☐ Standard-A ☐ Charger ☐ No ☐	Inspection	6.2.1
SACA17	If the Charger Port has a Micro-B receptacle or a Standard-A plug, does this have a valid TID? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	Vendor Declaration	
SACA18	Does the UUT charger port draw less than I_{SUSP} when anything other than a charging port is attached to it? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.3, 12.4, 12.5	6.2.6

CAR-RPA-ITC-05210
DELTRAN EX1002
IPR2024-01219

SACA19	Does the UUT charger port draw less than I_{SUSP} when a charging port is attached to it, and nothing is attached to the OTG port or accessory port? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.6	6.2.6
SACA20	Is the resistance between VBUS_CHG and either VBUS_OTG pins or VBUS_ACC of the UUT, $R_{ACA\_CHG\_OTG}$ when the charger switch is closed, and the voltage on V_{BUS_CHG} is V_{ACA_OPR} ? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.6	6.2.6
SACA21	Is the resistance between the internal ground of the UUT and the ground pin of the Micro-AB receptacle attached to the OTG port of the UUT, $R_{OTG\_ACA\_GND}$?	Yes ☐ No ☐	Vendor Declaration	6.2.6
SACA22	Does the UUT output V_{DP_SRC} on DP_CHG when it detects VBUS_CHG? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.8	6.2.6
SACA23	Does the UUT close its charger switch when it detects DN_CHG greater than V_{DAT_REF} and VBUS_CHG remains above $V_{OTG\_SESS\_VLD}$? This does not apply to a UUT with a combined charger.	Yes ☐ No ☐ N/A ☐	12.8	6.2.6
Questions specific to Standard-ACAs with Combined Charger				
SACC1	Is the output voltage of the UUT less than V_{CHG_OVRSHT} max for any step change in load current, and also when powering on or off? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4.1.1
SACC2	Is the output current of the UUT prevented from exceeding I_{CDP} max under any condition? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐	Vendor Declaration	4.1.2

CAR-RPA-ITC-05211
DELTRAN EX1002
IPR2024-01219

SACC3	Has it has been shown, using schematics or by some other explanation, that in the case of a single failure in the UUT, the output voltage on V_{BUS} will not exceed V_{CHG_FAIL}? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐	Vendor Declaration	4.1.5
SACC4	Is the output voltage of the UUT OTG port greater than V_{CHG_UNDSHT} min for any step change in load current where current is less than I_{CDP} min? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4.5.2
SACC5	Is the output voltage of the UUT Accessory port greater than V_{CHG_UNDSHT} min for any step change in load current where current is less than I_{CFG_MAX}? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4.5.2
SACC6	Does the UUT output a voltage of VCHG (averaged over T_{VBUS_AVG}) for all currents less than I_{CDP} min on its OTG port? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4
SACC7	Does the UUT output a voltage of VCHG (averaged over T_{VBUS_AVG}) allowing for a drop across $R_{ACA\_OTG\_ACC}$ for all currents less than 500mA on its ACC port? This does not apply to a UUT with a separate charger.	Yes ☐ No ☐ N/A ☐		4
SACC8	If the UUT goes into shutdown during a current overload condition, does it recover and output a voltage of V_{CHG} within a time of T_{SHTDWN_REC} when the current overload condition has been removed.	Yes ☐ No ☐	Vendor Declaration	4.2.2

CAR-RPA-ITC-05212
DELTRAN EX1002
IPR2024-01219

14.2 PET Cable Calibration

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	This is the first procedure in the Standard-ACA Test Suite.
Purpose	To calibrate the Test Cables, and to prepare the Standard-ACA for the following tests.
Description	The test operator is instructed to connect the test cables in turn, and these are calibrated. The test operator is then instructed to connect up the Standard-ACA in preparation for the tests.

14.2.1 Test procedure

1. Instruct test operator to plug Special Cable D into PET D-type connector, and the Standard-A plug of the Special Cable D into the Standard-A receptacle of the Special Cable D, and then click on 'OK'.

2. PET passes a current of 500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

3. Instruct test operator to unplug Standard-A plug of the Special Cable D from the Standard-A receptacle of the Special Cable D, and then click on 'OK'.

4. If 'Captive Cable' checkbox is checked, skip to step 9.

5. Instruct test operator to plug Special Cable B into the Standard-A receptacle of Special Cable D, and the Micro-B plug of the Special Cable B into the PET Micro-AB receptacle, and then click on 'OK'.

6. PET passes a current of 500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

7. PET passes a current of 1500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

8. Instruct test operator to unplug the Micro-B plug of the Special Cable B from the PET Micro-AB receptacle, and then click on 'OK'.

9. Instruct test operator to plug the Standard-A plug of Special Cable D into the Accessory Port of the Standard-ACA under test, and then click on 'OK'.

10. Instruct test operator to plug the Micro-B plug of the captive OTG cable of the Standard-ACA under test into the PET Micro-AB receptacle, and then click on 'OK'.

11. **With Captive Charger Cable**
    Instruct test operator to plug the Standard-A plug of the captive Charger cable of the Standard-ACA under test into the Standard-A receptacle of Special Cable D, and then click on 'OK'.

    With No Captive Charger Cable
    Instruct test operator to plug the Micro-B plug of Special Cable B into the Charger port of the Standard-ACA under test, and then click on 'OK'.

Check that cables are connected:

CAR-RPA-ITC-05213
DELTRAN EX1002
IPR2024-01219

12. Connect 10kΩ pull-down resistor to OTG port VBUS.
13. Apply 5V to VBUS on charger port.
14. Connect together D+ and D- on charger port via 200R.
15. Check that we can sense 5V on VBUS on OTG port.
16. Check that we can sense 5V on VBUS on accessory port.
17. Remove 5V from VBUS on charger port.
18. Disconnect D+ from D- on charger port.
19. Disconnect 10kΩ pull-down resistor from OTG port VBUS.
20. If test fails report 'Either cables not correctly connected or accessory port ID pin not functioning'.

End of Test

CAR-RPA-ITC-05214
DELTRAN EX1002
IPR2024-01219

14.3 SDP attached to Charger Port, Nothing attached to Accessory Port

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with SDP attached to the Charger Port and Nothing attached to accessory port
Description	The PET simulates an SDP being attached to the Charger Port of the UUT, and nothing to the Accessory Port of the UUT. Check whether V_{BUS} comes from the OTG port or the Accessory Port. Check the resistance to ground of ID pin on OTG port. Check the current drawn by the Charger Port. Check correct functioning of the Indicator.
Parameters	R_{ID_GND}, I_{SUSP}
Checklist	SACA2, SACA9, SACA18
Pass Criteria	Step 3. V_{BUS} is not coming from the Accessory port. Step 4. V_{BUS} is not coming from the OTG port. Step 5. Resistance to ground of ID pin on OTG port is R_{ID_GND}. Step 7. Indicator is off. Step 8. UUT is drawing less than I_{SUSP} from the charger port

14.3.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port V_{BUS}.
2. Apply 5V to V_{BUS} on charger port.
3. Check that V_{BUS} is not coming from the Accessory port. i.e. Check that Accessory port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)
4. Check that V_{BUS} is not coming from the OTG port. i.e. Check that OTG port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)

Check R_{ID_GND}

5. Check that resistance to ground of ID pin on OTG port is R_{ID_GND} (< 1 kΩ). [SACA9]

Check Indicator

6. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
7. Wait for response, if 'Yes', test fails. If 'No' it passes. [SACA2]

Check Current Drawn by UUT Charger Port

CAR-RPA-ITC-05215
DELTRAN EX1002
IPR2024-01219

8. Check that the UUT is drawing less than I_{SUSP} (2.5mA) from the charger port. [SACA18]

9. Remove 5V from V_{BUS} on charger port.

10. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

End of Test

CAR-RPA-ITC-05216
DELTRAN EX1002
IPR2024-01219

14.4 SDP attached to Charger Port, B-device attached to Accessory Port

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with SDP attached to the Charger Port and B-device attached to accessory port
Description	The PET simulates an SDP being attached to the Charger Port of the UUT, and a B-device to the Accessory Port of the UUT. Check whether V_{BUS} comes from the OTG port or the Accessory Port. Check the resistance to ground of ID pin on OTG port. Check the current drawn by the Charger Port. Check correct functioning of the Indicator.
Parameters	R_{ID_GND}, I_{SUSP}
Checklist	SACA2, SACA5
Pass Criteria	Step 4. V_{BUS} is not coming from the Accessory port. Step 5. V_{BUS} is not coming from the OTG port. Step 6. Resistance to ground of ID pin on OTG port is R_{ID_GND}. Step 8. Indicator is off. Step 11. Voltage is less than 100mV Step 16. UUT is drawing less than I_{SUSP} from the charger port

14.4.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port V_{BUS}.
2. Apply 5V to V_{BUS} on charger port.
3. Check that V_{BUS} is not coming from the Accessory port. i.e. Check that Accessory port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V).
4. Check that V_{BUS} is not coming from the OTG port. i.e. Check that OTG port V_{BUS} is less than $V_{OTG\_VBUS\_LKG}$ (0.7V)

Check R_{ID_GND}

5. Check that resistance to ground of ID pin on OTG port is R_{ID_GND} (< 1kΩ). [SACA5]

Check Indicator

6. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
7. Wait for response, if 'Yes', test fails. If 'No' it passes. [SACA2]

Check $R_{ACA\_OTG\_ACC}$

CAR-RPA-ITC-05217
DELTRAN EX1002
IPR2024-01219

8. Apply 5V V_{BUS} to OTG port

9. Connect 10Ω load to Accessory port V_{BUS} line

10. Check that voltage on OTG V_{BUS} minus Accessory port V_{BUS} is less than 100mV, allowing for the voltage drop in the test cables. This confirms that a VBUS path exists from OTG port to Accessory port.

11. Remove 10Ω load from accessory port V_{BUS} line.

Check Current Drawn by UUT Charger Port

12. Connect 625Ω load to Accessory Port V_{BUS} line.

13. Measure current drawn from V_{BUS} generator.

14. Disconnect V_{BUS} from Charger Port.

15. Check that current drops by less than I_{SUSP} (2.5mA)

16. Remove 5V from V_{BUS} on OTG port.

17. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

18. Disconnect 625Ω load from Accessory Port V_{BUS} line.

End of Test

CAR-RPA-ITC-05218
DELTRAN EX1002
IPR2024-01219

14.5 DCP or CDP attached to Charger Port, Nothing attached to Accessory Port

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Charger attached to the Charger Port and Nothing attached to accessory port
Description	The PET simulates a Charger being attached to the Charger Port of the UUT, and nothing to the Accessory Port of the UUT. Check whether VBUS comes from the OTG Port or the Accessory Port. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the Charger Port, and on the OTG Port. Check correct functioning of the Indicator. Check UUT outputs VDP_SRC on Charger Port D+.
Parameters	RID_A, RACA_CHG_OTG, VDP_SRC
Checklist	SACA2, SACA7, SACA19, SACA20, SACA22, SACA23
Pass Criteria	Step 4. VBUS is coming from the Accessory port. Step 5. VBUS is coming from the OTG port. Step 6. Less than 2.5mA is being drawn by the charger port. Step 8. Voltage is less than 300mV Step 10. Resistance to ground of ID pin on OTG port is RID_A. Step 12. Indicator is on. Step 13. Voltage is 0.5V-0.7V.

14.5.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port VBUS.
2. Apply 5V to VBUS on charger port.
3. Connect together D+ and D- on charger port via 200R.
4. Check that VBUS is coming from the Accessory port. i.e. Check that Accessory port VBUS is greater than 4.75V.
5. Check that VBUS is coming from the OTG port. i.e. Check that OTG port VBUS is greater than 4.75V. [SACA23]
6. Check that less than ISUSP max (2.5mA) is being drawn by charger port. [SACA19]

Check RACA_CHG_OTG

7. Set OTG Port VBUS current load to 1500mA.

CAR-RPA-ITC-05219
DELTRAN EX1002
IPR2024-01219

8. Check that voltage on Charger V_{BUS} minus OTG Port V_{BUS} is less than 300mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_CHG\_OTG}$ (200mΩ). [SACA20]

9. Set OTG Port V_{BUS} current load to 0mA.

Check R_{ID_A}

10. Check that resistance to ground of ID pin on OTG port is R_{ID_A} (122-126 kΩ). [SACA7]

Check Indicator

11. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

12. Wait for response, if 'Yes', test passes. If 'No' it fails. [SACA2]

Check V_{DP_SRC}

13. Check that voltage on D+ of charger port is V_{DP_SRC} (0.5V-0.7V). [SACA22]

14. Remove 5V from V_{BUS} on charger port.

15. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

16. Disconnect D+ from D- on charger port.

End of Test

CAR-RPA-ITC-05220
DELTRAN EX1002
IPR2024-01219

14.6 DCP or CDP attached to Charger Port, B-device attached to Accessory Port

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Charger attached to the Charger Port and B-device attached to accessory port
Description	The PET simulates a Charger being attached to the Charger Port of the UUT, and a B-device to the Accessory Port of the UUT. Check whether VBUS comes from the OTG Port or the Accessory Port. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the Charger Port, and on the OTG Port. Check the resistance between VBUS on the Charger Port, and on the Accessory Port. Check correct functioning of the Indicator. Check UUT outputs VDP_SRC on Charger Port D+.
Parameters	RID_A, VACA_OPR, VACA_DIS, RACA_CHG_ACC, RACA_CHG_OTG, VDP_SRC
Checklist	SACA2, SACA6
Pass Criteria	Step 5. VBUS is coming from the Accessory port. Step 6. VBUS is coming from the OTG port. Step 7. Resistance to ground of ID pin on OTG port is RID_A. Steo 9. VBUS is coming from the Accessory port. Step 10. VBUS is coming from the OTG port. Step 13. Voltage is less than 100mV Step 16. Indicator is on. Step 17. Voltage is > 0.5V-0.7V.

14.6.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No VBUS voltage applied to any port. Switch between D+ and D- to charger port is open.

Check Switching Functionality:

1. Connect 10kΩ pull-down resistor to OTG port VBUS.
2. Apply 5V to VBUS on charger port.
3. Connect together D+ and D- on charger port via 200R.
4. Connect 625Ω load on Accessory Port VBUS
5. Check that VBUS is coming from the Accessory port. i.e. Check that Accessory port VBUS is greater than 4.75V.
6. Check that VBUS is coming from the OTG port. i.e. Check that OTG port VBUS is greater than 4.75V.

CAR-RPA-ITC-05221
DELTRAN EX1002
IPR2024-01219

Check R_{ID_A}

7. Check that resistance to ground of ID pin on OTG port is R_{ID_A} (122-126 kΩ). [SACA6]

Check V_{ACA_OPR}

8. Change V_{BUS} generator voltage to V_{ACA_OPR} min (4.1V).

9. Check that V_{BUS} is coming from the Accessory port. i.e. Check that Accessory port V_{BUS} is greater than 3.85V.

10. Check that V_{BUS} is coming from the OTG port. i.e. Check that OTG port V_{BUS} is greater than 3.85V.

Check $R_{ACA\_CHG\_ACC}$

11. Disconnect 625Ω load from Accessory Port V_{BUS}

12. Connect 10Ω load to Accessory Port V_{BUS} line.

13. Check that voltage on Charger V_{BUS} minus Accessory Port V_{BUS} is less than 100mV, allowing for the voltage drop in the test cables. This confirms $R_{ACA\_CHG\_ACC}$ (200mΩ).

14. Disconnect 10Ω load from Accessory Port V_{BUS} line.

Check Indicator

15. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated. [SACA2]

16. Wait for response, if 'Yes', test passes. If 'No' it fails.

Check V_{DP_SRC}

17. Check that voltage on D+ of charger port is V_{DP_SRC} (0.5V-0.7V).

18. Remove 5V from V_{BUS} on charger port.

19. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

20. Disconnect D+ from D- on charger port.

End of Test

CAR-RPA-ITC-05222
DELTRAN EX1002
IPR2024-01219

14.7 Nothing attached to Charger Port, Nothing attached to Accessory Port

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Nothing attached to the Charger Port and an nothing attached to accessory port
Description	The PET simulates nothing being attached to the Charger Port of the UUT, and nothing to the Accessory Port of the UUT. Check the resistance to ground of ID pin on OTG Port. Check the resistance between VBUS on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	R_{ID_GND}
Checklist	SACA2, SACA8
Pass Criteria	Step 2. Voltage is less than 20mV. Step 4. Resistance to ground of ID pin on OTG port is R_{ID_GND}. Step 6. Indicator is off.

14.7.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check $R_{ACA\_OTG\_ACC}$

1. Apply 0.75V to V_{BUS} on OTG Port.

Note: Accessory port has 100kΩ to ground on V_{BUS}.

2. Check that voltage on OTG V_{BUS} minus Accessory Port V_{BUS} is less than 20mV. This confirms ability to transmit ADP probes.

3. Disconnect VBUS from OTG port.

Check R_{ID_GND}

4. Check that resistance to ground of ID pin on OTG port is R_{ID_GND} (< 1kΩ). [SACA8]

Check Indicator

5. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

6. Wait for response, if 'No', test passes. If 'Yes' it fails. [SACA2]

End of Test

CAR-RPA-ITC-05223
DELTRAN EX1002
IPR2024-01219

14.8 Nothing attached to Charger Port, B-device attached to Accessory Port

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check ACA behavior with Nothing attached to the Charger Port and a B-device attached to accessory port
Description	The PET simulates nothing being attached to the Charger Port of the UUT, and a B-device to the Accessory Port of the UUT. Check the resistance to ground of ID pin on OTG Port. Check the resistance between V_{BUS} on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	R_{ID_GND}
Checklist	SACA2, SACA4
Pass Criteria	Step 1. Resistance to ground of ID pin on OTG port is R_{ID_GND}. Step 4. Voltage is less than 100mV Step 7. Indicator is off.

14.8.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check R_{ID_GND}

1. Check that resistance to ground of ID pin on OTG port is R_{ID_GND} (< 1kΩ). [SACA4]

Check $R_{ACA\_OTG\_ACC}$

2. Connect 5V V_{BUS} to OTG port.
3. Connect Accessory Port 10Ω load.
4. Check that voltage on OTG V_{BUS} minus Accessory Port V_{BUS} is less than 100mV, allowing for the voltage drop in the test cables. This confirms that a V_{BUS} path exists from OTG port to Accessory port.
5. Disconnect Accessory Port 10Ω load.

Check Indicator

6. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
7. Wait for response, if 'No', test passes. If 'Yes' it fails. [SACA2]
8. Disconnect V_{BUS} from OTG port.

End of Test

CAR-RPA-ITC-05224
DELTRAN EX1002
IPR2024-01219

14.9 Bypass Capacitance

Test Setup	UUT is a Standard-ACA, PET simulates devices on the three ports
Pre-conditions	
Purpose	Check presence and values of bypass capacitor C_{SACA_VBUS}.
Description	The PET simulates necessary conditions for measuring the bypass capacitor on the OTG / Accessory port.
Parameters	C_{SACA_VBUS}
Checklist	SACA1
Pass Criteria	Step 4. Capacitance is 10-100nF

14.9.1 Test procedure

Initial State: The PET is connected to all three ports of ACA. No V_{BUS} voltage applied to any port. Switch between D+ and D- to charger port is open.

Check OTG Port Bypass Capacitance:

1. Use ADP circuit components in PET to evaluate capacitance on OTG port V_{BUS}.
2. Check that this capacitance lies within C_{SACA_VBUS} min and C_{SACA_VBUS} max (10 – 100 nF). [SACA1]

End of Test

CAR-RPA-ITC-05225
DELTRAN EX1002
IPR2024-01219

15 Standard-ACA Compliance, Combined Charger

15.1 Submission Materials

15.1.1 Device Specific Information

Table 15-1 Device Specific Information for Standard-ACAs with Combined Charger

Item	Function	Value/ Support
1	Schematics or other proof that UUT output current cannot exceed 5.0 amperes	
2	The USB-IF TID for the UUT standard-A receptacle used for the accessory port	
3	The USB-IF TID for the UUT micro-A plug used for the OTG port captive cable	
4	Schematics or other proof that a single UUT failure will not cause the output voltage on V_{BUS} to exceed V_{CHG_FAIL}?	

15.1.2 Checklists

See previous section for submission Materials.

CAR-RPA-ITC-05226
DELTRAN EX1002
IPR2024-01219

15.2 PET Cable Calibration

Test Setup	Test Setup 8b. UUT is a Standard-ACA, with combined charger, PET simulates devices on the two ports.
Pre-conditions	This is the first procedure in the Standard-ACA, Combined Charger Test Suite.
Purpose	To calibrate the Test Cables, and to prepare the Standard-ACA for the following tests.
Description	The test operator is instructed to connect the test cables in turn, and these are calibrated. The test operator is then instructed to connect up the Standard-ACA in preparation for the tests.

15.2.1 Test procedure

1. Instruct test operator to plug Special Cable D into PET D-type connector, and the Standard-A plug of the Special Cable D into the Standard-A receptacle of the Special Cable D, and then click on 'OK'.

2. PET passes a current of 500mA through the VBUS conductor of the cable, and measures and records the voltage drop.

3. Instruct test operator to unplug Standard-A plug of the Special Cable D from the Standard-A receptacle of the Special Cable D, and then click on 'OK'.

4. Instruct test operator to plug the Standard-A plug of Special Cable D into the Accessory Port of the Standard-ACA under test, and then click on 'OK'.

5. Instruct test operator to plug the Micro-B plug of the captive OTG cable of the Standard-ACA under test into the PET Micro-AB receptacle, and then click on 'OK'.

Check that cables are connected:

6. Connect 10kΩ pull-down resistor to OTG port VBUS.

7. Instruct test operator to power up the Standard-ACA under test, and then click on 'OK'.

8. Check that we can sense 5V on VBUS on OTG port.

9. Check that we can sense 5V on VBUS on accessory port.

10. Disconnect 10kΩ pull-down resistor from OTG port VBUS.

11. If test fails report 'Either cables not correctly connected or UUT is not functioning'.

12. Instruct test operator to perform steps required to bring the Standard-ACA from a powered state to an un-powered one.

13. Wait for operator to click 'OK'.

End of Test

CAR-RPA-ITC-05227
DELTRAN EX1002
IPR2024-01219

15.3 Standard-ACA Voltage, Current and Transient Test

Test Setup	Test Setup 8b. UUT is a Standard-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	PET Cable Calibration test has been run.
Purpose	To verify the Standard-ACA meets voltage, current, voltage overshoot and undershoot specifications, for any specified step change in load.
Description	This test measures the VBUS voltage at extremes of load current. It also changes the VBUS current abruptly, and measures the resulting voltage overshoot and undershoot levels.
Parameters	VCHG_OVERSHT, VCHG_UNDSHT, VCHG
Checklist	SACC1, SACC4, SACC5, SACC6, SACC7
Pass Criteria	Step 7 – Latch not triggered Step 9 – Voltage in range Step 13 – Latches not triggered Step 16 – Voltage in range Step 17 – Latches not triggered Step 25 – Latch not triggered Step 27 – Voltage in range Step 31 – Latches not triggered Step 35 – Latches not triggered

15.3.1 Test procedure

Initial State: No load applied.

OTG Port

1. Ensure that Standard-ACA is in an un-powered state.
2. Wait for Standard-ACA OTG port VBUS to fall below VBUS_LKG max (0.7V), in case it has just been switched off. (Speed up fall using 100mA current load.)
3. Set up voltage watch-block ready to capture overshoot of VCHG_OVRSHT (6.0V) on OTG port VBUS.
4. Instruct test operator to perform steps required to bring the Standard-ACA from an un-powered state to a powered one.
5. Wait for operator to click 'OK'.
6. Wait for Standard-ACA OTG port VBUS to rise above VCHG min (4.75V).
7. Check watch-block overshoot detector latch was not triggered. [SACC1]
8. Set up voltage watch-block ready to capture undershoot of VCHG_UNDSHT (4.1V), or overshoot of VCHG_OVRSHT (6.0V) on Standard-ACA OTG port VBUS.

CAR-RPA-ITC-05228
DELTRAN EX1002
IPR2024-01219

9. With no current load applied, check that Standard-ACA OTG port V_{BUS} is within appropriate range V_{CHG} (4.75V to 5.25V). [SACC6]

Load Testing OTG port

10. Apply load of I_{CDP} min (1.5A) to Standard-ACA OTG port V_{BUS}.

11. Wait 10ms.

12. Check that Standard-ACA OTG port V_{BUS}, at Standard-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V).

13. Check watch-block overshoot and undershoot detector latches were not triggered. [SACC1] [SACC4]

14. Remove Current Load.

15. Wait 10ms

16. Check that V_{BUS} voltage from Standard-ACA OTG port V_{BUS}, at Standard-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V). [SACC6]

17. Check watch-block overshoot and undershoot detector latches were not triggered. [SACC1] [SACC4]

18. Instruct test operator to perform steps required to bring the Standard-ACA from a powered state to an un-powered one.

19. Wait for operator to click 'OK'.

Accessory Port

20. Wait for Standard-ACA accessory port V_{BUS} to fall below V_{BUS_LKG} max (0.7V). (Speed up fall using 10R resistive load.)

21. Set up voltage watch-block ready to capture overshoot of V_{CHG_OVRSHT} (6.0V) on accessory port V_{BUS}.

22. Instruct test operator to perform steps required to bring the Standard-ACA from an un-powered state to a powered one.

23. Wait for operator to click 'OK'.

24. Wait for Standard-ACA accessory port V_{BUS} to rise above V_{CHG} min (4.75V).

25. Check watch-block overshoot detector latch was not triggered. [SACC1]

26. Set up voltage watch-block ready to capture undershoot of V_{CHG_UNDSHT} (4.1V), or overshoot of V_{CHG_OVRSHT} (6.0V) on Standard-ACA accessory port V_{BUS}, allowing for voltage drop in cable.

27. With no current load applied, check that Standard-ACA accessory port V_{BUS} is within appropriate range V_{CHG} (4.75V to 5.25V). [SACC7]

CAR-RPA-ITC-05229
DELTRAN EX1002
IPR2024-01219

Load Testing Accessory port

28. Apply load of I_{CFG_MAX} (500mA) to Standard-ACA accessory port V_{BUS}.

29. Wait 10ms.

30. Check that Standard-ACA accessory port V_{BUS}, at Standard-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V), making due allowance for voltage drop in cable.

31. Check watch-block overshoot and undershoot detector latches were not triggered. [SACC1] [SACC5]

32. Remove Current Load.

33. Wait 10ms

34. Check that V_{BUS} voltage from Standard-ACA accessory port V_{BUS}, at Standard-ACA connector, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range $V_{CHG} - R_{ACA\_OTG\_ACC} \times I_{CFG\_MAX}$ (4.65V to 5.25V). [SACC7]

35. Check watch-block overshoot and undershoot detector latches were not triggered. [SACC1] [SACC5]

36. Instruct test operator to perform steps required to bring the Standard-ACA from a powered state to an un-powered one.

37. Wait for operator to click 'OK'.

End of Test

CAR-RPA-ITC-05230
DELTRAN EX1002
IPR2024-01219

15.4 Standard-ACA Not Powered, Nothing or B-device attached to Accessory Port

Test Setup	Test Setup 8b. UUT is a Standard-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA not powered and nothing or a B-device attached to accessory port
Description	The PET simulates nothing being attached to the Accessory Port of the UUT. Checks the resistance to ground of ID pin on OTG Port. Checks the resistance between VBUS on the OTG Port, and on the Accessory Port. Check correct functioning of the Indicator.
Parameters	RID_FLOAT
Checklist	SACA2, SACA4, SACA8
Pass Criteria	Step 4. Voltage is less than 125mV. Step 7. Resistance to ground of ID pin on OTG port is RID_GND. Step 9. Indicator is off.

15.4.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to either port. ACA is not powered. Accessory port ID pin is floating.

1. Ensure that Standard-ACA is in an un-powered state.

Check VBUS Continuity

2. Apply 5V to VBUS on OTG Port.
3. Connect 10R load on accessory port VBUS.
4. Check that voltage on OTG VBUS minus Accessory Port VBUS is less than 125mV. (This value matches the drop allowed by OTG 2.0 in a detachable cable).
5. Disconnect 10R load from accessory port VBUS.
6. Disconnect VBUS from OTG port.

Check RID_GND

7. Check that resistance to ground of ID pin on OTG port is RID_GND (< 1 kΩ). [SACA4] [SACA8]

Check Indicator

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
9. Wait for response, if 'No', test passes. If 'Yes' it fails. [SACA2]

CAR-RPA-ITC-05231
DELTRAN EX1002
IPR2024-01219

End of Test

15.5 Standard-ACA Powered Up, Nothing or B-device attached to Accessory Port

Test Setup	Test Setup 8b. UUT is a Standard-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check ACA behavior with ACA powered and Nothing or a B-device attached to accessory port
Description	The PET simulates nothing being attached to the Accessory Port of the UUT. Checks whether VBUS comes from the OTG Port or the Accessory Port. Checks the resistance to ground of ID pin on OTG Port. Checks correct functioning of the Indicator.
Parameters	RID_A
Checklist	SACA2, SACA6, SACA7
Pass Criteria	Step 5. VBUS is coming from the Accessory port. Step 6. VBUS is coming from the OTG port. Step 7. Resistance to ground of ID pin on OTG port is RID_A. Step 9. Indicator is on.

15.5.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No VBUS voltage applied to either port. ACA is not powered. Accessory port ID pin is floating.

1. Instruct test operator to perform steps required to bring the Standard-ACA from an un-powered state to a powered one.
2. Wait for operator to click 'OK'.
3. Ensure that Standard-ACA is in a powered state.

Check Switching Functionality:

4. Connect 10kΩ pull-down resistor to OTG port VBUS.
5. Check that VBUS is coming from the accessory port. i.e. Check that accessory port VBUS is greater than 4.75V.
6. Check that VBUS is coming from the OTG port. i.e. Check that OTG port VBUS is greater than 4.75V.

Check RID_A

CAR-RPA-ITC-05232
DELTRAN EX1002
IPR2024-01219

7. Check that resistance to ground of ID pin on OTG port is R_{ID_A} (122-126 kΩ). [SACA6] [SACA7]

Check Indicator

8. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

9. Wait for response, if 'Yes', test passes. If 'No' it fails. [SACA2]

10. Disconnect 10kΩ pull-down resistor from OTG port V_{BUS}.

End of Test

CAR-RPA-ITC-05233
DELTRAN EX1002
IPR2024-01219

15.6 Bypass Capacitance

Test Setup	Test Setup 8b. UUT is a Standard-ACA with combined charger, PET simulates devices on the two ports.
Pre-conditions	
Purpose	Check presence and values of bypass capacitor C_{SACA_VBUS}.
Description	The PET simulates necessary conditions for measuring the bypass capacitor on the OTG / Accessory port.
Parameters	C_{SACA_VBUS}
Checklist	SACA1
Pass Criteria	Step 4. Capacitance is 10-100nF

15.6.1 Test procedure

Initial State: The PET is connected to both ports of ACA. No V_{BUS} voltage applied to either port.

Check OTG Port Bypass Capacitance:

1. Ensure that Standard-ACA is in an un-powered state.
2. Use ADP circuit components in PET to evaluate capacitance on OTG port V_{BUS}.
3. Check that this capacitance lies within C_{SACA_VBUS} min and C_{SACA_VBUS} max (10 – 100 nF). [SACA1]

CAR-RPA-ITC-05234
DELTRAN EX1002
IPR2024-01219

16 ACA-Dock Compliance

Note: USB2.0 tests are to be run separately, using appropriate equipment.

16.1 Submission Materials

16.1.1 Device Specific Information

Table 16-1 Device Specific Information for ACA-Docks

Item	Function	Value/ Support
1	Schematics or other proof that UUT output current cannot exceed 5.0 amperes	
2	The USB-IF TID for the UUT micro-A plug used for connecting the PD	
3	Schematics or other proof that a single UUT failure will not cause the output voltage on V_{BUS} to exceed V_{CHG_FAIL}?	
4	If it is not possible to plug the ACA-Dock into the PET Micr0-AB receptacle, a means of achieving this	

16.1.2 Checklists

Table 16-2 Checklist for ACA-Docks

ID and Question		Response	Test Number	BC 1.2 Section Number
ACAD1	Is the output voltage of the UUT less than V_{CHG_OVRSHT} max for any step change in load current, and also when powering on of off?	Yes ☐ No ☐	16.2	4.1.1
ACAD2	Is the output current of the UUT prevented from exceeding I_{CDP} max under any condition?	Yes ☐ No ☐	Vendor Declaration	4.1.2
ACAD3	Has it has been shown, using schematics or by some other explanation, that in the case of a single failure in the UUT, the output voltage on V_{BUS} will not exceed V_{CHG_FAIL}?	Yes ☐ No ☐	Vendor Declaration	4.1.5
ACAD4	As per provided UUT description: if the UUT provides multiple USB Charging Ports, the active UUT USB Charging Port does not affect operation of any other Charging Port.	Yes ☐ No ☐	Vendor Declaration	4.1.6
ACAD5	Does the UUT output a voltage of V_{CHG} (averaged over T_{VBUS_AVG}) for all currents less than I_{CDP} min?	Yes ☐ No ☐	16.3	4.3.1

CAR-RPA-ITC-05235
DELTRAN EX1002
IPR2024-01219

ACAD6	Is the output voltage of the UUT greater than V_{CHG_UNDSHT} min for any step change in load current where current is less than I_{CDP} min?	Yes ☐ No ☐	16.2	4.3.2
ACAD7	Does the UUT enable V_{DM_SRC} within $T_{CP\_VDM\_EN}$ if D+/- are at idle, and disable V_{DM_SRC} within $T_{CP\_VDM\_DIS}$ of any USB activity on D+/-?	Yes ☐ No ☐	16.3	4.3.3
ACAD8	Does the UUT pull the ID pin to ground through a resistance of R_{ID_A}, whenever the connected PD is allowed to act as host and to draw current, and through R_{ID_FLOAT} at all other times?	Yes ☐ No ☐	16.3	4.3.3
ACAD9	Does the UUT have a captive cable with a Micro-A plug?	Yes ☐ No ☐	Inspection	4.3.4
ACAD10	Does the Micro-A plug have a valid TID?	Yes ☐ No ☐	Vendor Declaration	
ACAD11	Does the UUT have a captive (non-removable) USB hub?	Yes ☐ No ☐	Vendor Declaration	
ACAD12	If the hub has exposed downstream-facing ports, are they exposed via Standard-A receptacle(s) with valid TID(s)?	Yes ☐ No ☐ N/A ☐	Vendor Declaration	
ACAD13	Does the hub silicon have a valid TID?	Yes ☐ No ☐	Vendor Declaration	
ACAD14	Does the UUT have an indicator showing when it is able to supply power to the OTG port?	Yes ☐ No ☐	16.3, 16.4	
ACAD15	If the UUT goes into shutdown during a current overload condition, does it recover and output a voltage of V_{CHG} within a time of T_{SHTDWN_REC} when the current overload condition has been removed.	Yes ☐ No ☐	Vendor Declaration	4.2.2

CAR-RPA-ITC-05236
DELTRAN EX1002
IPR2024-01219

16.2 ACA-Dock Overshoot and Undershoot Voltage Test

Test Setup	Test Setup 9. UUT is an ACA-Dock, PET simulates a PD.
Pre-conditions	This must be performed as the first test in the ACA-Dock suite.
Purpose	To verify the ACA-Dock meets overshoot and undershoot voltage specifications, for any specified step change in load.
Description	This test changes the VBUS current abruptly, and measures the resulting voltage overshoot and undershoot levels.
Parameters	VCHG_OVERSHT, VCHG_UNDSHT
Checklist	ACAD1, ACAD6
Pass Criteria	Step 4 – Maximum voltage during overshoot is less than 6.0V. Step 6 – VBUS is in range 4.75V to 5.25V Step 9 – VBUS is in range 4.75V to 5.25V Step 10 – Minimum voltage during undershoot is above 4.1V. Step 10 – Maximum voltage during overshoot is less than 6.0V. Step 13 – VBUS is in range 4.75V to 5.25V Step 14 – Minimum voltage during undershoot is above 4.1V. Step 14 – Maximum voltage during overshoot is less than 6.0V.

16.2.1 Test procedure

Initial State: No VBUS voltage applied. ACA-Dock is not powered.

1. Instruct test operator to plug captive cable of the ACA-Dock into the Micro-AB receptacle of the PET, and then click on 'OK'.

Note: If this is not physically possible, then make use of the alternative arrangement provided by the vendor.

2. Ask test operator to ensure that power is disconnected from the ACA-Dock, and then click on 'OK'. Check that VBUS is off.

3. Set up voltage watch-block ready to capture overshoot of VCHG_OVRSHT (6.0V) on VBUS.

4. Instruct test operator to perform steps required to bring the ACA-Dock from an un-powered state to a powered one.

5. Wait for operator to click 'OK'.

6. Wait for ACA-Dock OTG port VBUS to rise above VCHG min (4.75V).

7. Check watch-block overshoot detector latch was not triggered. [ACAD1]

8. Set up voltage watch-block ready to capture undershoot of VCHG_UNDSHT (4.1V), or overshoot of VCHG_OVRSHT (6.0V) on VBUS, allowing for voltage drop in cable.

CAR-RPA-ITC-05237
DELTRAN EX1002
IPR2024-01219

9. With an applied current load of 0mA, check that V_{BUS} is within appropriate range V_{CHG} (4.75V to 5.25V).

10. Apply load of I_{CDP} min (1.5A) to V_{BUS}.

11. Wait 10ms.

12. Check that V_{BUS} voltage from ACA-Dock, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V).

13. Check watch-block overshoot and undershoot detector latches were not triggered. [ACAD1] [ACAD6]

14. Remove Current Load.

15. Wait 10ms

16. Check that V_{BUS} voltage from ACA-Dock, samples taken every 1 ms and averaged over T_{VBUS_AVG} max (250ms), is within appropriate range V_{CHG} (4.75V to 5.25V). [ACAD1] [ACAD6]

17. Check watch-block overshoot and undershoot detector latches were not triggered.

End of Test

CAR-RPA-ITC-05238
DELTRAN EX1002
IPR2024-01219

16.3 ACA-Dock Voltage, Current, and RID_A Test

Test Setup	Test Setup 9. UUT is an ACA-Dock, PET simulates a PD.
Pre-conditions	ACA-Dock Overshoot and Undershoot Voltage Test has been run, and ACA-Dock is now switched on.
Purpose	To verify that the VBUS voltage / current load characteristic meets the specified requirements.
Description	This test measures the voltage at various current loads, in order to confirm correct behavior.
Parameters	VCHG, RID_A, VDM_SRC
Checklist	ACAD5, ACAD7, ACAD8, ACAD14
Pass Criteria	Step1 - VBUS voltage is in correct range. Step 4 - VBUS voltage is in correct range. Step 7 - Voltage on ID pin is in correct range. Step 9 – Response was 'Yes'. Step 10 - VDM_SRC is in correct range.

16.3.1 Test procedure

Initial State: The captive cable of the ACA-Dock is connected to the Micro-AB receptacle of the PET. No VBUS voltage applied. ACA-Dock is powered.

Check Voltage under load

1. Confirm that power has been connected to ACA-Dock, asking test operator to connect it, if not.
2. Check that VBUS voltage, samples taken every 1 ms and averaged over TVBUS_AVG max (250ms), from ACA-Dock is within VCHG (4.75 – 5.25V). [ACAD5]
3. Apply load of ICDP min (1.5A) to VBUS.
4. Wait 1 sec to avoid possible overshoot period (overshoot and undershoot are measured separately).
5. Check that VBUS voltage from ACA-Dock, samples taken every 1 ms and averaged over TVBUS_AVG max (250ms), is within VCHG (4.75 – 5.25V). [ACAD5]
6. Disconnect the current load.

Check ID pin

7. Connect voltage source (3.3V) via 82k resistor to ID pin.
8. Check voltage on ID pin is in the range 1.970V – 2.002V. [ACAD8]

Note: This shows that the RID_A value from the ACA-Dock lies in the range 122k – 126k.

Check Indicator

CAR-RPA-ITC-05239
DELTRAN EX1002
IPR2024-01219

9. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.

10. Wait for response, if 'Yes', test passes. If 'No' it fails. [ACAD14]

Check V_{DM_SRC}

11. Check that voltage on D- is in range V_{DM_SRC} (0.5 to 0.7V). [ACAD7]

End of Test

CAR-RPA-ITC-05240
DELTRAN EX1002
IPR2024-01219

16.4 ACA-Dock not Powered

Test Setup	Test Setup 9. UUT is an ACA-Dock, PET simulates a PD.
Pre-conditions	ACA-Dock Overshoot and Undershoot Voltage Test has been run, and ACA-Dock is now switched on.
Purpose	To verify that the ID pin and the indicator meets the specified requirements under no power conditions.
Description	This test measures the ID pin, and checks the indicator, after the power has been removed.
Parameters	R_{ID_FLOAT}
Checklist	ACAD8, ACAD14
Pass Criteria	Step 3 - Voltage on ID pin is 2.40V or above. Step 5 – Response was 'No'.

16.4.1 Test procedure

Initial State: ACA-Dock Micro-A plug is connected to Micro-AB receptacle on PET. No V_{BUS} voltage applied. ACA-Dock is powered.

Check ID pin

1. Ask test operator to disconnect power from ACA-Dock, and then to confirm that this has been done.
2. Connect voltage source (3.3V) via 82k resistor to ID pin.
3. Check voltage on ID pin is 2.40V or above. [ACAD8]

Note: This shows that the R_{ID_FLOAT} value from the ACA-Dock lies above 220k.

Check Indicator

4. Ask test operator to confirm 'Yes' or 'No' whether indicator lamp on UUT is illuminated.
5. Wait for response, if 'No', test passes. If 'Yes' it fails. [ACAD14]

End of Test

CAR-RPA-ITC-05241
DELTRAN EX1002
IPR2024-01219

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First Named Inventor	NOOK
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Examiner Name	DIAO
Attorney Docket Number	054985-000055-US-02-01

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

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	15	6997198	AU	A	1998-07-30	CLORE AUTOMOTIVE LLC		☐

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DELTRAN EX1002
IPR2024-01219

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16819831
	Filing Date	2020-03-16
	First Named Inventor	NOOK
	Art Unit	2859
	Examiner Name	DIAO
	Attorney Docket Number	054985-000055-US-02-01

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 08/14/19, The NOCO Company, Inc. v. Shenzhen Lianfa Tong Technology Co., Ltd. and Shenzhen Meditek Tong Technology Co., Ltd., 1 page.	
	2	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 08/14/19, The NOCO Company, Inc. v. Sictec Instruments Company Limited, 1 page.	
	3	Copy of Decision Granting Institution of Inter Partes Review, Patent Number 9007015, Application 14/325938 on 11/12/20, IPR2020-00944, 70 pages.	
	4	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 05/28/20, The NOCO Company, Inc. v. Shenzhen Yike Electronics, 1 page.	
	5	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 05/28/20, The NOCO Company, Inc. v. Guangzhou Unique Electronics Co., Ltd. and Sui Cheng Limited, 1 page.	
	6	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 05/28/20, The NOCO Company, Inc. v. Zhejiang Quingyou Electronic Commerce Co., Ltd., 1 page.	
	7	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 05/28/20, The NOCO Company, Inc. v. Shenzhen GOOLOO E-Commerce Co., Ltd., 1 page.	
	8	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 05/28/20, The NOCO Company, Inc. v. Nice Team Enterprise Limited, 1 page.	
	9	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 05/28/20, The NOCO Company, Inc. v. Aukey Technology Co., Ltd., 1 page.	
	10	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 03/16/20, The NOCO Company, Inc. v. Nekteck, Inc., 1 page.	

DELTRAN EX1002
IPR2024-01219

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	11	Copy of Report on the Filing or Determination of an Action Regarding a Patent or Trademark, filed 03/13/20, The NOCO Company, Inc. v. Medcursor, Inc., 1 page.	
	12	Australian Patent Opposition #2, Notice of Opposition, Australian Patent Application No. 2019201559, Brown & Watson International Pty Ltd., February 21, 2020, 1 page.	
	13	The offering for sale and sale by ATD Tools, Inc of a product identified as the ADT 5900 Jump Starter prior to July 2014.	
	14	Australian Patent Opposition #3, Notice of Opposition, Australian Patent Application No. 2020201223, Brown & Watson International Pty Ltd., August 7, 2020.	
	15	German Patent Opposition. German Patent Application No. 102014114997	
	16	D21 advertisement brochure of the opponent transmitted on 12-22-2013.	
	17	D22 advertisement brochure of the opponent transmitted on 04-23-2014.	
	18	D23 SGS test report relating to jump start devices of the opponent dated 04-21-2014.	
	19	D24 TWM417714U1	
	20	D24a machine translation of D24	
	21	D25 data sheet of TOPCOMTECHNOLOGY CO., LTD., for the product “Universal Power Bank”, dated November 15, 2011.	

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	22	D28 affidavit of the manager of the requesting party, 2013.	
	23	German Nullity Action, German Patent Application No. 202014011347.5	
	24	THE NOCO COMPANY v. RING AUTOMOTIVE LIMITED, HP-2020-000022, Grounds of Invalidity, In the High Court of Justice Business And Property Courts of England and Wales Intellectual Property List (ChD) Patents Court, 2 pages	
	25	the making available to the public by supply, description and/or use of the HP2200 jump starter described in the manual dated August 2013 at Annex A Before 3 July 2014 including in and after August 2013('HP2200') (cited on page 1 of reference THE NOCO COMPANY v. RING AUTOMOTIVE LIMITED, HP-2020-000022, Grounds of Invalidity)	
	26	the Carku E-Power 21 device in so far as it is established to have been made available to the public in the Eariler Proceedings ('Carku E-Power 21) (cited on page 2 of reference THE NOCO COMPANY v. RING AUTOMOTIVE LIMITED, HP-2020-000022, Grounds of Invalidity)	
	27	THE NOCO COMPANY v. SHENZHEN VALUELINK E-COMMERCES CO., LTD, Case No. 1:17-cv-02210, Defendants' Amended Final Invalidity and Unenforceability Contents, 9/23/2019, 5 pages.; The Powerall PBJS12000RD Jump Starter ("Powerall Jump Starter"), offered For sale by Gryphon Mobile Electronics at least as early as 11/5/2013; The Lightning 12V Jump Starter ("Lightning Jump Starter), offered for sale by Pilot, Inc. at least as early as 3/2014; The L3 Model Jump Starter, offered for sale by Shenzhen Tsevie Company as Early as 5/19/2019.	
	28	THE NOCO COMPANY, INC. v. SHENZHEN CHANGXINYANG TECHNOLOGY CO., LTD., Case No. 1:17-cv-02209, Defendents' Amended Final Invalidity and Unenforceability Contents, In the US District Court of Northern Ohio, Eastern District. The Powerall PBJS12000RD Jump Starter ("Powerall Jump Starter"), offered For sale by Gryphon Mobile Electronics at least as early 11/5/13; The Lightning 12V Jump Starter ("Lightning Jump Starter), offered for sale by Pilot, Inc. at least as early 3/14; The L3 Model Jump Starter, offered for sale by Shenzhen Tsevie Co as Early	
	29	Notification of Material filed under Section 27, Australian Government IP Australia, November 8, 2016 (3 pages); Declaration of Sheridan Lee (8 pages); Annexure SL-1 (8 pages); Annexure SL-2 (10 pages); Annexure SL-3 (9 pages); Annexure SL-4 (18 pages); Annexure SL-5, JP 3185027 (14 pages); Annexure SL-6 of English Translation of JP 3185027 (17 pages) and US 2004/0130298 (14 pages).	
	30	This Portable USB Charger Battery Pack Can Also Jump Start Your Car (viewed on Internet on October 27, 2020] <URL: https://www.howto geek.com/179499/this-portable-usb-charger-battery-pack-can-also-jump-start-your-car/>, published on January 13, 2014.	
	31	Clore Automotive, LLC, U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF CLORE AUTOMOTIVE, LLC TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION, pages 150-151.	
	32	Deltran USA, LLC, U.S. International Trade Commission, Investigation No. 337-TA-1256 DELTRAN USA, LLC'S RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION, pages 196-219.	

DELTRAN EX1002
IPR2024-01219

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	33	Schumaker Electric Corporation and Schumacher Power Technology (Binhai) Co. Ltd., U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF SCHUMACHER ELECTRIC CORPORATON AND SCHUMACHER POWER TECHNOLOGY (BINHAI) CO. LTD., TO THE COMPLAINT OF THE NOCO COMPANY UNDER SECTION 337 OF THE TARIFF ACT OF 1930 AND NOTICE OF INVESTIGATION, pages 180-184.
	34	Best Buy Co., Inc.., U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF BEST BUY CO., INC. TO THE FIRST AMENDED COMPLAINT AND THE NOTICE OF INVESTIGATION, pages 69-71.
	35	Guangdong Boltpower Energy Co, Ltd., U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF GUANGDONG BOLTPOWER ENERGY CO., LTD. TO THE FIRST AMENDED COMPLAINT AND THE NOTICE OF INVESTIGATION, pages 73-74.
	36	Winplus North America, Inc. U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF WINPLUS NORTH AMERICA, INC. TO THE AMENDED COMPLAINT AND THE COMMISSIONER'S NOTICE OF INVESTIGATION, Exhibit B, pages 1-5.
	37	Autozone, Inc.,, U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONDENTS AUTOZONE, INC. AND BEST PARTS, INC.'S RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION.
	38	Shenzhen Carku Technology Co., Ltd., 70MAI Co., Ltd., Antigravity Batteries LLC, Gooloo Technologies LLC, Great Neck Saw Manufactures, Inc., Horizon Tool, Inc., MATCO Tools Corporation, Nekteck, Inc., Paris Corporation, Powermax Battery (U.S.A.), Inc., and Shenzhen Gooloo E-Commerce Co., Ltd. U.S. International Trade Commission, Investigation No. 337-TA-1256, SHENZHEN CARKU TECHNOLOGY CO., LTD., 70MAI CO., LTD., ANTIGRAVITY BATTERIES LLC, GOOLOO TECHNOLOGIES LLC, GREAT NECK SAW MANUFACTURERS, INC., HORIZON
	39	Walmart Inc., U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF WALMATR INC., TO THE COMPLAINT OF THE NOCO COMPANY UNDER SECTION 337 OF THE TARIFF ACT OF 1930 AND NOTICE OF INVESTIGATION
	40	Smartech Products, Inc., U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONDENT SMARTECH PRODUCTS, INC.'S RESPONSE TO THE COMPLAINT UNDER 337 OF THE TARIFF ACT OF 1930, AS AMENDED, AND NOTICE OF INVESTIGATION, pages 98-102.
	41	Halo2Cloud, LLC and ZAGG Inc., U.S. International Trade Commission, Investigation No. 337-TA-1256, RESPONSE OF HALO2CLOUD, LLC AND ZAGG INC TO THE SECOND AMENDED COMPLAINT AND NOTICE OF INVESTIGATION, pages 141-142.
	42	QVC, Inc., U.S. International Trade Commission, Investigation No. 337-1256, RESPONSE OF QVC, INC. TO THE SECOND AMENDED COMPLAINT AND NOTICE OF INVESTIGATION, pages 144-145.
	43	In re Certain Portable Battery Jumpstarters and Components Thereof, 3370TA01256, United States International Trade Commission (March 17, 2021).

DELTRAN EX1002
IPR2024-01219

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	44	Fairchild MC78XX/LM78XX/MC78XXA 3-Terminal 1A Positive Voltage Regulator	
	45	USB Battery Charging 1.2 Compliance Plan, Rev. 1.0	
	46	Xysemi XR3403	
	47	Texas Instruments LM2621	
	48	USB Implementers Forum, Inc., Battery Charging Specification, Revision 1.1	
	49	Carku Epower-20B catalog information	
	50	USB Power Delivery Specification 1.0, July 16, 2012, Exhibit 1045	

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Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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DELTRAN EX1002
IPR2024-01219

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/William L. Klima/	Date (YYYY-MM-DD)	2022-05-02
Name/Print	William L. Klima	Registration Number	32422

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

DELTRAN EX1002
IPR2024-01219

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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DELTRAN EX1002
IPR2024-01219

(19)中華民國智慧財產局
(12)新型說明書公告本 (11)證書號數：TW M417714U1
(45)公告日： 中華民國 100 (2011) 年 12 月 01 日

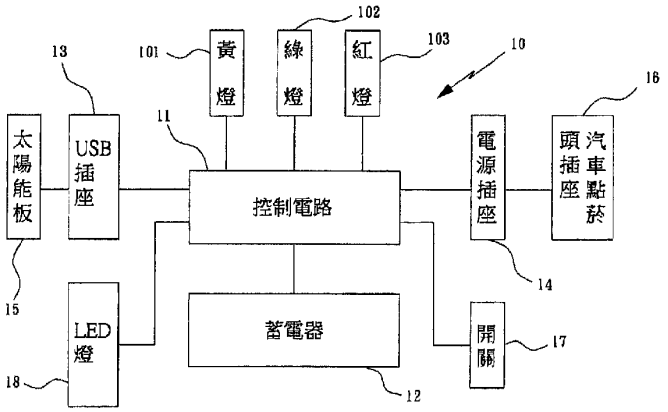
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(51)Int. Cl.： *H02J7/32 (2006.01)*
(71)申請人：海鉅能源股份有限公司(中華民國) (TW)
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(72)創作人：羅仲和 (TW)
申請專利範圍項數：6 項 圖式數：4 共 14 頁

(54)名稱

多功能隨身電源裝置

(57)摘要

一種多功能隨身電源裝置，包括：一控制電路、一蓄電器、一 USB 插座及一電源插座；其中，該控制電路設於本體內；該蓄電器設於本體內，與控制電路相接；該 USB 插座設於本體上，與控制電路相接，可藉由一 USB 傳輸線一端連接於該 USB 插座，另一端連接於一太陽能板，使太陽能板發電產生之電力，經由控制電路之操控，而對蓄電器充電與蓄電；該電源插座設於本體上，與控制電路相接，可藉由一電源線一端連接於該電源插座，另一端連接於一汽車之點菸頭插座上，使控制電路啟動蓄電器供電予汽車，藉以作為輔助啟動汽車電源之救援。



第3圖

10・・・本體
101・・・黃燈
102・・・綠燈
103・・・紅燈
11・・・控制電路
12・・・蓄電器
13・・・USB 插座
14・・・電源插座
15・・・太陽能板
16・・・汽車之點菸頭插座
17・・・開關
18・・・LED 燈

DELTRAN EX1002
IPR2024-01219

五、新型說明：

【新型所屬之技術領域】

本創作係一種多功能隨身電源裝置，尤指一種結合蓄電器及控制電路之創新構造，藉以作為輔助啟動汽車電源救援及戶外電源使用之裝置者。

【先前技術】

按，汽車駕駛人在用車過程當中，難免會遇到汽車無法發動的情形，而這其中的原因，往往和電瓶之電力不足有關，而導致的原因也有幾種可能，例如：忘記關掉車燈、周遭溫度過低、電瓶本身過於老舊而失去效能等因素；而當此一問題發生時，若是汽車停在汽車過往頻繁的地點，或許駕駛人能夠藉由它車的電瓶連結來輔助發動引擎讓問題獲得解決；又或者，汽車恰好停在修護場附近，也能夠交由修護人員加以修復。

然而，駕駛人有時也可能遇到求助困難的時候（如深夜時、偏僻地區），最終，可能就因為電瓶電力不足的問題而無法開車，因而耽誤了原本的計劃、行程，造成駕駛人莫大的損失。

DELTRAN EX1002
IPR2024-01219

【新型內容】

創作人有鑑於前述先前技術之缺點，乃依其從事各種電源裝置之製造經驗和技術累積，針對上述缺失悉心研究各種解決的方法，在經過不斷的研究、實驗與改良後，終於開發設計出本創作之一種全新多功能隨身電源裝置之創作，以期能摒除先前技術所產生之缺失。

本創作之一目的，係提供一種多功能隨身電源裝置，係結合蓄電器及控制電路之創新構造，藉以作為輔助啟動汽車電源之救援。

本創作之另一目的，係提供一種多功能隨身電源裝置，係結合蓄電器及控制電路之創新構造，藉以作為戶外電源之使用。

根據上述之目的，本創作之隨身電源裝置，其係設有一本體，該本體包括有：一控制電路、一蓄電器、一USB插座及一電源插座；其中，該控制電路設於本體內；該蓄電器設於本體內，與控制電路相連接；該USB插座設於本體上，與控制電路相連接，可藉由一USB傳輸線一端連接於該USB插座，另一端連接於一太陽能板，使太陽能板發電產生之電力，經由控制電路之操控，而對蓄電器充電與蓄電；該電源插座設於本體上，與控制電路相連接，可藉由一電源線一端連接於該電源插座，另一端連接於一汽車之點菸頭插座上，使控制電路啟動蓄電器供電予汽車，作為輔助啟動汽車電源之救援；如此，當汽車駕駛人遇到汽車電

DELTRAN EX1002
IPR2024-01219

瓶電力不足無法發動的情形時，即可藉助蓄電器之供電來發動汽車，達到自力救濟之目的。

為便 貴審查委員能對本創作之目的、形狀、構造裝置特徵及其功效，做更進一步之認識與瞭解，茲舉實施例配合圖式，詳細說明如下：

【實施方式】

本創作乃有關一種「多功能隨身電源裝置」，請參閱第1、2、3圖所示，本創作之隨身電源裝置，其係設有一本體10，該本體10包括有：一控制電路11、一蓄電器12、一USB插座13及一電源插座14。

其中，該控制電路11設於本體10內。

該蓄電器12設於本體10內，其與控制電路11相連接。

該USB插座13設於本體10上，其與控制電路11相連接，可藉由一USB傳輸線131一端連接於該USB插座13，另一端連接於一太陽能板15，使太陽能板15發電產生之電力，經由控制電路11之操控，而對蓄電器12充電與蓄電。

該電源插座14設於本體10一端上，與控制電路11相連接，可藉由一電源線141一端連接於該電源插座14，另一端連接於一汽車之點菸頭插座16上，使控制電路11啟動蓄電器12供電予汽車，作為輔助啟動汽車電源之救援。

藉此，當汽車駕駛人遇到汽車電瓶電力不足無法

DELTRAN EX1002
IPR2024-01219

發動的情形時，即可藉助本創作之隨身電源裝置的蓄電器12之供電來發動汽車，達到自力救濟之目的。

另，該本體10上設有一黃燈101、一綠燈102及一紅燈103，其中該黃燈101、綠燈102、紅燈103分別與控制電路11相連接，當控制電路11偵測出該蓄電器12過度充電時，係啟動該黃燈101發出黃色之警示亮光，當控制電路11偵測出該蓄電器12正常時，係啟動該綠燈102發出綠色之正常亮光，當控制電路11偵測出該蓄電器12需充電時，係啟動該紅燈103發出紅色之提示需充電亮光。

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該本體10上設有一開關17，該開關17與該控制電路11相連接，可藉由操控該開關17為開啟（ON）/關閉（OFF），來啟動（ON）及關閉（OFF）該本體10之運作。

該本體10一端上設有一LED燈18，該LED燈18與該控制電路11相連接，當該本體10被啟動（ON）運作時，該控制電路11可啟動蓄電器12供電予該LED燈18，使該LED燈18發亮作為照明使用，當該本體10被關閉（OFF）運作時，同時該LED燈18被關閉（OFF）。

請參閱第4圖所示，該本體10底部設有一安裝孔104，該安裝孔104供安裝一腳架19，使本體10藉由該腳架19之支撐，而站立於一平面上。

該本體10在該USB插座13一側邊設有一防塵開關20，該防塵開關20具有一防塵蓋21，藉由推動該防塵開關20可使防塵蓋21蓋覆/離開該USB插座13上，藉以

DELTRAN EX1002
IPR2024-01219

防止細塵微粒落入該USB插座13中。

當藉由電源線141一端連接於該電源插座14，另一端連接於汽車之點菸頭插座16上時，該控制電路11可對汽車之電源設備作穩壓及穩流之作動。

當藉由電源線141一端連接於該電源插座14，另一端連接於汽車之點菸頭插座16上時，亦可利用汽車之電源設備產生之電力，對蓄電器12充電與蓄電。

又，亦可藉由一USB傳輸線131一端連接於該USB插座13，另一端連接於一攜帶型電子裝置（圖中未示）（例如：平板電腦、手機、筆記型電腦…等），使控制電路11啟動蓄電器12供電予該攜帶型電子裝置。

綜合上所述，本創作之多功能隨身電源裝置，確實具有前所未有之創新構造，其既未見於任何刊物，且市面上亦未見有任何類似的產品，是以，其具有新穎性應無疑慮。另外，本創作所具有之獨特特徵以及功能遠非習用所可比擬，所以其確實比習用更具有其進步性，而符合我國專利法有關新型專利之申請要件之規定，乃依法提起專利申請。

以上所述，僅為本創作最佳具體實施例，惟本創作之構造特徵並不侷限於此，任何熟悉該項技藝者在本創作領域內，可輕易思及之變化或修飾，皆可涵蓋在以下本案之專利範圍。

【圖式簡單說明】

第 1、2 圖為本創作多功能隨身電源裝置之二

DELTRAN EX1002
IPR2024-01219

種立體外觀圖。

第 3 圖為本創作多功能隨身電源裝置之電路方塊圖。

第 4 圖為本創作多功能隨身電源裝置之腳架示意圖。

【主要元件符號說明】

本體10
黃燈101
綠燈102
紅燈103
安裝孔104
控制電路11
蓄電器12
USB插座13
USB傳輸線131
電源插座14
電源線141
太陽能板15
汽車之點菸頭插座16
開關17
LED燈18
腳架19
防塵開關20
防塵蓋21

DELTRAN EX1002
IPR2024-01219

公告本

新型專利說明書

（本說明書格式、順序，請勿任意更動，※記號部分請勿填寫）

※ 申請案號：110207292

※ 申請日：　　※IPC 分類：H02J 7/32 (2006.01)

一、新型名稱：(中文/英文)

多功能隨身電源裝置

二、中文新型摘要：

一種多功能隨身電源裝置，包括：一控制電路、一蓄電器、一 USB 插座及一電源插座；其中，該控制電路設於本體內；該蓄電器設於本體內，與控制電路相接；該 USB 插座設於本體上，與控制電路相接，可藉由一 USB 傳輸線一端連接於該 USB 插座，另一端連接於一太陽能板，使太陽能板發電產生之電力，經由控制電路之操控，而對蓄電器充電與蓄電；該電源插座設於本體上，與控制電路相接，可藉由一電源線一端連接於該電源插座，另一端連接於一汽車之點菸頭插座上，使控制電路啟動蓄電器供電予汽車，藉以作為輔助啟動汽車電源之救援。

三、英文新型摘要：

DELTRAN EX1002
IPR2024-01219

六、申請專利範圍：

1、一種多功能隨身電源裝置，其係設有一本體，該本體包括有：

一控制電路，設於本體內；

一蓄電器，設於本體內，其與控制電路相接；

一USB插座，設於本體上，其與控制電路相接，藉由一USB傳輸線一端連接於該USB插座，另一端連接於一太陽能板，使太陽能板發電產生之電力，經由控制電路之操控，而對蓄電器充電及蓄電；

一電源插座，設於本體一端上，與控制電路相接，藉由一電源線一端連接於該電源插座，另一端連接於一汽車之點菸頭插座上，使控制電路啟動蓄電器供電予汽車，作為輔助啟動汽車電源之救援。

2、如申請專利範圍第 1 項所述之多功能隨身電源裝置，其中該本體上設有一黃燈、一綠燈及一紅燈，該黃燈、綠燈、紅燈分別與控制電路相接，當控制電路偵測出該蓄電器過度充電時，係啟動該黃燈發出黃色之警示亮光，當控制電路偵測出該蓄電器正常時，係啟動該綠燈發出綠色之正常亮光，當控制電路偵測出該蓄電器需充電時，係啟動該紅燈發出紅色之提示需充電亮光。

3、如申請專利範圍第 1 項所述之多功能隨身電源裝置，其中該本體上設有一開關，該開關與該控制電路相連接，藉由操控該開關為開啟（ON）/關閉（OFF），來啟動（ON）及關閉（OFF）該本體之運作。

DELTRAN EX1002
IPR2024-01219

4、如申請專利範圍第 1 項所述之多功能隨身電源裝置，其中該本體一端上設有一LED燈，該LED燈與該控制電路相接，當該本體被啟動（ON）運作時，該控制電路啟動蓄電器供電予該LED燈，使該LED燈發亮作為照明使用。

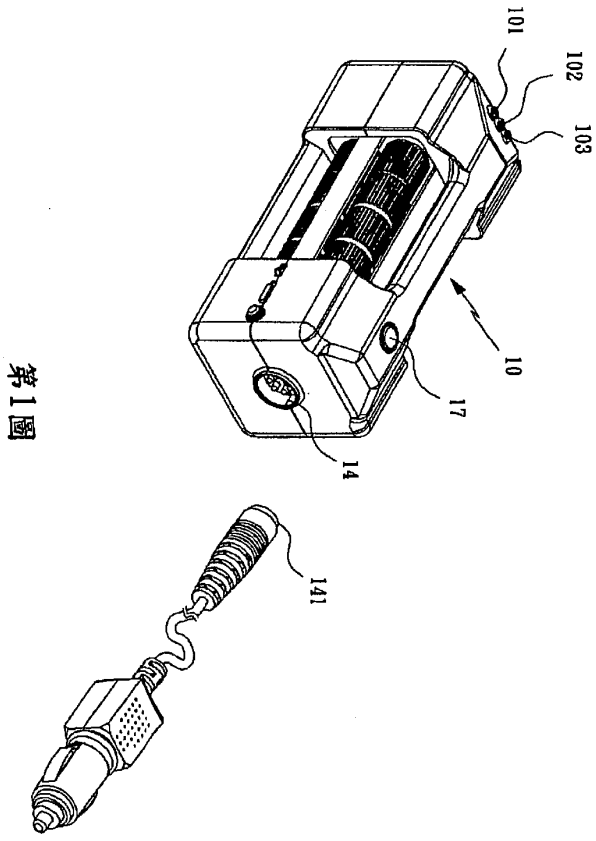
5、如申請專利範圍第 1 項所述之多功能隨身電源裝置，其中該本體底部設有一安裝孔，該安裝孔供安裝一腳架。

6、如申請專利範圍第 1 項所述之多功能隨身電源裝置，其中該本體在該USB插座一側邊設有一防塵開關，該防塵開關具有一防塵蓋，藉由推動該防塵開關可使防塵蓋蓋覆/離開該USB插座上。

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DELTRAN EX1002
IPR2024-01219

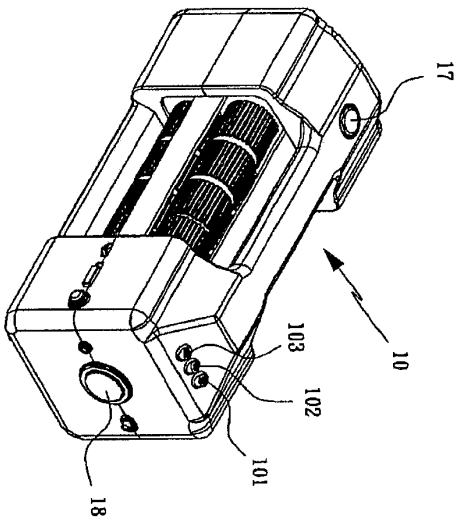
七、圖式：



第1圖

DELTRAN EX1002
IPR2024-01219

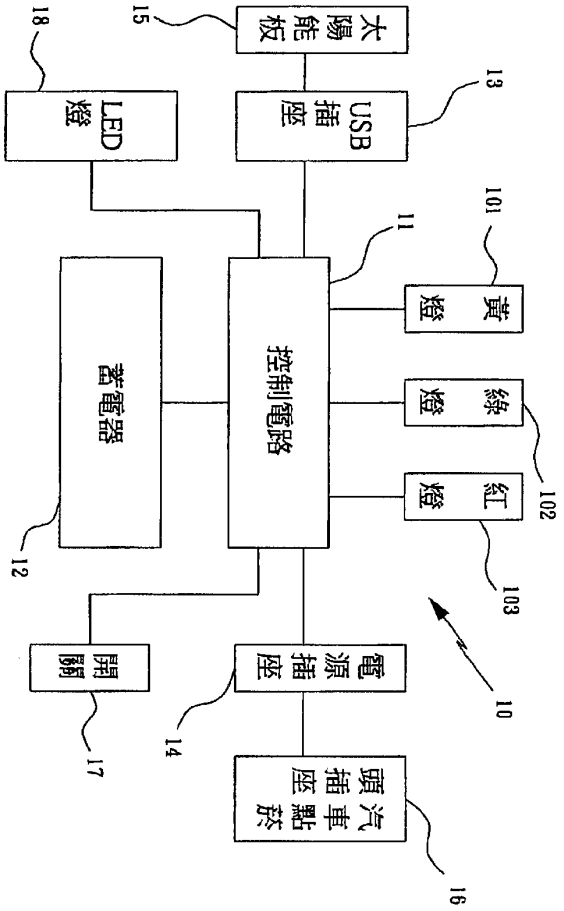
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第2圖

DELTRAN EX1002
IPR2024-01219

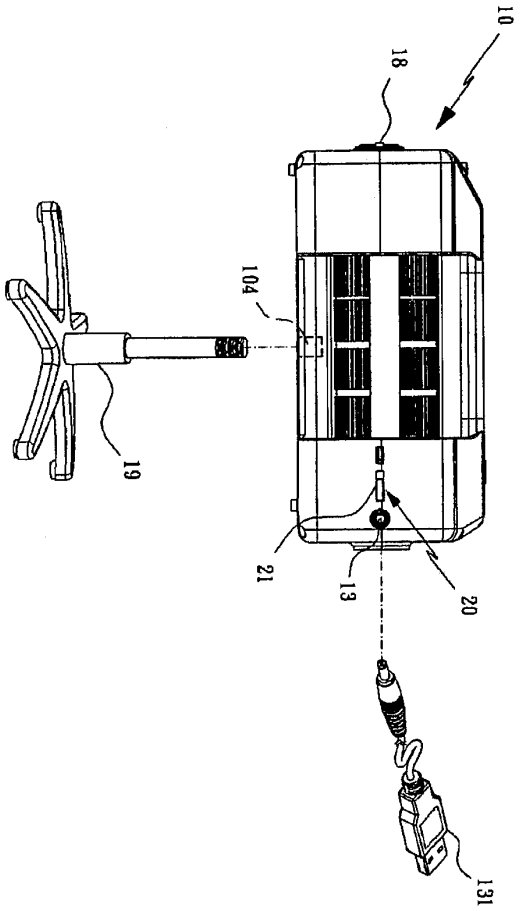
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第3圖

DELTRAN EX1002
IPR2024-01219

1614848416280115051 10



第4圖

DELTRAN EX1002
IPR2024-01219

四、指定代表圖：

(一)本案指定代表圖為：第（ 3 ）圖。

(二)本代表圖之元件符號簡單說明：

本體10

黃燈101

綠燈102

紅燈103

控制電路11

蓄電器12

USB插座13

電源插座14

太陽能板15

汽車之點菸頭插座16

開關17

LED燈18

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DELTRAN EX1002
IPR2024-01219


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IN THE HIGH COURT OF JUSTICE **HP-2020-000022**
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

B E T W E E N :

THE NOCO COMPANY
(a company incorporated under the laws of Ohio, United States of America)
Claimant

and

RING AUTOMOTIVE LIMITED
Defendant

GROUNDS OF INVALIDITY

---

1. The following are the Grounds of Invalidity referred to in the Defence and Counterclaim upon which the Defendant relies.

2. The alleged inventions claimed in UK Patent No. GB 2 527 858 (the '**Patent**') are not new and/or do not involve an inventive step, being obvious to a person skilled in the art, having regard to the matters comprising the state of the art before the priority date of the Patent and in particular:

   (1) the making available to the public by supply, description and/or use of the HP2200 jump starter described in the manual dated August 2013 at **Annex A** before 3 July 2014 including in and after August 2013 ('**HP2200**');

   (2) the publication prior to the earliest claimed priority date of the Patent of International Patent Application WO 2004/0 36 714 on or after about 29 April 2004 ('**Krieger April 2004**');

   (3) the making available to the public prior to the earliest claimed priority date of the Patent (as alleged in the Grounds of Invalidity in the Earlier Proceedings referred to in the Defence and Counterclaim) of:

      (a) Chinese Patent Application CN 103 066 662 A on or after about 24 April 2013 ('**Carku CN**'),

DELTRAN EX1002
IPR2024-01219

(b) US Patent Application US 2004/0 130 298 on or after about 8 July 2004 (**'Krieger July 2004'**),

(c) US Patent Application US 2013/0 154 543 on or after about 20 June 2013 (**'Richardson'**),

(d) the Carku E-Power 21 device in so far as it is established to have been made available to the public in the Earlier Proceedings (**'Carku E-Power 21'**);

(e) US Patent No. 6 424 158 (**'Klang'**), and

(f) US Patent No. 8 172 603 (**'Richardet'**).

(4) common general knowledge.

JAMES ST.VILLE

STATEMENT OF TRUTH

The Defendant believes that the facts stated in these Grounds of Invalidity are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth. I am duly authorised to sign this Statement of Truth on the Defendant's behalf.

Signed 

Name: Theresa Spencer

Date: August 3, 2020

Position: Director

Served: August 3, 2020

DELTRAN EX1002
IPR2024-01219

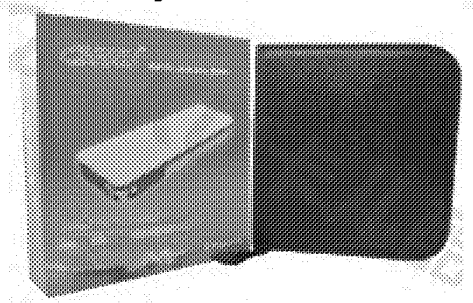
CARKU卡儿酷®

Model : E-Power-21



TECHNICAL SPECIFICATION :
Input : 14V1A
Output : 5V/2A; 5V/1A; 12V10A; 19V/3.5A 12V Jump start LED light (light, burst flashing, SOS)
Start Current : 300A
Peak Current : 600A
Size : 230*87*28mm
Weight : 615g,Battery capacity:18000mAh
Operating Temp. : -20℃~60℃
Lifetime : >1000 cycles

ACCESSORIES :	
Home charger*1	Intelligent Jumper Cable*1
Car charger*1	3 mobile connectors*1 (Micro, iP4, iP5)
Laptop connectors*8+swtich cable*1	



Packing: Color Box + PU bag

FEATURES :

1. Powerful capability for jump Start 12V vehicle.
2. Supply power for 19V laptop.
3. Supply power for Mobile, Tablet PC, MP3/MP4, PSP, Camera and other digital devices.
4. Supply power for car refrigerator, blast pump, and other 12V devices.
5. LED light (light, burst flashing, SOS)

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Northern District of Ohio, Eastern Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
1:20-cv-01169	5/28/2020	for the Northern District of Ohio, Eastern Division

PLAINTIFF	DEFENDANT
The NOCO Company, Inc.	Guangzhou Unique Electronics Co., Ltd. and Sui Cheng Limited

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	9,007,015	4/14/2015	The NOCO Company, Inc.
2			
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

Trials@uspto.gov
571-272-7822

Paper 20
Date: November 12, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN CARKU TECHNOLOGY CO., LTD.,
Petitioner,

v.

THE NOCO COMPANY
Patent Owner.

IPR2020-00944
Patent 9,007,015 B1

Before JAMESON LEE, DAVID C. McKONE, and
JASON M. REPKO, *Administrative Patent Judges.*

LEE, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background and Summary

Shenzhen Carku Technology Co., Ltd. ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 1–23 ("challenged claims") of U.S. Patent No. 9,007,015 B1 (Ex. 1001, "the '015 Patent"). The Noco Company ("Patent Owner") filed a Preliminary Response (Paper 10, "Prelim. Resp."). Petitioner filed a Reply. Paper 13. Patent Owner filed a Sur-Reply. Paper 14.

An *inter partes* review may not be instituted unless "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Further, a decision to institute may not institute on fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). After considering the evidence and arguments presented by the parties, we determine that Petitioner has shown a reasonable likelihood of prevailing on at least 1 of the challenged claims.

Accordingly, we institute an *inter partes* review of claims 1–23 of the '015 patent with respect to all grounds of unpatentability presented in the Petition.

B. Real Parties-in-Interest

Each party identifies itself as the only real party-in-interest. Pet. 93; Paper 5, 1.

C. Related Matters

The parties identify multiple district court litigation involving the '015 patent, in the Northern District of Ohio, the Southern District of Ohio, the Northern District of California, the Central District of California, the District of Delaware, and the Middle District of Florida. Pet. 94–95; Paper 5, 1–2. Petitioner is not a

party to any of these district court litigations. Prelim. Resp. 32. The parties also identify IPR2018-00503 as a proceeding involving a petition for *inter partes* review of claims 1–21 and 23 the '015 patent. Pet. 96; Paper 5, 3. Petitioner was not the petitioner in that proceeding. The Board declined institution in IPR2018-00503 on July 11, 2018. IPR2018-00503, Paper 9.

D. The '015 Patent

The '015 patent is titled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection." Ex. 1001, Code 54. It discloses an apparatus for jump starting a vehicle engine, which apparatus includes an internal power supply, an output port having positive and negative polarity outputs, a "vehicle battery isolation sensor" to detect presence of a vehicle battery connected between the positive and negative polarity outputs, a "reverse polarity sensor" to detect the polarity of the vehicle battery connected between the positive and negative outputs, a power FET switch connected between the internal power supply and the output port, and a microcontroller which receives input signals from the vehicle battery isolation sensor and the reverse polarity sensor and provides an output signal to the power FET switch. *Id.* at 3:16–30. The '015 patent describes that the power FET switch is turned on by the microcontroller to connect the internal power supply to the output port in response to signals from the two sensors indicating the presence of a vehicle battery at the output port and proper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs. *Id.* at 3:31–36.

Figure 1 of the '015 patent is a functional block diagram of the disclosed apparatus and is reproduced below.

DELTRAN EX1002
IPR2024-01219

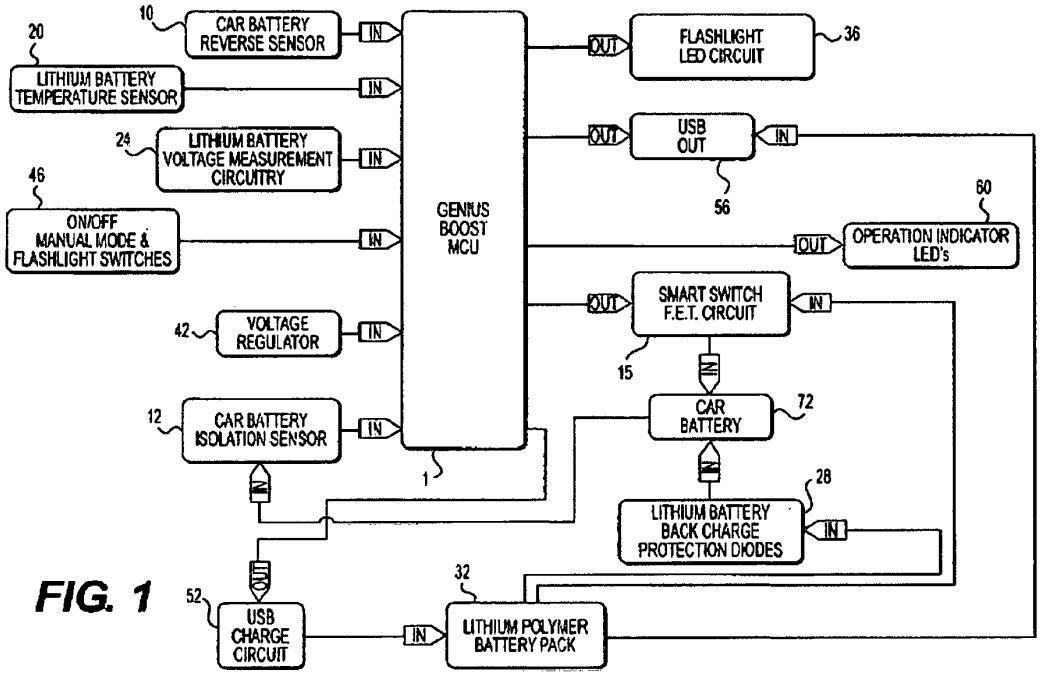


FIG. 1

Figure 1 is a functional block diagram of a handheld vehicle battery boost apparatus according to the '015 patent. *Id.* at 3:50–52.

The apparatus includes, *inter alia*, lithium polymer battery pack 32, car battery isolation sensor 12, car battery reverse [polarity] sensor 10, smart switch FET circuit 15, and programmable microcontroller unit (MCU) 1. *Id.*, cols. 3–4. Reverse polarity sensor 10 "monitors the polarity of the vehicle battery 72 when the handheld battery booster device is connected to the vehicle's electric system." *Id.* at 4:20–22. Car battery isolation sensor 12 "detects whether or not a vehicle battery 72 is connected to the booster device." *Id.* at 4:26–28. Smart switch FET circuit 15 "electrically switches the handheld battery booster lithium battery to the vehicle's electric system only when the vehicle battery is determined by the MCU 1 to be present (in response to a detection signal provided by isolation sensor 12)

and connected with the correct polarity (in response to a detection signal provided by reverse sensor 10)." *Id.* at 4:32–38.

Figure 2A-4 of the '015 patent, reproduced below, discloses preferred embodiments of the vehicle isolation sensor 12 and the reverse polarity sensor 10.

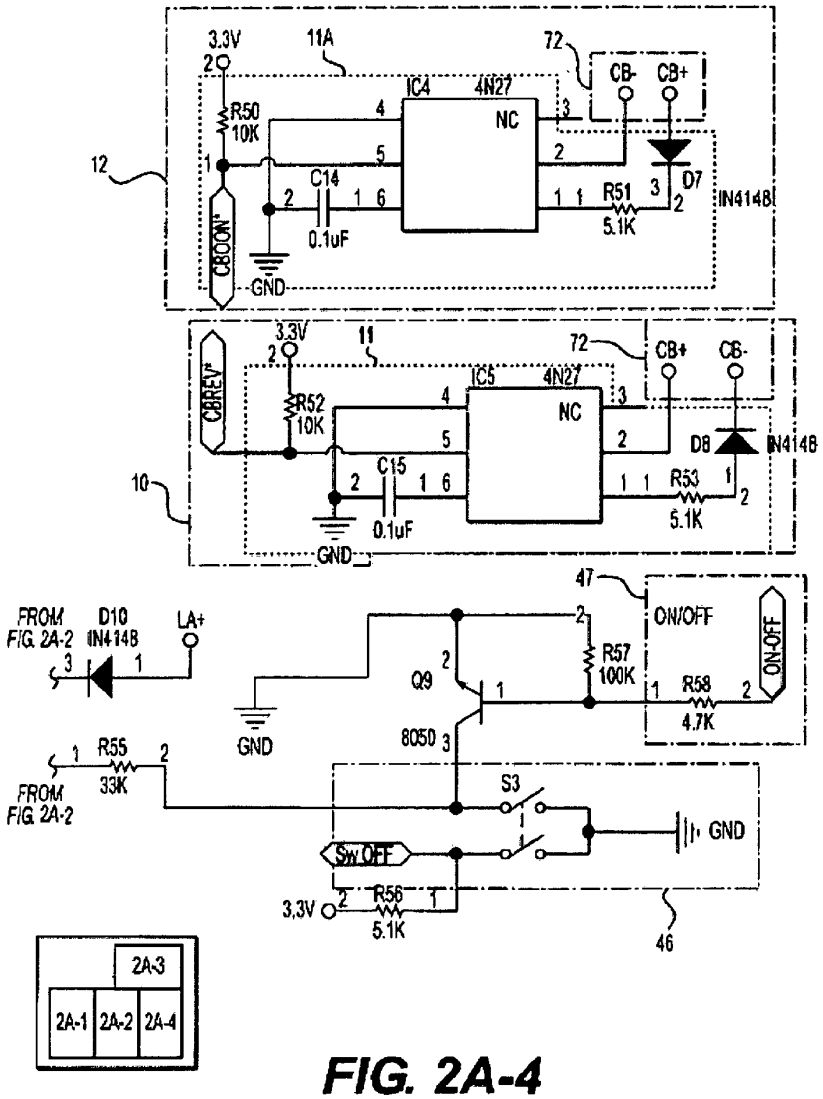


FIG. 2A-4

Id., Fig. 2A-4. Figure 2A-4, above, is a schematic circuit diagram depicting elements of an exemplary embodiment of a handheld vehicle battery boost

apparatus. *E.g.*, *id.* at 3:53–55. Element 12 of Fig. 2A-4 is a preferred embodiment of the vehicle isolation sensor and comprises optocoupler LED 11A that, "if the battery 72 is connected to the terminals of the booster device with the correct polarity," will conduct current, "and is therefore turned on, . . . indicating the presence of a battery across the jumper output terminals of the handheld booster device." *Id.* at 5:26–36. Element 10 of Fig. 2A-4 is a preferred embodiment of the reverse polarity sensor and comprises optocoupler LED 11 that, "if the battery 72 is connected to the terminals of the booster device with the correct polarity," will not conduct current, "and is therefore turned off." *Id.* at 5:17–26.

The '015 patent explains:

> If the car battery 72 is connected to the handheld booster device with reverse polarity, the optocoupler LED 11 of the reverse sensor 10 will conduct current, providing a "0" or low signal to microcontroller unit 1. Further, if no battery is connected to the handheld booster device, the optocoupler LED 11A of the isolation sensor 12 will not conduct current, and is therefore turned off, providing a "1" or high output signal to the MCU, indicating the absence of any battery connected to the handheld booster device. Using these specific inputs, the microcontroller software of MCU 1 can determine when it is safe to turn on the smart switch FET 15, thereby connecting the lithium battery pack to the jumper terminals of the booster device. Consequently, if the car battery 72 either is not connected to the booster device at all, or is connected with reverse polarity, the MCU 1 can keep the smart switch FET 15 from being turned on, thus prevent[ing] sparking/short circuiting of the lithium battery pack.

Id. at 5:37–54.

Claim 1, reproduced below with bracketed letters added consistent with the labeling in the claim charts of the Petition, is the sole independent claim and is illustrative of the challenged claims (paragraph break added at limitation [g]).

1. Apparatus for jump starting a vehicle engine, comprising:

[a] an internal power supply;

[b] an output port having positive and negative polarity outputs;

[c] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;

[d] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;

[e] a power switch connected between said internal power supply and said output port; and

[f] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,

[g] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

Id. at 8:4–37.

E. Evidence

Petitioner relies on the following evidence:[1]

References		Date	Exhibit
Richardson	US Pub. App. 2013/0154543 A1	Published June 20, 2013	Ex. 1006
Klang	US Patent No. 6,424,158 B2	Issued July 3, 2002	Ex. 1007
Lei	US Patent No. 9,954,391 B2	Issued Apr. 24, 2018; Filed Nov. 8, 2013	Ex. 1008
Krieger	US Pub. App. 2004/0130298 A1	Published July 8, 2004	Ex. 1009
Wanzong	US Patent No. 5,319,298	Issued June 7, 1994	Ex. 1010
Baxter	WO 2010/129723 A2 (International Published Pat. App.)	Published Nov. 11, 2010	Ex. 1011
Epower-20	Product Brochure for Model E-Power-20B, Shenzhen Carku Technology Co., Ltd.	Allegedly Distributed Apr. 15 – May 5, 2014, at "2014 Canton Fair"	Ex. 1012
Epower-21	Product Brochure for Model E-Power-21, Shenzhen Carku Technology Co., Ltd.	Allegedly Distributed Apr. 15 – May 5, 2014, at	Ex. 1013

[1] The '015 patent issued from Application 14/325,938, filed July 8, 2014, which is a continuation of Application PCT/US2014/045434, filed July 3, 2014. Ex. 1001 at Codes [21], [22], [63].

DELTRAN EX1002
IPR2024-01219

References		Date	Exhibit
		"2014 Canton Fair"	
Richardet	US Patent 8,172,603 B1	Issued May 8, 2012	Ex. 1014

Petitioner also relies on the Declarations of James L. Kirtley, Jr., Ph.D. (Ex. 1002) and Yingchun Wan (Ex. 1018).

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §[2]	Basis
1, 7–9, 15, 17–21	102	Richardson
2, 3, 12–14, 23	103	Richardson, Lei
4, 5	103	Richardson, Krieger
6	103	Richardson, Wanzong
16	103	Richardson, Baxter
10–13	103	Richardson and either Epower-20 or Epower-21
22	103	Richardson, Richardet
1, 17, 21	102	Klang
4, 5	103	Klang, Krieger
22	103	Klang, Richardet
23	103	Klang, Lei

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), revised 35 U.S.C. §§ 102 and 103 effective March 16, 2013. Because the challenged patent has an effective filing date after March 16, 2013 (Ex. 1001, Codes (22), (63)), the effective date of the applicable AIA provisions, we refer to the post-AIA versions of §§ 102 and 103.

II. ANALYSIS

A. Level of Ordinary Skill

Petitioner asserts that in the relevant time frame, a person of ordinary skill in the art ("POSITA"), would have had "a minimum of a bachelor's degree in electrical engineering or its equivalent and two years of experience in electrical engineering with some experience in design of battery charging systems." Pet. 9. Petitioner also contends that graduate education could substitute for professional experience, and that significant experience in the field could substitute for formal education. *Id.* (citing Ex. 1002 ¶ 14).

Patent Owner has not proposed a description of the level of ordinary skill in the art or disputed Petitioner's articulation. Petitioner's articulation of the level of ordinary skill in the art is supported by the Declaration of Dr. Kirtley. Ex. 1002 ¶ 14. It also appears consistent with what is reflected by the content of the applied prior art references. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill).

We adopt Petitioner's articulation of the level of ordinary skill in the art, but delete the qualifier "a minimum of" for the level of education, to keep that level from being vague and extending to a range that corresponds to the skill level of an expert. Thus, we regard the level of ordinary skill as being at the level of a person with "a bachelor's degree in electrical engineering or its equivalent and two years of experience in electrical engineering with some experience in design of battery charging systems."

B. Claim Construction

For petitions filed on or after November 13, 2018, we use the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the

ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2019). The Petition here was filed on May 14, 2020. Paper 2. We apply the claim construction standard from *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) ("the *Phillips* standard").[3]

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and even extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Id.* at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The disavowal, if any, can be effectuated by language in the specification or the prosecution history. *Poly-America, L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016).

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017);

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[3] Petitioner asserts that "[claim construction] standards applied during IPR are different from those in litigation." Pet. 10 n.2. That is incorrect.

Wellman, Inc. v. Eastman Chem. Co., 642 F.3d 1355, 1361 (Fed. Cir. 2011); *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner proposes a construction relating to four terms in claim 1: (1) "reverse polarity sensor," (2) "vehicle battery isolation sensor", (3) "input signals from said vehicle isolation sensor and said reverse polarity sensor," and (4) "output port." Pet. 11. Petitioner states that its proposed claim constructions "are the same as the constructions made in the Shenzen Dika Order (Ex. 1005 at 14–15) and the SmarTech Order (Ex. 1017 at 20–31)," claim construction orders entered in related district court litigations. *Id.* at 10. Patent Owner states that "Patent Owner will agree that the claim constructions set forth by Petitioner that were adopted in two pending litigations should be applied at this stage." Prelim. Resp. 7.

According to Petitioner, in the context of claim 1, "reverse polarity sensor" is a reverse polarity sensor "separate from the vehicle battery isolation sensor." Pet. 11. We have reviewed the Specification of the '015 patent and have no reason to disagree with the parties and the district courts. We adopt the construction that "reverse polarity sensor" is "separate from the vehicle battery isolation sensor."

According to Petitioner, in the context of claim 1, "vehicle battery isolation sensor" is a vehicle battery isolation sensor "separate from the reverse polarity sensor." Pet. 11. We have reviewed the Specification of the '015 patent and have no reason to disagree with the parties and the district courts. We adopt the construction that "vehicle battery isolation sensor" is "separate from the reverse polarity sensor."

According to Petitioner, in the context of claim 1, "input signals from said vehicle isolation sensor and said reverse polarity sensor" are "[d]istinct input signals from said vehicle isolation sensor and said reverse polarity sensor,

respectively." Pet. 11. We have reviewed the Specification of the '015 patent and have no reason to disagree with the parties and the district courts. We adopt the construction that "input signals from said vehicle isolation sensor and said reverse polarity sensor" are "distinct input signals from said vehicle isolation sensor and said reverse polarity sensor, respectively."

According to Petitioner, in the context of claim 1, "output port" is a "[c]omponent through which power from an internal power supply is transmitted." Pet. 11. We have reviewed the Specification of the '015 patent and have no reason to disagree with the parties and the district courts that in the context of claim 1, power from an internal power supply is transmitted through the output port. We agree that, in the context of claim 1, "output port" is a "component through which power from an internal power supply is transmitted."

C. Alleged Anticipation of Claims 1, 7–9, 15, and 17–21 by Richardson

1. The Law on Anticipation

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010); *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). The applied reference "need not satisfy an *ipsissimis verbis* test." *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990). Identity of terminology between the prior art reference and the claim is not required.

2. Richardson

Richardson relates to a portable power source to provide supplemental power to start internal combustion and turbine engines. Ex. 1006 ¶ 2. As background, Richardson describes that internal combustion and turbine engines

DELTRAN EX1002
IPR2024-01219

require a power source to start, and that commonly this power source is in the form of a battery. *Id.* ¶ 3. Richardson further describes that if the battery lacks sufficient power to start the engine, a supplemental power source is necessary to jump start the engine, and that, typically, "jumper cables are used to connect the battery of one vehicle to the dead battery of another vehicle needing to be jumped." *Id.* ¶ 4. Richardson discloses an apparatus and method for temporarily delivering supplemental power to the electrical system of a vehicle. *Id.* ¶ 6. A preferred embodiment is a portable supplemental power source, also called a "jump starter," illustrated in Figure 1, which is reproduced below:

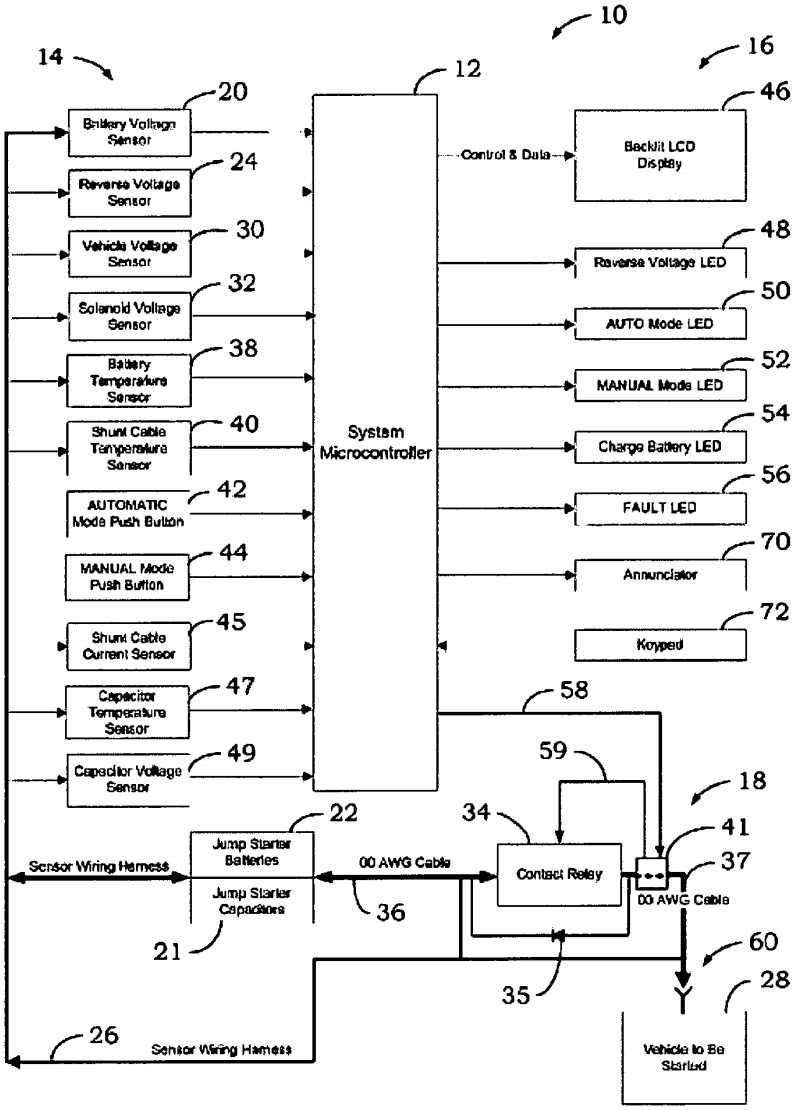


Fig. 1

Figure 1 is a functional block diagram of Richardson's portable jump starter. *Id.* ¶ 8.

Jump starter 10 includes programmable microprocessor 12, which receives input 14 and produces informational outputs 16 and control outputs 18. *Id.* ¶ 14. Control outputs 18 includes contact relay control output 58, which operates contact

relay 34 through temperature sensor 41. *Id.* ¶ 21. Shunt cable 36 connects capacitors 21 and batteries 22 to control relay 34. *Id.* ¶ 16. "When the jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter capacitors 21 and batteries 22 are connected to the starter system or batteries of the vehicle to be started." *Id.* ¶ 21.

Battery voltage sensor monitors the voltage level of one or more batteries 22; reverse voltage sensor 24 monitors the polarity of the jumper cables on line 26; vehicle voltage sensor 30 monitors the voltage on line 37, which reflects the voltage of the vehicle. *Id.* ¶ 16. Capacitor voltage sensor monitors the voltage level of one or more capacitors 21. *Id.* ¶ 15. Battery temperature 38 monitors the temperature of the jump starter's batteries 22 to detect overheating due to excess current draw from the batteries during jump starting, and shunt cable temperature sensor 40 monitors the temperature of shunt cable 36 to detect overheating of the cable. *Id.* ¶ 17. Automatic mode push button 42 is provided to set the jump starter in automatic mode of operation, and manual mode push button 44 is provided to set the jump starter in manual mode of operation. *Id.*

LCD display 46 displays user instructions, error messages, and real-time sensor data during operation. *Id.* ¶ 20.

3. Claim 1

For reasons discussed below, Petitioner has not adequately addressed this limitation of claim 1:

> such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper

> polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

Ex. 1001, 8:26–37. Petitioner's accounting for it is vague and incomplete, as well as speculative.

The limitation refers to the action of the claimed microcontroller, which receives input signals from the vehicle isolation sensor and the reverse polarity sensor and provides an output signal to the power switch. Ex. 1001, 8:23–25. According to this limitation, the power switch can be turned on only in response to a signal indicating presence of a vehicle battery and a signal indicating proper polarity connection to that vehicle battery. If a signal indicates absence of a vehicle battery, or if a signal indicates improper polarity connection to the vehicle battery, the power switch cannot be turned on. Petitioner has not made a sufficient showing that this is true in Richardson.

Petitioner explains as follows:

> Richardson discloses the reverse voltage sensor 24 detecting whether jumper cables that have been manually connected to the vehicle battery have been properly connected or if there is a reverse connection. Richardson discloses that the power switch for charging the vehicle battery cannot be turned on unless there is a proper polarity connection of the cables. Referring to FIG. 3, Richardson states:
>
> > *If the system does not detect a battery charging voltage 212*, once jumper cables 60 have been manually connected to the vehicle to be started 28, *the voltage is measured by the reverse voltage sensor 24 to determine if the cables have been properly connected to the vehicle 214*. If the voltage measured is significantly less than the voltage of the jump start capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set and the event saved in non-volatile memory 216. A "Reverse Polarity" error message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216. Any further jump

DELTRAN EX1002
IPR2024-01219

> starter action by the operator is ignored until the reverse voltage condition is corrected 220, at which point processing returns to the start of the main processing loop 210. Ex. 1006, ¶ 0027.

Pet. 26–27 (emphasis added). The above-cited disclosure of Richardson (Ex. 1006 ¶ 0027) does not support Petitioner's assertion (Pet. 26) that "the power switch for charging the vehicle battery cannot be turned on unless there is a proper polarity connection of the cables." The cited disclosure of Richardson relates to the condition of detecting that there is no vehicle "charging" voltage after the jumper cables have been manually connected to a vehicle battery. At that time, the cited disclosure indicates Richardson uses the reverse polarity sensor to determine if the vehicle battery has been connected with the proper polarity, and if not, indicate a "Reverse Polarity" error and wait for a correction.

The Richardson disclosure cited by Petitioner does *not* indicate that the power switch is turned on *only* if the presence of a vehicle battery is detected and the connection to the vehicle battery is made with the proper polarity. Rather, the cited disclosure indicates the opposite, i.e., that the power switch already is turned on, before the microprocessor even determines if the vehicle battery is connected with improper polarity.

The cited paragraph begins with the phrase "*If the system does not detect a battery charging voltage,*" and follows with steps to take to determine, in case there is no battery charging voltage, if there is a "Reverse Polarity" error in connecting to the vehicle battery. Ex. 1006 ¶ 27. That description suggests an expectation, in the absence of connection error, that there would be a "charging" voltage. But the vehicle battery cannot be "charging" unless Richardson's power switch already has been turned on to connect its internal batteries to the vehicle battery. And if battery charging voltage were detected, then based on this

DELTRAN EX1002
IPR2024-01219

disclosure charging would have continued without ever determining whether the vehicle battery is connected with proper polarity.

Thus, the cited paragraph actually indicates the power switch already is turned on, prior to Richardson's determining whether the vehicle battery has been connected with wrong polarity. It does not support Petitioner's assertion that the power switch is turned on *only* in response to both a signal indicating presence of a vehicle battery and a signal indicating connection to the vehicle battery with proper polarity.

Other parts of the Richardson disclosure, cited by Patent Owner and discussed below, are contrary to Petitioner's assertion and further undermine Petitioner's position. As discussed below, they indicate that in Richardson's device, the power switch is turned on regardless of whether the vehicle battery is connected to the output port with the proper polarity and no check is made in that regard prior to turning on of the power switch.

Citing Paragraph 24 of Richardson, Patent Owner asserts that "Richardson discloses that the microcontroller is configured to close the contact relay if a shunt calibration flag is set, and that this occurs prior to any check for the vehicle battery presence or polarity." Prelim. Resp. 14. Paragraph 24 refers to elements in Figures 3 and 4 and is reproduced below:

> At the start of the main process loop 210, the flags are checked 404 beginning with the shunt calibration flag 406. *If the shunt calibration flag is set 406, the starter contact relay 34 is closed 408.* The temperature of the shunt cable is measured 410 and the voltage drop across the shunt cable is read 412. The temperature of the shunt cable is measured a second time and averaged with the previous reading 414. The shunt resistance is then calculated and saved 416 and the shunt calibration flag is cleared.

Ex. 1006 ¶ 24 (emphasis added). Based on that disclosure, Patent Owner correctly states that "– Richardson closes the contact relay (*i.e.*, turns on the power switch)

DELTRAN EX1002
IPR2024-01219

in response to a single input – namely, whether the shunt calibration flag is set."

Prelim. Resp. 15. Figure 3, illustrating a flow chart, is reproduced below:

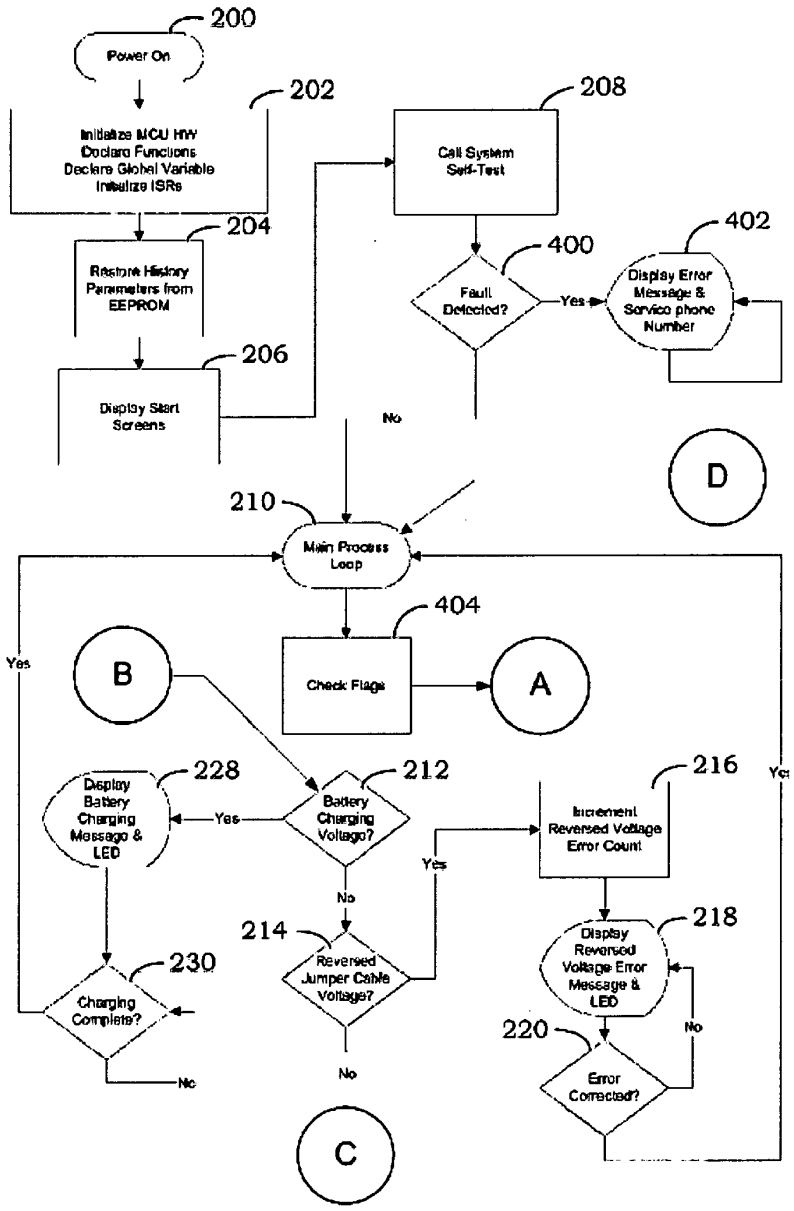


Fig. 3

Figure 3 is a partial flow chart of the processing steps of Richardson's device. Ex. 1006 ¶ 10. It includes main processing loop 210. The first step is to check flags at 404, and leads to Point A, continued in Figure 4, reproduced below:

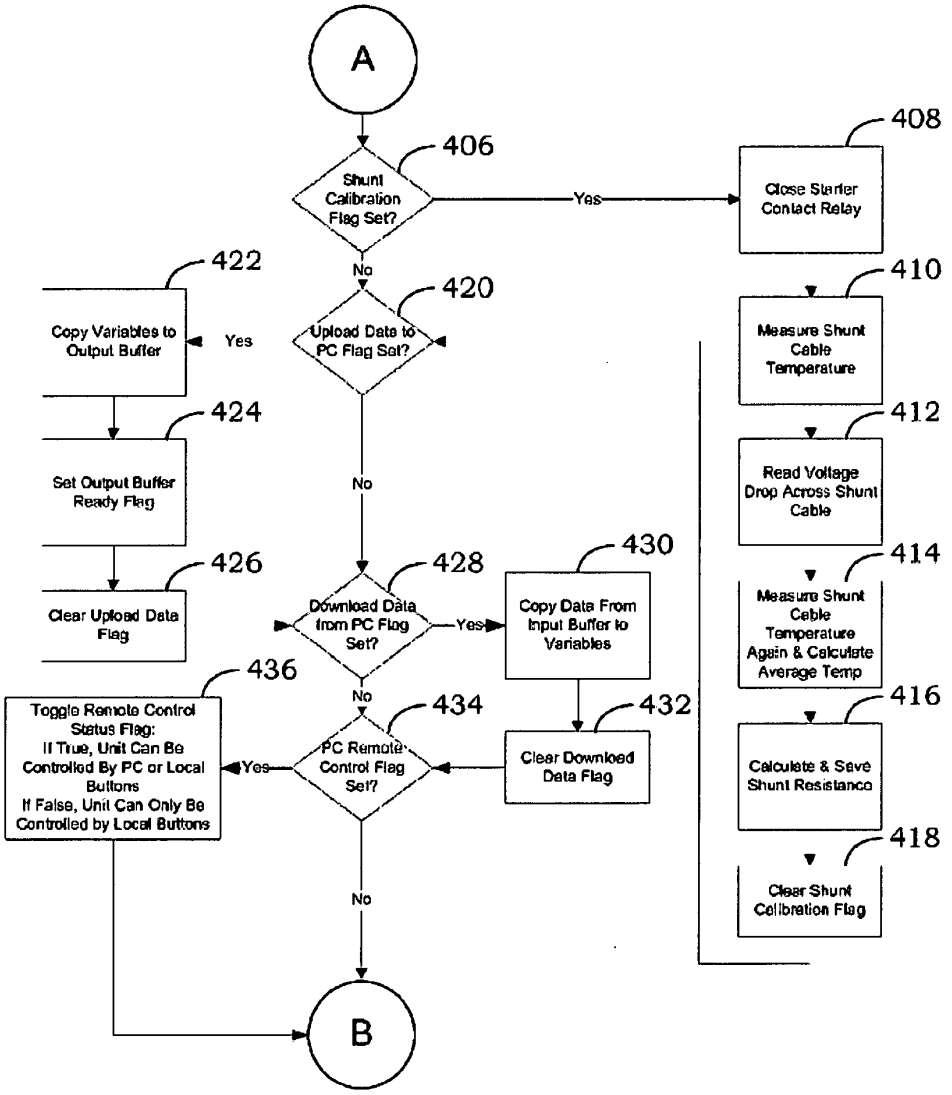


Fig. 4

Figure 4 is a partial flow chart of the processing steps of Richardson's device. Ex. 1006 ¶ 10. It shows that only a single question is asked at 406, i.e., whether

the shunt calibration flag is set, before closing the starter contact relay at 408, thus turning on the power switch. Thereafter, further steps are taken until Point B, which leads back to Figure 3.

When processing returns back to Figure 3 through Point B, the next step is to check at 212 whether there is a charging voltage, and if not, then processing goes to 214 for the microcontroller to determine whether the vehicle battery has been connected, in error, with reverse polarity. Thus, it is *not* the case that the microcontroller checks if the vehicle battery has been connected with proper polarity before turning on the power switch. This set of operations confirms our conclusion above on Petitioner's reasoning, that Paragraph 24 of Richardson, cited by Petitioner, does not support Petitioner's assertion that in Richardson the power switch is turned on *only* if the presence of a vehicle battery is detected and the connection to the vehicle battery is made with the proper polarity.

Additionally, without integrating the argument into its earlier contentions, Petitioner cites to a separate portion of Richardson's disclosure, pertaining to checking if an operator has set the apparatus's configuration to that corresponding to the type of vehicle battery, as indicating detecting the presence of a vehicle battery before turning on the power switch to jump start the vehicle. Pet. 28–30. Petitioner asserts:

> 44. Richardson discloses that the starter voltage of the jump starter apparatus can be configured by the operator "for 12, 18, 24, 30, 36, 42, or 48 volts, for example." Ex. 1006, ¶ 0034. Richardson discloses a vehicle voltage sensor 30 that "monitors the voltage on line 37 (voltage of the vehicle)" for detecting the voltage of the vehicle to be started. Ex. 1006, ¶ 0016. "If one of the push buttons 42 or 44 has been selected, the system will compare the operator-configured starter voltage against the voltage of the vehicle to be started 28. . . . If the difference between the voltage selected and the voltage measured is not within a predetermined range and tolerance 252, a "Wrong Selector

> Volts" message is displayed 254 on the LCD 46 and further operation is prohibited until the correct voltage is selected 256 at which point processing returns to the main processing loop 210." Ex. 1006, ¶ 0034. In other words, Richardson discloses that if a vehicle battery with a particular voltage that matches an operator-configured starter voltage is not detected by the vehicle voltage sensor 30, then the charging process cannot occur.
>
> 45. The process of sensing the voltage of the vehicle battery by the vehicle voltage sensor 30 necessarily involves detecting the presence or absence of the vehicle battery since a reading of zero volts would indicate the absence of a battery. The system controller turns on the power switch only if the battery were present and further more within a particular range (which has to be greater than zero since the operator-configured starter voltage will always be some positive number greater than zero).

Id. at 29–30.

Petitioner's argument is unpersuasive for two reasons. First, the referenced procedure does not compare the detected voltage to zero and makes no determination that the detected voltage equals zero. The determination made is whether the difference between the detected voltage and the battery type as set by the operator is within a predetermined range. If it is not, then a conclusion is drawn that the operator has selected the wrong setting and such an alert message is displayed to the operator. Ex. 1006 ¶ 34. There is no awareness of whether a vehicle battery is connected. In the absence of a connected battery, the difference with respect to a selected setting would lead to a conclusion that the operator has made the wrong selection of battery type, not that a battery has not been connected.

Second, even assuming that Petitioner is correct that the procedure for checking proper configuration setting for battery type determines the presence or absence of a battery, Petitioner has not sufficiently shown that that process occurs before closing of the power switch as is required by claim 1. The procedure at

issue occurs in the operational flow chart shown in Figure 5, where the starting point is labeled Point "C," reproduced below:

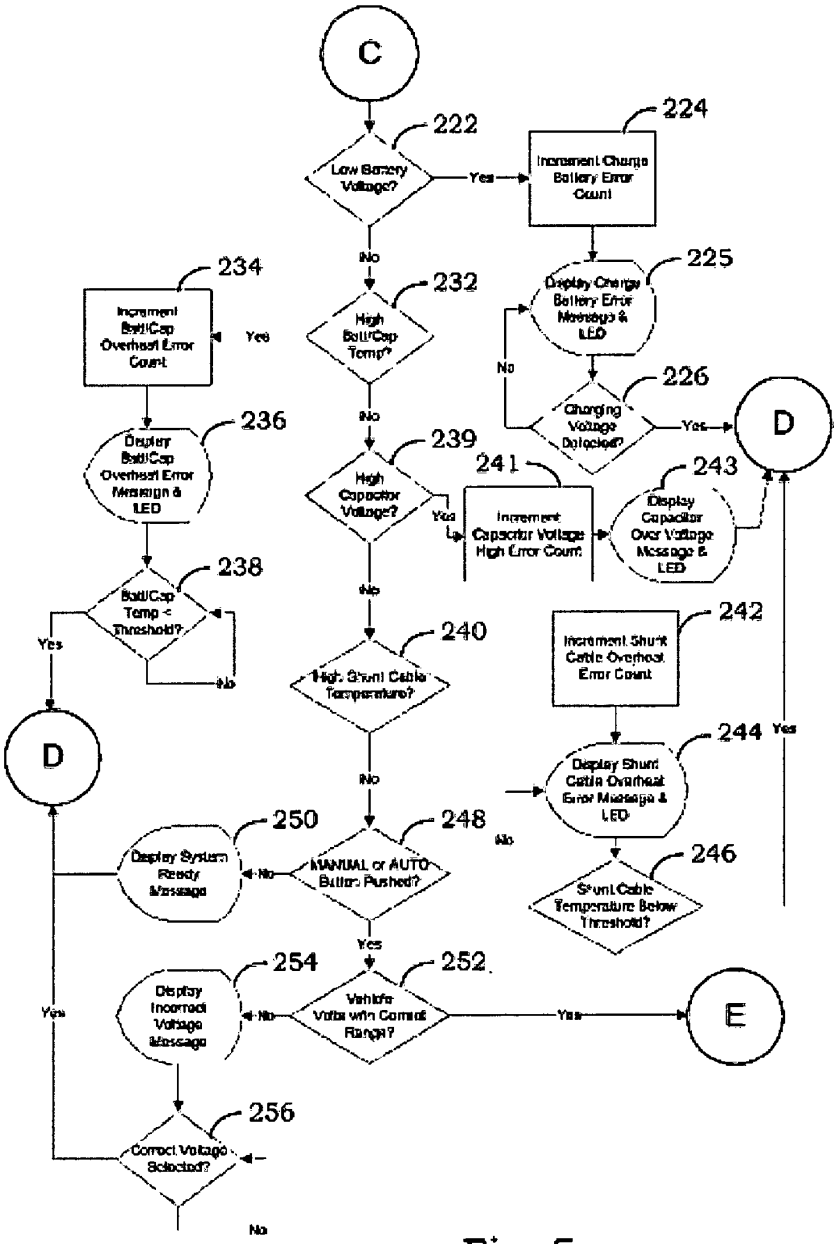


Fig. 5

Figure 5 is a flow chart within which is shown the steps for determining whether the operator has selected the correct battery type configuration. Ex. 1006 ¶ 34. Box 248 is where it is determined whether the operator has pressed buttons 42 or 44. *Id.* ¶ 33. Box 252 is where it is determined whether the difference between the voltage selected and the detected voltage is not within a predetermined range. *Id.* ¶ 34. All of the actions taken in Figure 5, however, appear to be subsequent to closing of the starter contact relay or power switch 34, not prior.

As shown in Figure 3, the process proceeds from Box 404 to actions represented by "A." As shown in Figure 4, when actions in "A" are completed, the process advances to Point "B." As shown in Figure 3, Point "B" leads to Box 212 and then Box 214 in Figure 3. Finally, as shown in Figure 3, the process advances from Box 214 to actions represented by "C." Figure 5 illustrates the actions taken in "C." As discussed above, the power switch is turned on within "A," specifically Box 408 in "A." Yet, all of "A" precedes entry of the process into "C" where the battery type selection is checked at Box 252 as discussed above. This flow of events is contrary to Petitioner's contention that the power switch is turned on after the checking that is performed at Box 252.

For the foregoing reasons, we have substantial doubt with respect to Petitioner's assertion that claim 1 is anticipated by Richardson. Claims 7–9, 15, and 17–21 each depend, directly or indirectly, from claim 1, and thus incorporate all of the limitations of claim 1. 35 U.S.C. § 112(d). Thus, we have the same doubt as that explained above for claim 1, with respect to claims 7–9, 15, and 17–21.

D. Alleged Obviousness of Claims 2, 3, 12–14, and 23 over Richardson and Lei

Claims 2, 3, 12–14, and 23 each depend, directly or indirectly, from claim 1, and thus incorporate all of the limitations of claim 1. 35 U.S.C. § 112(d). Lei, as

DELTRAN EX1002
IPR2024-01219

applied by Petitioner, does not make up for the deficiency of Richardson as discussed above in the context of claim 1, but relates to limitations additionally set forth in the dependent claims. Thus, we have the same doubt as that explained above for claim 1, with respect to claims 2, 3, 12–14, and 23.

E. Alleged Obviousness of Claims 4 and 5 over Richardson and Krieger

Claims 4 and 5 each depend from claim 1, and thus incorporate all of the limitations of claim 1. 35 U.S.C. § 112(d). Krieger, as applied by Petitioner, does not make up for the deficiency of Richardson as discussed above in the context of claim 1, but relates to limitations additionally set forth in claims 4 and 5. Thus, we have the same doubt as that explained above for claim 1, with respect to claims 4 and 5.

F. Alleged Obviousness of Claim 6 over Richardson and Wanzong

Claim 6 depends from claim 1, and thus incorporates all of the limitations of claim 1. 35 U.S.C. § 112(d). Wanzong, as applied by Petitioner, does not make up for the deficiency of Richardson as discussed above in the context of claim 1, but relates to limitations additionally set forth in claim 6. Thus, we have the same doubt as those explained above for claim 1, with respect to claim 6.

G. Alleged Obviousness of Claim 16 over Richardson and Baxter

Claim 16 depends indirectly from claim 1, and thus incorporates all of the limitations of claim 1. 35 U.S.C. § 112(d). Baxter, as applied by Petitioner, does not make up for the deficiency of Richardson as discussed above in the context of claim 1, but relates to limitations additionally set forth in claim 16. Thus, we have the same doubt as those explained above for claim 1, with respect to claim 16.

H. Alleged Obviousness of Claims 10–13 over Richardson and either Epower-20 or Epower-21

Claims 10–13 each depend, directly or indirectly, from claim 1, and thus incorporate all of the limitations of claim 1. 35 U.S.C. § 112(d). Epower-20 and Epower-21, as applied by Petitioner, do not make up for the deficiency of Richardson as discussed above in the context of claim 1, but relate to limitations additionally set forth in claims 10–13. Thus, we have the same doubt as those explained above for claim 1, with respect to claims 10–13.

I. Alleged Obviousness of Claim 22 over Richardson and Richardet

Claim 22 depends indirectly from claim 1, and thus incorporates all of the limitations of claim 1. 35 U.S.C. § 112(d). Richardet, as applied by Petitioner, does not make up for the deficiency of Richardson as discussed above in the context of claim 1, but relates to limitations additionally set forth in claim 22. Thus, we have the same doubt as those explained above for claims claim 1, with respect to claim 22.

J. Alleged Anticipation of Claims 1, 7, and 21 by Klang

1. Klang

Klang relates to an apparatus and method for rapidly carrying out diagnostic tests on lead-acid batteries and charging such batteries if appropriate. Ex. 1007, 1:15–19. It relies on the known fact that battery resistance can be characterized by discharging at various rates and measuring the resulting voltage. *Id.* at 3:5–9. In that context, it was known that current versus voltage relationship is linear and the proportionality constant is the resistance of the battery in a discharging mode. *Id.* at 3:9–13. Klang's diagnostic test unit utilizes a charger combined with a rapidly

variable load controlled by signals to and from a microprocessor. *Id.* at 3:15–18.

Figure 1 of Klang illustrates the diagnostic test unit and is reproduced below:

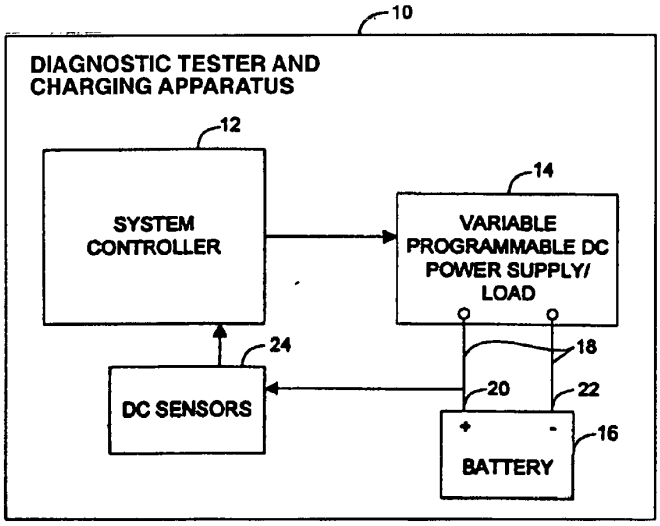


FIG._1

Figure 1 is a block diagram of Klang's diagnostic test unit. *Id.* at 3:66–67. Among other steps, Klang describes determining whether a battery is connected, and also whether the battery is connected in reverse polarity. *Id.* at 8:55–65.

Figure 2 illustrates the system controller and is reproduced below:

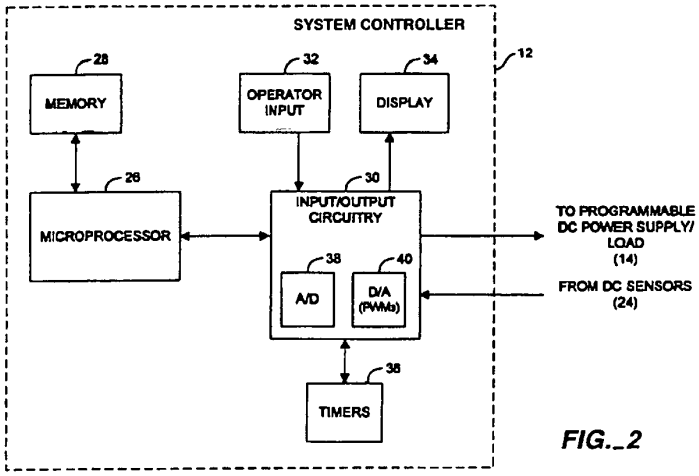


FIG._2

DELTRAN EX1002
IPR2024-01219

Figure 2 is a block diagram of a system controller, which includes microprocessor 6, memory 28, and input/output circuitry 30. *Id.* at 5:27–29. Input/Output circuitry 30 is coupled to operator input 32, and also display 34, which displays relevant output messages such as the status of diagnostic testing or charging or a prompt for the operator to enter commands or data. *Id.* at 5:34–39. Input/Output circuitry 30 is coupled to the power supply, load 14, microprocessor 26, and sensors 24. *Id.* at 5:39–46.

Figure 3 illustrates sensors in the diagnostic unit and is reproduced below:

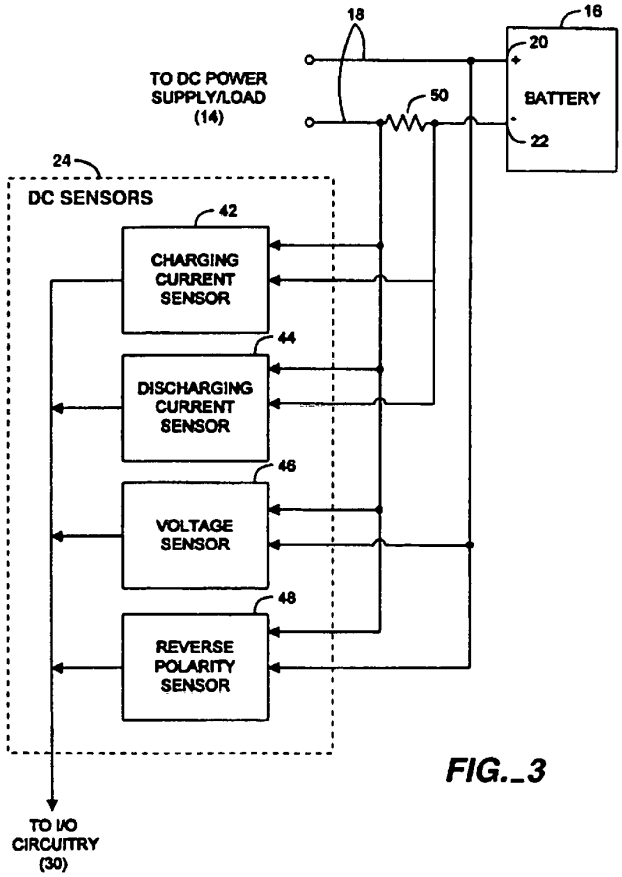


FIG._3

Figure 3 is a block diagram of DC sensors for sensing voltage and current across the battery terminals according to the Klang. *Id.* at 4:4–6. Voltage sensor 46

DELTRAN EX1002
IPR2024-01219

measures the voltage across terminals 20 and 22 of battery 16. *Id.* at 6:12–14. Reverse polarity sensor 48 also is connected across battery terminals 20 and 22, and senses negative voltage indicating that the battery leads are connected backwards. *Id.* at 6:20–22. Charging current sensor 42 and discharging current sensor 44 are connected to measure the current across shunt resistor 50. *Id.* at 6:27–29. Charging current sensor 42 measures current flow into the battery. *Id.* at 6:30–32. Discharging current sensor 44 is used to measure current flow out of the battery. *Id.* at 6:38–39.

Figure 4 illustrates Klang's variable power supply and load and is reproduced below:

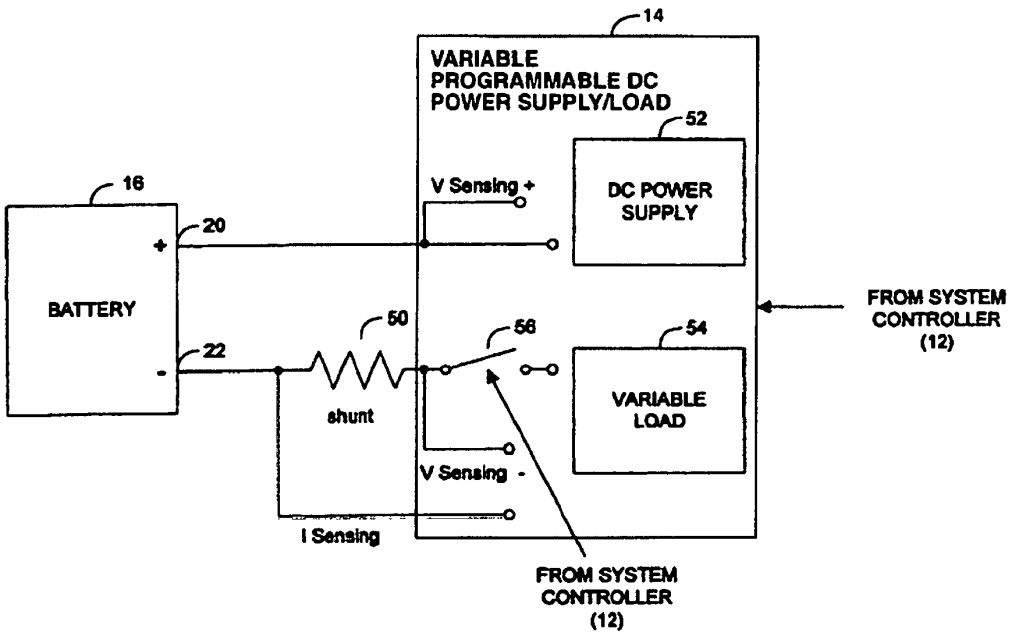


FIG._4

Figure 4 is a block diagram of a variable programmable DC power supply and load for charging and discharging batteries. *Id.* at 4:7–9.

DELTRAN EX1002
IPR2024-01219

Variable programmable DC power supply and load 14 includes DC power supply 52 and variable load 54. *Id.* at 6:47–49. The amount of current or voltage supplied by power supply 14 is determined by system controller 12, which sends commands to power supply 14. *Id.* at 6:52–54. With regard to connecting the variable programmable power supply and load to the vehicle battery, Klang describes as follows:

> During the diagnostic test or charge, the system controller 12 may control means 56 such as a relay, a switch or the like to automatically connect the battery 16 to the circuit. For example, the switch 56 is open while measuring the open circuit voltage of the system. Conversely, the switch 56 is closed allowing current to flow across a shunt resistor 50 to enable charging, discharging and current measurements to be taken.

Id. at 7:7–14,

2. Claim 1

Claim 1 begins with this recitation: "Apparatus for jump starting a vehicle engine." Ex. 1001, 8:4. Petitioner asserts that this preamble does not limit the claim, because (1) it only recites an intended use of an apparatus, (2) it imposes no structural requirement beyond those recited in the body of the claim, (3) no argument depending on "jump starting a vehicle engine" was made to overcome prior art during prosecution, and (4) "jump starting a vehicle engine" does not provide antecedent basis for anything in the body of the claim. Pet. 68. Patent Owner has not submitted any contrary argument. We agree with Petitioner that the recitation merely articulates an intended use, and, thus, is non-limiting. In any event, satisfaction of all of the elements in the body of the claim, as explained below, also would satisfy the intended use of "jump starting a vehicle engine."

Claim 1 recites "an internal power supply." *Id.* at 8:6. Petitioner asserts that Klang describes that its device includes an internal power supply. Pet. 69–70

DELTRAN EX1002
IPR2024-01219

(citing Ex. 1007, 5:9–17). Patent Owner does not dispute the assertion. Petitioner's assertion is supported by the cited description of Klang. Ex. 1007, 5:10–13. We are sufficiently persuaded by Petitioner that Klang's device includes an internal power supply.

Claim 1 recites "an output port having positive and negative polarity outputs." Ex. 1001, 8:7–8. Petitioner asserts that Klang's device includes an output port having positive and negative polarity outputs through which power from the internal power supply is transmitted. Pet. 71 (citing Ex. 1007, Fig. 1, 5:17–19). Patent Owner does not dispute the assertion. Petitioner's assertion is supported by the cited description of Klang. Ex. 1007, Fig. 1, 5:17–19. We are sufficiently persuaded by Petitioner that Klang's device includes "an output port having positive and negative polarity outputs."

Claim 1 recites "a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs." Ex. 1001, 8:9–12. Petitioner cites to voltage sensor 46 of Klang's Figure 3 as meeting this limitation. Pet. 72–73. As illustrated, voltage sensor 46 is connected to measure the voltage across terminals 20 and 22 of battery 16. Ex. 1007, Fig. 3.

Petitioner explains as follows: "The voltage sensor 46 detects the presence of the battery 16 by detecting whether it is connected. 'If the OCV [open circuit voltage] is greater than -0.5V, at step 148, the OCV is compared to an extremely low voltage to determine whether a battery is connected.'" Pet. 73 (citing Ex. 1007, 8:55–58). Petitioner also explains that Figure 3 of Klang shows voltage sensor 46 as separate from reverse polarity sensor 48. Pet. 73. Petitioner's assertions are supported by the cited disclosures of Klang.

DELTRAN EX1002
IPR2024-01219

Notwithstanding contrary argument of Patent Owner, discussed below, we are sufficiently persuaded by Petitioner that Klang's device includes "a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs."

Claim 1 recites "a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative outputs of said output port." *Id.* at 8:13–20. Petitioner cites to reverse polarity sensor 48 of Klang's Figure 3 as meeting this limitation. Pet. 75–76. As illustrated, reverse polarity sensor 48 is connected to measure the voltage across terminals 20 and 22 of battery 16. Ex. 1007, Fig. 3.

Petitioner explains as follows:

> Referring to FIG. 3, Klang states: "[t[he reverse polarity sensor 48, connected in a like manner across the battery terminals 20, 22, senses negative voltage indicating that the battery leads are connected backwards." Ex. 1007, 6:20–23. Klang's reverse polarity sensor provides an output signal (sensed negative voltage) indicating whether the battery has a proper polarity connection. Klang states: "[i]f the start button has not been pressed, at step 144, the OCV [battery open circuit voltage] is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery 16. If the OCV is less than -0.5V, the method proceeds at step 146 to notify the operator that the leads are reversed." Ex. 1007, 8:55–60.

Pet. 75–76. Petitioner also explains that Figure 3 of Klang shows reverse voltage sensor 48 as separate from voltage sensor 46. Pet. 76. Petitioner's assertions are supported by the cited disclosures of Klang.

DELTRAN EX1002
IPR2024-01219

Notwithstanding contrary argument of Patent Owner, discussed below, we are sufficiently persuaded by Petitioner that Klang's device includes "a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative outputs of said output port."

Claim 1 recites "a power switch connected between said internal power supply and said output port." Ex. 1001, 8:21–22. Citing Figure 4 of Klang, Petitioner asserts that "Klang discloses a switch 56 connected between the power supply 52 and the leads (output port) connected to the battery 16." Pet. 77. Petitioner explains that "[d]uring the diagnostic test or charge, the system controller 12 may control means 56 such as a relay, a switch or the like to automatically connect the battery 16 to the circuit. . . ." *Id.* at 77–78 (citing Ex. 1007, 7:7–14). Patent Owner does not dispute the assertions. Petitioner's assertions are supported by the cited disclosures of Klang. We are sufficiently persuaded by Petitioner that Klang's device includes "a power switch connected between said internal power supply and said output port."

Claim 1 recites "a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch." Ex. 1001, 8:23–26. Petitioner identifies Klang's system controller 12, shown in Figure 1, as the claimed microcontroller. Pet. 78–79. Figure 1, illustrating Klang's test unit, is reproduced below:

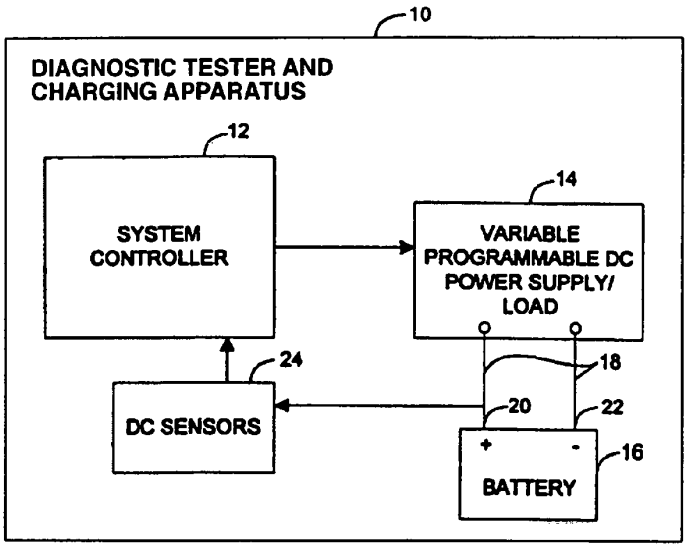


FIG._1

Figure 1 is a block diagram of Klang's diagnostic test unit. Ex. 1007, 3:66–67. Klang describes that "[t]he DC sensors [including voltage sensor 46 and reverse polarity sensor 48 shown in Klang's Figure 3], which sense current and voltage across the battery terminals 20, 22, return the values thereof to the system controller 12 to which they are coupled." *Id.* at 5:22–25 (cited by Petitioner at Pet. 79). Klang further describes that the system controller 12 is coupled to the power supply 14 and includes control circuitry for regulating the output of power supply 14." *Id.* at 5:13–16 (cited by Petitioner at Pet. 78). Petitioner notes that power switch 56 is within variable programmable DC power supply/load 14, citing Figure 4 of Klang. Pet. 78. These assertions are supported by the cited disclosures of Klang.

Notwithstanding contrary argument of Patent Owner, discussed below, we are sufficiently persuaded by Petitioner that Klang's device includes "a microcontroller configured to receive input signals from said vehicle isolation

sensor and said reverse polarity sensor, and to provide an output signal to said power switch."

Patent Owner argues that Klang does not disclose two separate sensors, one for detecting the presence of a battery and another for detecting whether, as connected, the polarity of the vehicle battery is reversed. Prelim. Resp. 22. According to Patent Owner, Klang discloses only a single sensor that does both detections. *Id.* at 22. In support of that assertion, Patent Owner explains that "Klang provides only one input signal to the microprocessor, namely the open circuit voltage." *Id.* at 22–23. With respect to the multiple sensors illustrated in Klang's Figure 3, Patent Owner notes that "Klang does not explain or illustrate how these sensors are constructed to measure the voltage across the terminals 20, 22 of the battery 16." *Id.* at 23. Patent Owner then produces a color annotated version of Klang's Figure 6, illustrating an operational flow chart, shown below:

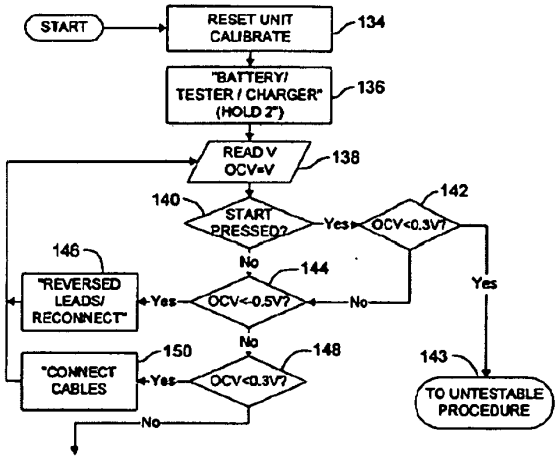


Figure 6 is a logical flow diagram illustrating the steps involved in starting up the diagnostic tester and charging system of Klang. Ex. 1007, 4:14–16 (color annotation added by Patent Owner (Prelim. Resp. 23)).

Patent Owner notes that Klang states that "the voltage sensor 46 and the reverse voltage polarity sensor 48 read the voltage across the battery terminals 20, 22 without any load or charge." Prelim. Resp. 24 (citing Ex. 1007, 8:42–45). Patent Owner states that "[t]he battery open circuit voltage is a single measurement illustrated at step 138 in FIG. 6." Prelim. Resp. 24. On the basis of Figure 6, Patent Owner explains: "After reading the open circuit voltage, Klang then compares that single measurement against each of two thresholds in steps 144 and 148. These comparisons perform the function of the voltage sensor 44 and reverse polarity sensor 48 illustrated in FIG. 3." *Id.* Thus, Patent Owner contends:

> Contrary to the requirement in Claim 1, Klang discloses that the microprocessor receives one and only one signal – the measured open circuit voltage. The microprocessor does not receive "distinct input signals from said vehicle battery isolation sensor and said reverse polarity sensor, respectively" as required by the construction proposed by Petitioner and adopted in the pending litigation.

Id. at 25.

Patent Owner's argument is misplaced and unpersuasive. The argument ignores the block diagram shown in Figure 3 of Klang, and also assumes that the open circuit voltage across the battery terminals is taken by only one sensing circuit and also outputted by only one sensing circuit. The operational flow chart of Figure 6 illustrates only the steps that are taken, not what structures perform those steps or how many structures perform those steps. It is not inconsistent with the two sensors being separate from each other.

Even assuming it is true that Klang provides only one substantive input signal to the microprocessor, namely the open circuit voltage, that does not mean the open circuit voltage cannot be taken twice by two separate structures, and separately provided to the microprocessor. Indeed, Figure 3 of Klang shows two separate identities for the voltage sensor 46 and the reverse polarity sensor 48, and

DELTRAN EX1002
IPR2024-01219

separate inputs and outputs for those sensors, respectively. Patent Owner's argument fails to distinguish the substance of a signal with separate instances of the signal. Further, we note additional disclosures of Klang, reproduced below, that clearly indicate that the two sensors have separate structures:

> As illustrated, the voltage sensor 46 is connected in a conventional manner to measure the voltage across the terminals 20, 22 of the battery 16. The voltage across the battery terminals is read and attenuated by a voltage attenuator in order to match the input range of the analog-to-digital converters 38 residing in the system controller 12. The voltage sensor 46 is selected so as to be sensitive enough to reflect critical voltage changes with 0.01V accuracy.
>
> The reverse polarity sensor 48, connected in a like manner across the battery terminals 20, 22, senses negative voltage indicating that the battery leads are connected backwards. The reverse polarity sensor 48 is similarly connected to a voltage attenuator which scales the voltage reading to match the input range of the analog-to-digital converters 38.

Ex. 1007, 6:11–25. The above-quoted text refers to Figure 3 of Klang, which illustrates sensor connections to the vehicle battery and is again reproduced below:

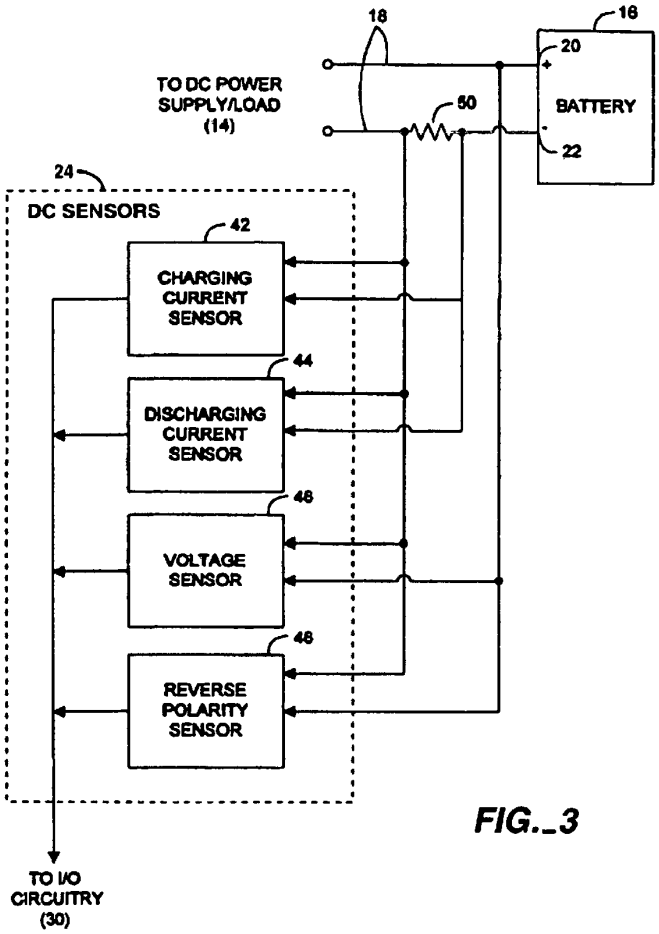


FIG._3

Figure 3 is a block diagram of DC sensors for sensing voltage and current across the battery terminals according to the Klang. Ex. 1007, 4:4–6.

We are sufficiently persuaded that Klang discloses current charging sensor 42 and reverse polarity sensor 48 that are separate from each other.

Claim 1, with respect to the claimed microcontroller, recites:

> such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals

> of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

Ex. 1001, 8:26–37.

Figure 5 is a logical flow diagram illustrating the steps in the overall performing the diagnostic battery test and battery charging procedures according to Klang. Ex. 1007, 4:10–12; 7:49–57. Figure 6 is a logical flow diagram more particularly illustrating the start-up portion of Klang's procedure. *Id.* at 4:13–15. Petitioner refers to the flow charts shown in Klang's Figures 5 and 6. Pet. 84–85. The box immediately after "START" box 100 is box 102 and is labeled "START UP PROCEDURE (CONNECT AND INPUT BATTERY PARAMETERS)." Ex. 1007, Fig. 5. Petitioner asserts that in step 102, the start-up procedure is invoked "wherein proper connection of the battery to the diagnostic unit is verified." Pet. 83 (citing Ex. 1007, 7:49–57). Petitioner further notes that the "start-up" process is more particularly illustrated in Figure 6 of Klang. *Id.*

A pertinent part of Figure 5, illustrating the overall procedure according to Klang, from starting up the device at step 100 to starting to charge a depleted battery at step 114, is reproduced below:

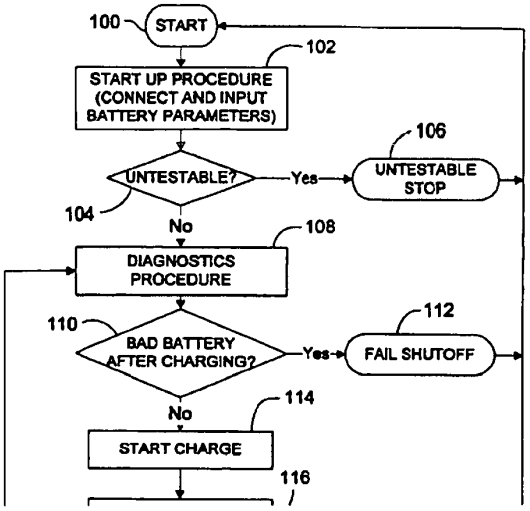


Figure 5 is a logic flow diagram illustrating the steps involved in performing the diagnostic battery test and battery charge procedure of Klang. Ex. 1007, 4:10–12.

A pertinent portion of Figure 6, illustrating the particulars of the start-up procedure relied on by Petitioner, is reproduced below:

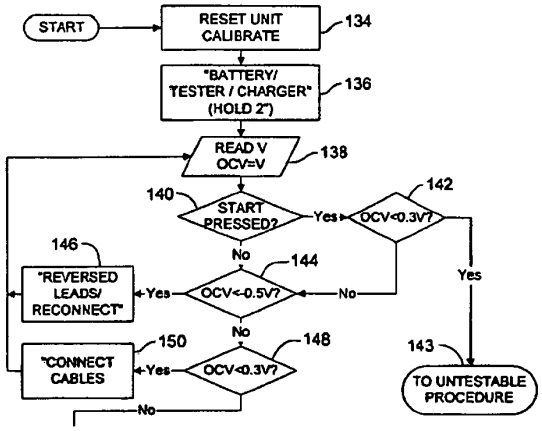


Figure 6 shows the logic flow of the steps involved in starting up Klang's diagnostic tester and charging system. Ex. 1007, 4:14–16.

Klang describes that, at step 144, a determination is made and if OCV is less than –0.5V, "the method proceeds at step 146 to notify the operator that the leads are reversed." Ex. 1007, 8:55–60 (cited by Petitioner at Pet. 86). Klang describes

that, at step 148, a determination is made and if OCV is less than 0.3V, "indicating that a battery is not connected, the method proceeds at step 150 to display a message instructing the operator to connect the cables." Ex. 1007, 8:60–65 (cited by Petitioner at Pet. 86). Referring to the flow diagram of Figure 5, Petitioner explains that it is only after the start-up process of Figure 6 has been completed that logic flow returns to the path in Figure 5 and then at step 114 in Figure 5, "the charger will be turned on and the battery will be charged." Pet. 83 (citing Ex. 1007, 8:5–8).

On the basis of the foregoing, Petitioner contends that Klang discloses the above-quoted limitation regarding the microcontroller, where the power switch is turned on "in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs," and is not turned on "when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs." Pet. 82. Petitioner's position is supported by the cited disclosures of Klang. Notwithstanding the contrary arguments of Patent Owner, discussed below, we are sufficiently persuaded that Klang describes the limitation.

Patent Owner relies on the complete flow chart in Figure 6 of Klang. The complete chart of Figure 6, color annotated by Patent Owner, is reproduced below:

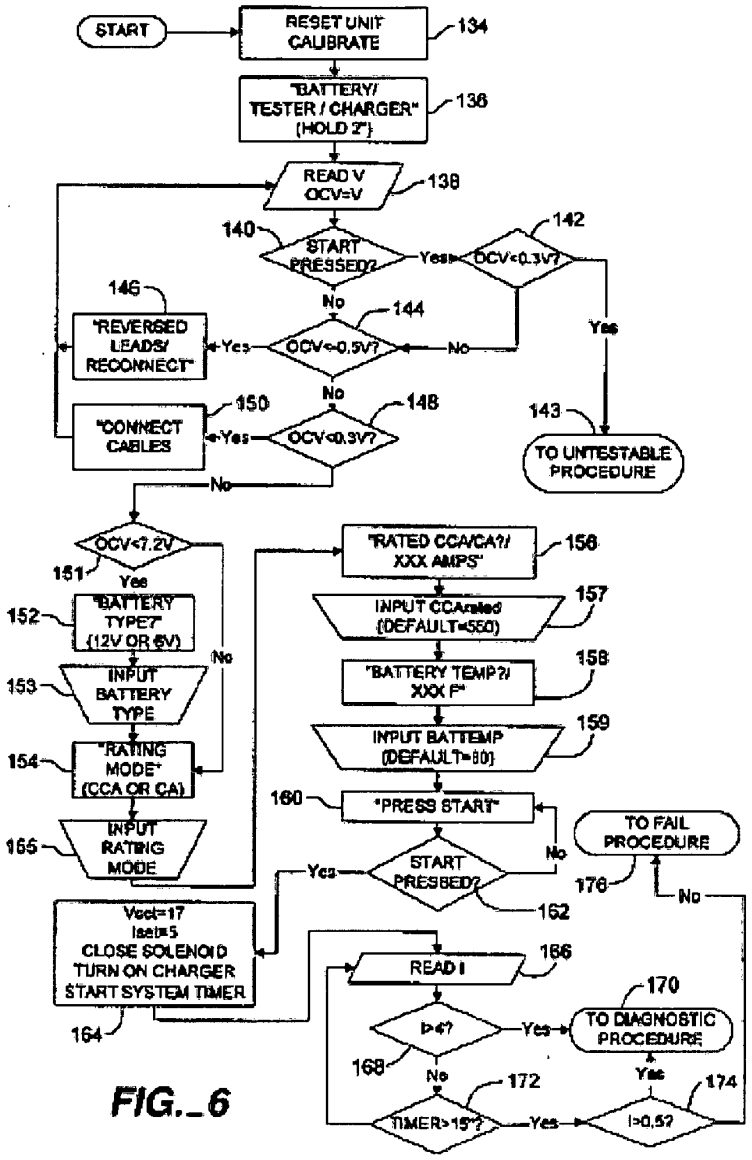


FIG._6

Figure 6 is a logic flow diagram illustrating the steps in starting up Klang's diagnostic tester and charging system. Ex. 1007, 4:14–16.

Patent Owner argues that the complete flow chart in Figure 6 of Klang shows that power switch 56, a solenoid, is closed at step 164, upon detecting that the START button has been pressed by the operator, and thus the power switch is

turned on in response to the operator pressing the START button, not "in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs" as claimed. Prelim. Resp. 20–21 (emphasis omitted).

Patent Owner asserts that "[e]ven assuming that Klang disclosed every other limitation of Claim 1, Klang is explicit that the solenoid switch is instructed to close in response to manual intervention of the user — specifically when the user presses the start button." *Id.* at 21. Patent Owner further asserts that "[n]either the Petition nor Petitioner's expert address the explicit disclosure that the Klang controller turns on the solenoid in response to manual intervention of the user." *Id.* Patent Owner states that "Klang is explicit that once the user presses the start button (step 162), the solenoid is closed (step 164)." *Id.* at 22.

Patent Owner's argument is misplaced and unpersuasive. The pertinent disclosure of Klang is this:

> Once critical battery information is input into the system, at step 160 the operator is prompted to press start. The method then waits at step 162 until start is pressed . . . . Thereafter, commands are sent to close the solenoid switch 56 to allow current flow into the battery, to turn the charger on, and to set the start the system timer.

Ex. 1007, 9:45–54. Although it is true that the system prompts the operator to press the START button and waits for the START button to be pressed, that is not inconsistent with turning on the power switch in response to signals indicating presence of the vehicle battery and proper polarity connection to the vehicle battery. As shown in Figure 6, step 160 cannot be reached until and unless the system has moved through steps 146 and 150, discussed above, which verify that a vehicle battery is present and that the vehicle battery has been connected with proper polarity, respectively. Thus, the closing of the solenoid or turning on of

power switch 56 is in response to signals indicating presence of the vehicle battery and proper polarity connection of the vehicle battery and also to the operator pressing the START button upon being prompt to do so. The recitation in the claim of "in response to" does not restrict the trigger to "only" those specifically identified in the claim and nothing else. In this circumstance, the closing of the switch is in response to all three elements, i.e., signal indicating presence of the vehicle battery, signal indicating proper polarity connection of the vehicle battery, and pressing of the START button by operator upon prompting. That is sufficient to meet the claim requirement of turning on the power switch in response to signals indicating presence of the vehicle battery and proper polarity connection of the vehicle battery.

For the foregoing reasons, Petitioner has shown a reasonable likelihood that it would prevail in establishing that claim 1 is anticipated by Klang.

3. Claims 17 and 21

Claims 17 and 21 each depend from claim 1, and thus incorporates all of the limitations of claim 1. 35 U.S.C. § 112(d). Claim 17 additionally recites "further comprising a visual indicator configured to warn a user when the vehicle battery is connected with reverse polarity." Ex. 1001, 9:17–19. Claim 21 additionally recites "further comprising a jumper cable device including a plug configured to plug into said output port, a pair of cables integrated with the plug at one respective end thereof and being configured to be connected to terminals of a battery at another respective end thereof." *Id.* at 10:10–14.

With respect to claim 17, Petitioner explains as follows:

> Klang states "[i]f the start button has not been pressed, at step 144, the OCV is compared to a low negative voltage to determine whether the conducting cables 18 are properly connected to the battery

> 16. If the OCV is less than –0.5V, the method proceeds at step 146 to notify the operator that the leads are reversed.

Pet. 87. Petitioner further asserts that Klang discloses outputting such messages on a visual display. *Id.* (citing Ex. 1007, 5:34–39). The assertion is supported by the cited disclosure of Klang, which states: "The I/O circuitry 30 is also coupled to a display 34 that comprises the means to display relevant output messages, such as messages informing the operator on the status of diagnostic testing or charging, or messages prompting the operator to enter commands or data." Ex. 1007, 5:34–39. Further, Klang states that "the method proceeds at step 146 [Fig. 6] to notify the operator that the leads are reversed." *Id.* at 8:59–60 (cited by Petitioner at Pet. 87). Petitioner notes that in Figure 6, step 146 identifies the text "REVERSED LEADS / RECONNECT" in quotations, which further indicates that the text is displayed to the operator. Pet. 87–88.

Petitioner's assertions are supported by the cited disclosures of Klang. Patent Owner does not present counter-arguments with respect to claim 17, other than those already discussed above in the context of claim 1. We are sufficiently persuaded by Petitioner that Klang discloses that its device includes "a visual indicator configured to warn a user when the vehicle battery is connected with reverse polarity."

With respect to claim 21, Petitioner identifies jumper cable 18 illustrated in Figure 3 of Klang as the claimed jumper cable device. Pet. 88. Petitioner cites to the following description in Klang: "The power supply and load 14 are coupled in a conventional manner to a battery 16 using conducting cables 18 which link the power supply and load 14 to the charging terminals 20, 22 of the battery 16." Ex. 1007, 5:17–20 (cited by Petitioner at 88).

Petitioner's assertions are supported by the cited disclosures of Klang. Patent Owner does not present counter-arguments with respect to claim 21, other

than those already discussed above in the context of claim 1. We are sufficiently persuaded by Petitioner that Klang discloses that its device includes "a jumper cable device including a plug configured to plug into said output port, a pair of cables integrated with the plug at one respective end thereof and being configured to be connected to terminals of a battery at another respective end thereof."

Accordingly, Petitioner has shown a reasonable likelihood that it would prevail in establishing that claims 17 and 21 are anticipated by Klang.

K. Alleged Obviousness of Claims 4 and 5 over Klang and Krieger

Claims 4 and 5 each depend from claim 1, and thus incorporate all of the limitations of claim 1. 35 U.S.C. § 112(d). Claim 4 further recites "wherein said power switch comprises a plurality of FETs in parallel." Ex. 1001, 8:43–44. Claim 5 further recites "wherein said vehicle isolation sensor and reverse polarity sensor comprise optically coupled isolator phototransistors." *Id.* at 8:45–47.

Krieger relates to a booster device used for boosting a depleted battery, and in particular to microprocessor control of the booster apparatus and a polarity protection circuit. Ex. 1009 ¶ 2. Krieger discloses a polarity protection circuit that is electrically connected to the battery to be charged, the depleted battery, and to a boosting battery or other power source. *Id.* ¶ 10. Figure 1 of Krieger is a schematic diagram and is reproduced below:

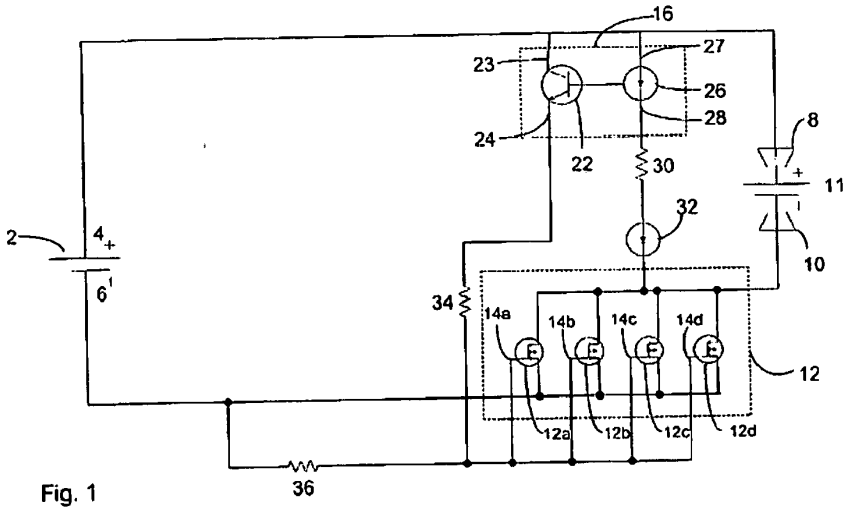


Fig. 1

Figure 1 of Krieger is a circuit schematic illustrating a polarity protection circuit. Ex. 1009 ¶ 22. Krieger describes "[t]he switch 12 is activated to complete a boosting circuit between the boosting battery 2 and the depleted battery 11 only when a correct polarity connection between the batteries is attained." *Id.* ¶ 29.

With respect to claim 4, Petitioner asserts that Krieger discloses a power switch comprising a plurality of FETs in parallel. Pet. 47. Petitioner cites the following disclosure of Krieger: "The [power] switch 12 is preferabl[y] a solid state device, such as a transistor, diode, field effect transistor (FET), etc. FIG. 1 represents the switch 12 as a number [of] FETs 12a–12d connected in parallel with each other." Ex. 1009 ¶ 0030 (cited by Petitioner at Pet. 47). The assertions of Petitioner are supported by the cited disclosures of Krieger. Patent Owner does not present contrary arguments with respect to these assertions.

Petitioner notes that Krieger explains that by using a solid state switch comprising FETs, "[t]here is no need for any mechanical or electro-mechanical devices." Pet. 48 (citing Ex. 1009 ¶ 33). Petitioner explains, citing the testimony of Dr. Kirtley, that "[s]ubstituting a relay switch in [Klang's] jump starter with a solid state switch comprising a plurality of FETs would have been obvious to a

DELTRAN EX1002
IPR2024-01219

POSITA to avoid or reduce electro-mechanical components, as suggested by Krieger." Pet. 48 (citing Ex. 1002 ¶ 144). Patent Owner does not present contrary arguments with regard to Petitioner's articulated reasoning for substituting Klang's relay with Krieger's solid state power switch. We are sufficiently persuaded by Petitioner that it would have been obvious to one with ordinary skill in the art to substitute Klang's relay switch with Krieger's solid state switch.

With respect to claim 5, Petitioner asserts that Krieger discloses a vehicle isolation sensor and reverse polarity sensor comprising an optically coupled phototransistor. Pet. 49. Petitioner cites the following disclosure of Krieger: "In the embodiment of FIG. 1, the polarity sensing circuit comprises an opto-isolator 16. The opto-isolator 16 comprises a phototransistor 22 and a light emitting diode (LED) 26." *Id.* (citing Ex. 1009 ¶ 0032). Petitioner also asserts that "Krieger uses the opto-isolator 16 to perform the functions of both the vehicle isolation sensor and reverse polarity sensor." *Id.* at 50 (citing Ex. 1009 ¶ 0033). These assertions of Petitioner are supported by the cited disclosures of Krieger. Patent Owner does not present contrary arguments with respect to these assertions.

Petitioner asserts that in light of Krieger's disclosure, it would have been obvious to one with ordinary skill in the art "to use one opto-isolator to sense the presence of a vehicle battery and a correct polarity connection, or two opto-isolators if a POSITA wanted to use one for battery detection and another for polarity connection, e.g., for redundancy." *Id.* at 50–51. Regarding reasons to apply Krieger's teachings in Klang, Petitioner explains as follows:

> A POSITA would be particularly motivated to use opto-couplers of the type [disclosed] by Krieger for sensing the presence of a vehicle battery and a correct polarity connection because the opto-coupler used in Krieger is an inherently digital device that can be preferable over using analog inputs to the system microcontroller, which may be subject to tests to determine if the vehicle battery is

> present or reversed. A POSITA would be motivated to simplify the system by using an optical coupler for one or both sensing functions, e.g., to provide a compact, packaged jump starter. Ex. 1002, ¶ 150.

Pet. 51. Petitioner's assertion is supported by the cited testimony of Dr. Kirtley. Ex. 1002 ¶ 150. Patent Owner does not present contrary arguments with regard to Petitioner's articulated reasoning for constituting each of Klang's vehicle isolation sensor and reverse polarity sensor with an optically coupled isolator phototransistor. We are sufficiently persuaded by Petitioner that in light of Krieger it would have been obvious to one with ordinary skill in the art to implement Klang's vehicle isolation sensor and reverse polarity sensor with optically coupled isolator phototransistors.

Accordingly, Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 4 and 5 over Klang and Krieger.

L. Alleged Obviousness of Claim 22 over Klang and Richardet

Claim 22 depends from claim 21, which depends from claim 1, and thus incorporates all of the limitations of claims 1 and 21. 35 U.S.C. § 112(d). Claim 22 further recites "wherein said jumper cable device further comprises a pair of ring terminals configured to respectively connect said pair of cables at said another end thereof with one of a battery terminal and a battery terminal clamp." Ex. 1001, 10:15–19.

Richardet relates to a battery terminal connector that provides a secure and stable connection to a motor vehicle battery. Ex. 1014, 1:60–65. Richardet also relates to providing a temporary clamping attachment to a charging battery to jump-start a car. *Id.* at 2:32–36. Petitioner cites to Figure 2A of Richardet, illustrating a battery connector assembly, reproduced below:

DELTRAN EX1002
IPR2024-01219

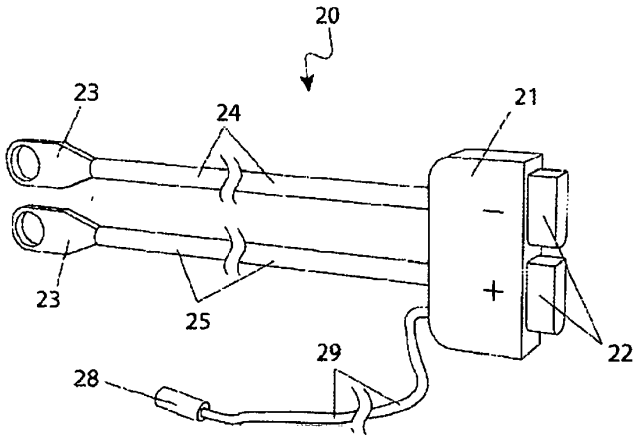


Fig. 2a

Figure 2A is a perspective view of a battery connector assembly portion 20 of a quick-release battery cable system 10. Ex. 1014, 3:5–7. Richardet describes:

> The battery connector assembly 20 comprises a first fastener 21, a pair of battery ring terminals 23, a negative battery cable 24, a positive battery cable 25, and an accessory connector 28. The battery ring terminals 23 provide an attachment means thereto a positive battery terminal 120 and a negative battery terminal 130 thereon a primary battery 100 (see FIG. 3). The battery ring terminals are attached to appropriately gauged battery cables 24, 25 comprising heavy gauged battery cables 24, 25 comprising heavily gauged conductors being approximately five (5) feet long.

Id. at 4:57–63 (cited by Petitioner at Pet. 65–66).

Based on the foregoing, Petitioner asserts that Richardet discloses a pair of ring terminals 23 to connect a pair pf cables 24, 25 with battery terminals 120 and 130. Pet. 66. The assertion is supported by the cited disclosures of Richardet, and Patent Owner does not present contrary arguments with respect to the assertion. We are sufficiently persuaded that Richardet discloses a pair of ring terminals as recited by claim 22.

Petitioner notes that Richardet states, with respect to preexisting systems, that there is a need for a means to "provide a battery terminal connection which

provides secure and stable connection to a motor vehicle battery or the like adaptable to a variety of common scenarios and which is simple and quick for an average user." Pet. 67 (citing Ex. 1014, 1:59–65). Petitioner asserts that using Richardet's cable system with ring terminals in Klang's battery charger would have been obvious to one with ordinary skill in the art "to provide a secure and stable connection to a motor vehicle battery in a way that is simple and quick for an average user, as suggested by Richardet." Pet. 92. The assertion is supported by the testimony of Dr. Kirtley. Ex. 1002 ¶ 203. Patent Owner does not present a contrary argument in this regard.

We are sufficiently persuaded that one with ordinary skill in the art would have had reason to use Richardet's cable system with ring terminals in Klang's battery charger. Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claim 22 over Klang and Richardet.

M. Alleged Obviousness of Claim 23 over Klang and Lei

Claim 23 depends from claim 21, which depends from claim 1, and thus incorporates all of the limitations of claims 1 and 21. 35 U.S.C. § 112(d). Claim 23 further recites "wherein said output port and said plug are dimensioned so that the plug will fit into the output port only in one specific orientation." Ex. 1001, 10:20–22.

Lei discloses an emergency power source that outputs a high current for starting a vehicle. Ex. 1008, 2:7–9. The emergency power source includes a battery pack. *Id.* at 2:13–14. Output terminals of the battery pack are connected to a high current outputting circuit for outputting a high current used for starting a vehicle. *Id.* at 2:17–20. An external smart battery detection system is connected between the battery pack and the high current outputting circuit. *Id.* at 2:23–25.

DELTRAN EX1002
IPR2024-01219

Petitioner asserts that Lei discloses a jumper cable device having a plug that fits into an output port only in one specific orientation. Pet. 45 (citing Ex. 1008, 7:65–8:35). The assertion is supported by the cited disclosure of Lei. In particular, Lei describes that a red power source clip and a black power source clip are used for connecting to an external battery. Ex. 1008, 7:65–67. Also, Lei describes that the red and black power source clips are connected, at the other end, to the battery pack "through an *anti-reverse connector* connected to the positive and negative electrodes of the battery pack 4." *Id.* at 8:10–14 (emphasis added). Dr. Kirtley testifies that "[t]he insertable anti-reverse connector disclosed by Lei comprises a plug that can fit into the output port only in the correct orientation, not a reversed connection." Ex. 1002 ¶ 131.

Patent Owner does not present contrary arguments with respect to the assertion. We are sufficiently persuaded that Lei discloses a jumper cable device having a plug that fits into an output port only in one specific orientation.

Petitioner asserts that one with ordinary skill in the art would have been motivated to incorporate the insertable anti-reverse connector of Lei in Klang's battery charging system "for safety or convenience for the user." Pet. 92. Patent Owner has not presented contrary argument in that regard. Dr. Kirtley testifies that one with ordinary skill in the art would have been motivated to incorporate Lei's insertable anti-reverse connector in Richardson's jump starter to void a reverse connection, "for safe operation and also convenience." Ex. 1002 ¶ 132. The same appears to be true with respect to using Lei's anti-reverse connector in Klang's battery diagnostic test unit. Petitioner's proposed reasoning to combine teachings is sufficiently based on rational underpinning.

Accordingly, Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claim 23 over Klang and Lei.

N. Discretionary Denial under 35 U.S.C. § 314(a)

Patent Owner asserts that we should exercise delegated discretion under 35 U.S.C. § 314(a) not to institute review, based on (1) the factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"), and also (2) separately, based on Patent Owner's assertion that the Declaration of Yingchun Wan (Ex. 1018, "Wan Declaration"), relied on by Petitioner on the issue of public accessibility of Epower20 and Epower-21 as printed publications, should be disregarded. Prelim. Resp. 26–37. The latter could be viewed as a *Fintiv* factor, the sixth *Fintiv* factor, i.e., other circumstances that impact the Board's exercise of discretion, including the merits. But because Patent Owner raised, characterized, and discussed it as a non-*Fintiv* factor, we will do the same, to avoid unnecessary confusion.

For reasons discussed below, we decline to discretionarily deny the Petition. First, we address the non-*Fintiv* factor raised by Patent Owner, i.e., that the Wan Declaration should be disregarded. *Id.* at 32–36. Then we discuss an application of the *Fintiv* factors to the circumstance here.

1. Non-*Fintiv* Factor

Patent Owner asserts that the Declaration "suggests that NOCO derived certain of the dependent claims from Carku," and that "[s]uch argumentation has no place in an *inter partes* review." Prelim. Resp. 32–33. Patent Owner, however, does not identify any specific testimony from YingChun Wan in that regard. It is incumbent on Patent Owner to specifically identify the testimony, if any, that fits the description. As is, we have nothing to evaluate. We also see no assertion in the Petition of derivation by Patent Owner.

Patent Owner also asserts that the Wan Declaration does not provide sufficient information in that (1) "there is little information provided as to the

number of people who picked up the brochures, or who exactly they might have been"; (2) "there is no statement in the declaration that the brochures were otherwise made available after the trade show, such as by placing links to them on Petitioner's website"; and (3) "this individual's declaration does not state that the declarant agrees to appear to testify in the United States for cross-examination regarding the declaration's contents." *Id.* at 34–35. Patent Owner further asserts that although the "declaration states that additional copies of the brochures were emailed to a limited number of persons after the trades show," "this selective mailing cannot amount to public dissemination." *Id.* at 34.

None of these assertions, even if true, alone or in combination, justify disregarding the Wan Declaration. Whether the Declaration is persuasive on the pertinent issues in the proceeding is a different question. Moreover, even assuming, hypothetically, that the Wan Declaration should be disregarded, that is not a persuasive reason to discretionarily deny the entire Petition, because only one of eleven alleged grounds of unpatentability involves Epower-20 and E-power 21, the prior art status of which depends on the Wan Declaration. Finally, as Patent Owner has recognized (Prelim. Resp. 34), there is no requirement that a declarant state in his declaration that he agrees to be cross-examined in the United States. In any event, Petitioner has represented that Yingchun Wan "is, of course, willing to travel to the United States for deposition." Reply 1. In a Reply Declaration, Yingchun Wan also has testified: "I am willing to appear to testify in the United States for cross-examination by deposition regarding the contents of my Declarations, or at any other proceedings as may be required by the Board should the IPR be instituted." Ex. 1020 ¶ 4.

For the foregoing reasons, nothing about the Wan Declaration urges in favor of discretionary denial of the Petition.

2. *Fintiv* Factors

In *Fintiv*, the Board set forth the following factors to consider when deciding, in the context of related parallel district court proceedings, whether to discretionarily deny a petition under 35 U.S.C. § 314(a):

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between the issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Fintiv, Paper 11 at 6.

The evaluation of *Fintiv* factors here involves multiple parallel district court cases. We need to be careful not to "mix and match" selectively the factors among different cases. For instance, a case for which a close trial date has been set but which does not involve the same prior art as asserted in this proceeding should be considered on its own, and not simply be "combined" with a different case for which no trial date has been set, but which involves the same prior art as in the petition, when evaluating whether to exercise our discretion. Likewise, a case for which substantial investment has been made but which does not involve the same prior art applied in this proceeding may not significantly add to another case which does involve that same prior art, but lacks investment. Absent an explanation as to why we should combine the circumstances of multiple cases, the parallel litigations should be considered case-by-case. Patent Owner appears to have engaged in

selective "mix and match" of separate facts in different cases, without persuasively explaining why they should be combined, which is inappropriate here. Where multiple parallel litigations are involved, the proper analysis extends beyond identifying, for each *Fintiv* factor, whether one or more parallel proceedings fit the bill, and then determining the sum.

whether a court granted a stay or evidence exists that one may be granted if a proceeding is instituted

A district court's stay of a parallel litigation pending resolution of a PTAB trial "has strongly weighed against exercising the authority to deny institution." *Fintiv*, Paper 11 at 6. Similarly, a denial of stay but with a willingness to reconsider if the PTAB institutes review, weighs against discretionary denial of institution. *Id.* at 6–7.

In this case, two co-pending district court cases involving the '015 patent have already been stayed pending resolution of this proceeding: *The Noco Company v. Medcursor, Inc.*, No. 2:20-cv-01358 (S.D. Ohio), and *The Noco Company v. Nekteck, Inc.*, No. 2-20-cv-01356 (S.D. Ohio). Reply 2. In another district court case, *The Noco Company v. Deltona Transformer Corporation and Deltran USA, LLC*, No. 6:20-cv-00050 (M.D. Fla), although a motion to stay was denied, the district court expressly stated that "[i]n the event the PTAB grants Carku's Petition for IPR, the Defendants may refile their Motion to Stay." Ex. 2006, 6. These two stays and one potential stay strongly urge against exercising discretionary denial due to the *Medcursor*, *Nekteck*, and *Deltona* cases.

DELTRAN EX1002
IPR2024-01219

Motions to stay have been filed in the *Mediatek*[4] and *ChangXinYang*[5] cases, but have not yet been resolved. No motions to stay have been filed in the *SmarTech* or *TII Trading* cases. As to cases in which a court has not considered or resolved a motion to stay, we decline to speculate as to how that court might decide. *Cf. Sand Revolution II, LLC v. Continental Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) ("In the absence of specific evidence, we will not attempt to predict how the district court in the related district court litigation will proceed because the court may determine whether or not to stay any individual case, including the related one, based on a variety of circumstances and facts beyond our control and to which the Board is not privy."). The parties have not identified any district court litigation in which a motion to stay pending resolution of this proceeding has been outright denied.

Thus, consideration of *Fintiv* factor 1 strongly weighs against exercising discretionary denial on the basis of parallel district court proceedings as it pertains to the *Medcursor*, *Nekteck*, and *Deltona* cases. This factor is neutral as to the *Mediatek*, *ChangXinYang*, *SmarTech*, and *TII Trading* cases.

proximity of the court's trial date to the Board's projected statutory deadline for a final written decision

The proximity factor in *Fintiv*, on its face, asks us to evaluate our discretion in light of trial dates that have been set in parallel litigations, not to speculate as to trial dates that are still to-be-determined. *See Fintiv*, Paper 11 at 9 ("If the court's

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[4] *The NOCO Company, Inc. v. Shenzhen Lianfa Tong Tech. Co., Ltd., Shenzhen Mediatek Tong Tech. Co., Ltd.,* and *Shenzhen Bi Te Yi Tech. Co., Ltd.,* 1:19-cv-01855 (N.D. Ohio).

[5] *The NOCO Company v. Shenzhen ChangXinYang Technology Co., Ltd.*, No. 1:17-cv-02209 (N.D. Ohio).

trial date is earlier than the projected statutory deadline . . . . If the court's trial date is at or around the same time as the projected statutory deadline or even significantly after the projected statutory deadline . . . ."); *see also id.* at 5 ("When the patent owner raises an argument for discretionary denial under *NHK* due to an earlier trial date, the Board's decisions have balanced the following factors . . . .") (footnote omitted). For this *Fintiv* factor, the Preliminary Response does not present any trial date which has been set, for our consideration. Prelim. Resp. 30. Patent Owner simply states the following:

> As discussed above, the *ChangXinYang* case has been through claim construction, and if not for the COVID-19 crisis, it is at least possible, if not likely, that trial would have been scheduled by this time. In any event, it can be expected that a trial will occur well before the November 2021 statutory deadline to complete this proceeding.

Id. Nothing in the record shows that a prospective trial date has been scheduled in the *ChangXinYan* case. Patent Owner presents no reasonable basis to assert that "it can be expected that a trial will occur well before the November 2021 statutory deadline to complete this proceeding." *Id.* The assertion is highly speculative, given that the United States District Court for the Northern District of Ohio suspended all jury trials months ago and only recently, on September 21, 2020, restarted having jury trials, with the limitation of one jury trial at a time in each courthouse. Ex. 1019O, 3.

Patent Owner also argues that "[t]rial in the *SmarTech* case, like the *ChangXinYang* case, may also be held by November 2021." Prelim. Resp. 31. However, Patent Owner does not argue that the district court in the *SmarTech* case has scheduled a trial. As with the *ChangXinYang* case, Patent Owner's assertion is speculative.

Thus, under *Fintiv* factor 2, we do not see that a trial will likely occur in the *ChangXinYan* or *SmarTech* cases, or any other related district court case, before the projected deadline of a final written decision in this case if a trial is instituted. Thus, this factor weighs strongly against exercising discretion to deny the Petition.

Petitioner indicates that a trial date was set in *The NOCO Company v. TII Trading*, No. 2:19-cv-07127 (C.D. Cal.) for April 2021.[6] Reply at 6. However, on August 6, 2020, the United States District Court for the Central District of California released a general order continuing to suspend civil and criminal jury trials indefinitely due to the COVID-19 pandemic. Ex. 1019Q. The April 2021 date appears to be superseded by subsequent orders of the district court. Patent Owner does not argue in the Preliminary Response that the proximity of a *TII Trading* trial favors denial or that it overlaps with this proceeding. Prelim. Resp. 30–31. Even Patent Owner appears to agree that the *TII Trading* trial will be pushed back. Specifically, in the Sur-Reply, Patent Owner argues that "it is to be anticipated that by April 2021, the pandemic situation will have changed and a new trial date may have been set, but it would be illogical to presume that such trial date would be later than November 2021." Sur-Reply 3. Patent Owner does not explain the basis of this argument. It is speculative to surmise what that new trial date, when set, will be.

We recognize that panels of the Board have assessed this factor on a case-by-case basis. On one hand, the *Fintiv* panel took the district court's trial schedule at "face value" and declined to question it "absent some strong evidence to the contrary." *Fintiv,* Paper 11 at 12–13. On the other hand, the *Sand Revolution*

[6] The Petition, Preliminary Response, Reply, and Sur-Reply identify no other specific scheduled trial date in any other related district court case.

panel was persuaded by the uncertainty in the schedule (including that caused by the parties agreeing to jointly request rescheduling of the trial date on several occasions and the global pandemic) despite a scheduled trial date. *Sand Revolution*, Paper 24 at 8–9. Moreover, as the *Sand Revolution* panel recognized, "even in the extraordinary circumstances under which the entire country is currently operating because of the COVID-19 pandemic, the Board continues to be fully operational." *Id.* at 9.

This factor looks at the *proximity* of the trial date to the date of our final decision to assess the weight to be accorded a trial date set earlier than the expected final written decision date. This proximity inquiry is a proxy for the likelihood that the trial court will reach a decision on validity issues before the Board reaches a final written decision. A trial set to occur soon after the institution decision is fairly likely to happen prior to the Board's final decision, even if the trial date were postponed due to intervening circumstances. Here, however, where the *TII Trading* trial, at best, is scheduled for about six months before the final decision, and there is at least some persuasive evidence that delays are possible, the efficiency and system integrity concerns that animate the *Fintiv* analysis are not as strong all other things being equal. Thus, this factor as applied to the *TII Trading* case is neutral to whether we should exercise discretion to deny the Petition.[7]

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[7] On November 5, 2020, the parties by email informed the Board that in *TII Trading* the litigants in district court stipulated to have the trial date moved back to June 14, 2021, and that the stipulation has been entered. Ex. 3002. Nothing in our discussion of this *Fintiv* factor is materially changed by this stipulation. It appears to be a tentative place holder until the district court can actually determine a more realistic trial date. If anything, it only accents the uncertainty of any trial date that is currently set. *Cf. Sand Revolution*, Paper 24 at 8–9 ("Since our Denial Decision on February 5, 2020, the parties have jointly moved the district court to extend schedule deadlines twice; these motions were granted. Furthermore, the district

investment in the parallel proceeding by the court and the parties

Exercising discretionary denial is favored "if at the time of the institution decision, the district court has issued substantive orders related to the patent at issue in the petition." *Fintiv*, Paper 11 at 9–10. In contrast, if the district court has not issued orders related to the patent at issue in the petition at the time of the institution decision, that weighs against exercise of discretionary denial. *Id.* at 10.

Regarding this *Fintiv* factor, Patent Owner identifies three co-pending district court cases: the *ChangXinYang*, *SmarTech*, and *Deltona* cases. Prelim. Resp. 30–31. Fact discovery in *SmarTech* closed on October 9, 2020, and initial expert witness disclosures were due by October 30, 2020. Ex. 2008, 8.

As to the *Deltona* case, Patent Owner argues that the district court in that case stated that "it would enter a claim construction ruling this fall." Prelim. Resp. 30. In the *ChangXinYang* case, Patent Owner argues that "the parties have completed claim construction and are working to schedule further proceedings against the COVID-19 crisis." *Id.* In the Sur-Reply, Patent Owner contends that in the *ChangXinYang* case, "the Court has issued a claim construction and expert discovery has also taken place." Sur-Reply 2. As to the *SmarTech* case, Patent Owner argues that the district court has entered a claim construction ruling and that "under the current case schedule fact discovery will close in October 2020, with expert reports and discovery to run into January 2021, and briefing on dispositive motions to be complete by March 2021." Prelim. Resp. 31; *accord* Sur-Reply 3–4. As to each of these cases, Patent Owner does not provide additional detail, such as

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court's express inclusion of the qualifier 'or as available' for each calendared trial date of its evolving schedule, which indicates a continuing degree of recognized uncertainty of the court's schedule by the court.") (footnote and citation omitted).

the extent to which the alleged investment bears on the issues that we are being asked to consider, namely, patentability.

In the Sur-Reply, Patent Owner argues that, in the *TII Trading* case, "[b]y the time a decision to institute is due in this proceeding, the Court will have held a Markman hearing and fact discovery will have closed." Sur-Reply 3. We note that, other than stating that preliminary invalidity contentions have been served in the *TII Trading* case, Patent Owner does not explain how the *TII Trading* district court's investment pertains to the patentability issues that we are being asked to resolve.

Fintiv states that we are to consider the "type of work already completed" and explains that the "investment factor is related to the trial date factor, in that more work completed by the parties and court in the parallel proceeding tends to support the arguments that the parallel proceeding is more advanced, a stay may be less likely, and instituting would lead to duplicative costs." *Fintiv*, Paper 11, at 9–10. The risk of duplication is most prominent for issues of patentability. Patent Owner is silent as to the extent the investment it alleges pertains to issues of patentability. As to the *Deltona*, *ChangXinYang*, *SmarTech*, and *TII Trading* cases, if this factor weighs in favor of denial, it does so only slightly.[8] *Cf. Sand Revolution*, Paper 24 at 10–11 (finding that "this factor weighs only marginally, if at all, in favor of exercising discretion to deny institution" when the district court issued a *Markman* order and issued several other orders that "relate[d] to ancillary matters untethered to the validity issue itself," while "much work remain[ed] in the district court case as it relates to invalidity: fact discovery [was] still ongoing,

[8] As noted above, no trial dates have been set in the *Deltona*, *ChangXinYang*, and *SmarTech* cases. Patent Owner does not explain why the *Fintiv* factors nevertheless should be evaluated at all with respect to these cases.

DELTRAN EX1002
IPR2024-01219

expert reports [were] not yet due, and substantive motion practice [was] yet to come.").

overlap between the issues raise in the petition and in the parallel proceeding

This *Fintiv* factor relates to the extent of overlap in the applied prior art references between this Petition and copending parallel litigation in another tribunal. Patent Owner states:

> The grounds asserted by Petitioner in the present action are not identical to those asserted by ChangXinYang in the district court litigation. However, the grounds in this petition do carry references in common (Krieger (Ex. 1009) and Baxter (Ex. 1011)) that were at issue in the Dongguan Juxing IPR petition, which was not instituted by the Board. (*See* Ex. 1004.)

Prelim. Resp. 31. IPR2018-00503, the Dongguan IPR petition referred to in the above-quoted text, is not a parallel copending proceeding of another tribunal. Also, in IPR2018-00503, the Board declined to institute review and the case is terminated and no longer pending. The references applied in IPR2018-00503 are not pertinent to this *Fintiv* factor.

Patent Owner asserts that in the *SmarTech* case, certain claims are alleged as anticipated by Richardson and anticipated by Klang, same as the assertions here. Sur-Reply at 3. As noted above, there is no trial scheduled in the *SmarTech* case, and Patent Owner does not explain why the *Fintiv* factors should be evaluated with respect to the *SmarTech* case. However, the anticipation assertion in *SmarTech* does not cover claims 7, 18, 20, and 21 over Richardson, or claim 21 over Klang. Ex. 2012, 5–7. Additionally, in *SmarTech*, there are no assertions of unpatentability against claims 4–6, 11, 14, 16, 22, and 23. *Id.* Further, in *SmarTech*, the assertions of unpatentability against claims 10, 12, and 13 for

DELTRAN EX1002
IPR2024-01219

obviousness are based on different grounds as those alleged in this proceeding. *Id.* Thus, there is not a substantial overlap in the issues raised here and those raised in *SmarTech.*

Patent Owner asserts that in the *TII Trading* case, claims 1–3, 8–15, and 17–20 of the '015 patent have been alleged as unpatentable over Richardson. Sur-Reply at 3. However, the invalidity contentions in *TII Trading* are not final and may change to eliminate those assertions. Ex. 2011. In any event, even assuming that those contentions are final, there still is not a substantial overlap. For instance, in *TII Trading*, claims 7 and 21 have not been alleged as anticipated by Richardson. *Id* at 3. As explained above, Petitioner's strongest grounds are based on Klang. In *TII Trading*, there are no assertions of unpatentability based in whole or in part on Klang. *Id* at 3–4. Also, in *TII Trading*, there are no assertions of unpatentability based on any ground against claims 4–7, 16, and 21–23. *Id.* Further, in *TII Trading*, the assertions of unpatentability against claims 1–3, 8–15, 17, 19, and 20 for obviousness are based on different grounds as those alleged in this proceeding. *Id.* Thus, there is not a substantial overlap in the issues raised here and those raised in *TII Trading.*

Patent Owner does not contend that there is overlap between this proceeding and the *ChangXinYang*, *Mediatek*, *Deltona*, *Nekteck*, or *Medcursor* cases.

For these reasons, on this record and based on what the parties have argued, there is only a partial but not substantial overlap in the issues raised in this proceeding and those raised in copending parallel district court litigation. As to each of the cited co-pending cases, *Fintiv* factor 4 weighs against discretionary denial.

whether the petitioner and the defendant in the parallel proceeding are the same party

For this *Fintiv* factor, "if a petitioner is unrelated to a defendant in an earlier court proceeding, the Board has weighed this fact against exercising discretion to deny institution." *Fintiv*, 13–14.

Patent Owner acknowledges that Petitioner is not a direct party to any of the related co-pending district court litigation. Prelim. Resp. 32. On the other hand, Petitioner is not totally unrelated to any party litigant in all of the related co-pending district court litigation. On this record, Petitioner is a supplier to distributors who have been named as defendants in *Deltona* case. Ex. 2006. Patent Owner states that in the circumstance here, this factor is neutral. Prelim. Resp. 32. We agree as to the *Deltona* case.

Petitioner argues that it "did not supply the accused products in the only two pending parallel proceedings filed before May 14, 2019," namely, the *ChangXinYang* and *SmarTech* cases. Reply 8–9. Patent Owner does not argue otherwise. Thus, as to the *ChangXinYang* and *SmarTech* cases this factor weighs against exercising our discretion.[9] In any event, as detailed above and instructed by *Fintiv*, we "address any other district court or Federal Circuit proceedings involving the challenged patent to discuss why addressing the same or substantially the same issues would not be duplicative of the prior case even if the petition is brought by a different party." *Fintiv*, Paper 11 at 14.

[9] We note also that the record does not show Petitioner to be a supplier to a defendant in the *Mediatek*, *Deltona*, *Nekteck*, and *Medcursor* cases, all of which have no trial scheduled. Thus, this factor weighs against exercising discretionary denial for those cases as well.

other circumstances that impact the Board's exercise of discretion, including the merits

> Additional factors we can consider include the merits.
>
> For example, if the merits of a ground raised in the petition seem particularly strong on the preliminary record, this fact has favored institution. In such cases, the institution of a trial may serve the interest of overall system efficiency and integrity because it allows the proceeding to continue in the event that the parallel proceeding settles or fails to resolve the patentability question presented in the PTAB proceeding.

Fintiv, Paper 11 at 14–15 (footnotes omitted). As explained above, the merits of the alleged grounds of unpatentability based at least in part on Klang are strong, which also weighs against exercising discretion to deny.

3. Conclusion

We consider the above factors and take "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Fintiv*, Paper 11 at 6.

The *Nekteck* and *Medcursor* cases are stayed pending the outcome of any trial we might institute. As noted above, the *Deltona* court has indicated that it is open to staying that case if we institute. No trial dates have been set in these cases. Moreover, Patent Owner has not persuasively argued significant investment in those cases or significant overlap with this proceeding. Thus, the *Nekteck*, *Medcursor*, and *Deltona* cases do not provide a persuasive basis for exercising our discretion to deny the Petition.

As to the *ChangXinYang*, *Mediatek*, and *SmarTech* cases, the record does not indicate that the district courts in those cases have scheduled trials. Patent Owner's arguments that trials might happen in *ChangXinYang* and *SmarTech* before our final written decision is due in this proceeding are

DELTRAN EX1002
IPR2024-01219

mere speculation. Patent Owner does not explain persuasively why we should exercise our discretion based on the mere speculation that a trial might later be scheduled to take place before our final written decision due date. In any event, as explained above, those cases do not overlap significantly with this proceeding and the investment in those cases would weigh in favor of denial only marginally, if at all. Thus, the *ChangXinYang*, *Mediatek*, and *SmarTech* cases do not provide a persuasive basis for exercising our discretion to deny the Petition.

The *TII Trading* case is the only district court case in which Patent Owner has identified a trial date. As noted above, however, there is significant uncertainty in that date, making that factor neutral at best. Patent Owner identifies some investment in that case, but does not explain its relevance to the patentability issues we are being asked to decide. If that factor weighs in favor of exercising our discretion, it does so only marginally. As explained above, the overlap between the *TII Trading* case and this proceeding is not substantial—if that case is tried first, it likely will not address the strongest grounds Petitioner raises here. There is a low likelihood that we and the *TII Trading* court will duplicate efforts or risk inconsistent results regarding Klang grounds,[10] which we consider to be Petitioner's strongest position. This weighs against exercise of our

[10] Although Klang is raised in the *SmarTech* case, no trial date is scheduled in the *SmarTech* case and Patent Owner does not explain persuasively why the *Fintiv* factors should apply to a parallel case in which no trial is scheduled. There is little risk of a duplicative or inconsistent result as to Klang, as there is no scheduled trial that would resolve the issues. As to *TII Trading*, there is no indication that Klang will be raised in the only parallel action in which a trial has been scheduled. Thus, the risks of duplication and inconsistency are low with respect to *TII Trading* as well.

DELTRAN EX1002
IPR2024-01219

discretion. Moreover, as noted above, the merits of the non-overlapping grounds Petitioner raises in the Petition are strong, further weighing against exercise of our discretion. Upon a holistic review of these factors, it would be most efficient to try Petitioner's best grounds here, despite some investment in the district court proceedings.

For the foregoing reasons, after weighing all factors discussed above as to each of the cases co-pending district court Patent Owner raises, we decline to exercise our delegated discretion to deny the Petition.

III. CONCLUSION

Petitioner has shown a reasonable likelihood that it would prevail in establishing unpatentability of at least 1 challenged claim of the '015 patent.

IV. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), *inter partes* review of claims 1–23 of the '015 patent is instituted, and that the specific grounds of unpatentability, directed to specific claims, are *all* of those presented in the Petition and as listed in the table included above; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '015 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

IPR2020-00944
Patent 9,007,015 B1

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P/00/038
Sections 59, 104(4), 223(6), 75 and 101M
Regulation 22.21

AUSTRALIA
Patents Act 1990

Notice of Opposition

We, Brown & Watson International Pty Ltd of 1500 Ferntree Gully Road, Knoxfield, Victoria 3180 give notice that we oppose the grant of a patent in respect of patent Application No. 2020201223 in the name of The NOCO Company.

Address for service and correspondence in Australia is:

Phillips Ormonde Fitzpatrick
333 Collins Street
Melbourne Victoria 3000
Telephone No.: (03) 9614 1944 Facsimile No.: (03) 9614 1867

Reference: 2020201223

Email address for sharing of evidence and documents:

attorney@pof.com.au

Dated: 7 August 2020

PHILLIPS ORMONDE FITZPATRICK

Attorneys for:
Brown & Watson International Pty Ltd

Hwth fee: $600

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This data, for application number 2020201223, is current as of 2021-03-23 21:00 AEST

SGS

Compliance test report for Saudi Arabia Report No: SZES140200030901

Date: 2014-04-21

Applicant :	Shenzhen Carku Technology Co., Ltd. 2 Floor, Block A, Tongsheng Technology Building, Dalang, Longhua, Shenzhen, Guangdong, China
Manufacturer:	Same as applicant
Test object / Model :	Mini Jump starter Epower10, Epower-22, Epower-03, Epower-02
Test specifications / Test standard:	IEC 60950-1: 2005 with applicable addition Saudi ICCP requirement (218.CVG: April 2005)
Purpose of examination:	Test according to the test specification.
Test result:	In the opinion of SGS-CSTC the presented appliance was found to be in compliance with the test specification and standards.
Remark:	None

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SGS-CSTC SAFETY LAB SHENZHEN

Gina Wen
Project Reviewer
Safety Laboratory

Change Li
Project Engineer

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IPR2024-01219

Compliance test report for Saudi Arabia Report No: SZES140200030901

Date: 2014-04-21

1. Function / Description :

Product name	Mini Jump starter
Functions	Movable power bank
Power source	Powered by external power source via USB port (DC 5 V) or external power source via car adapter (DC 12V) or Lithium battery pack with 3 lithium battery cells in series (3 x Model: 406888HP30C,11,1 Vd.c., 6000 mAh)
Material of enclosure	Plastic enclosure
Model differemce	All models are identical except for model No. and external decoration of enclosure

2. Ratings :

Model : Epower10, Epower-22, Epower-03, Epower-02

Rated input : Power by USB port: 5 Vd.c.; 1,0 A
Power by car adapter: 12 Vd.c.; 1,0 A

Rated output : 5 Vd.c./ 2,0 A
Protection Class : Class III
Protection Against Moisture : IPX0
Construction : Transportable
Supply connection : DC connection
Operation mode : Continuous

3. Summary of testing and conclusion:

Possible test case verdicts:
- test case does not apply to the test object: N/A (Not Applicable)
- test object does meet the requirement: P (Pass)
- test object does not meet the requirement: F (Fail)

The test was done in the Electrical Safety Laboratory of SGS-CSTC in Shenzhen.
Test item was received on 2014-02-27.
Tests were performed from 2014-02-27 to 2014-03-20.

Tropical conditions were considered and complied.

Heating test (4.5):
Ta = 45 °C (declared by manufacturer)
Tamb = 20,5 °C – 22,5°C
T-type thermocouple was used for temperature measurement.

Remark:
The LED part of the equipment was tested according to IEC 62471: 2006 and EN 62471: 2008 by SGS-CSTC (Report No.: GZES140300262201).

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IPR2024-01219

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4. Marking plate:

For Unit



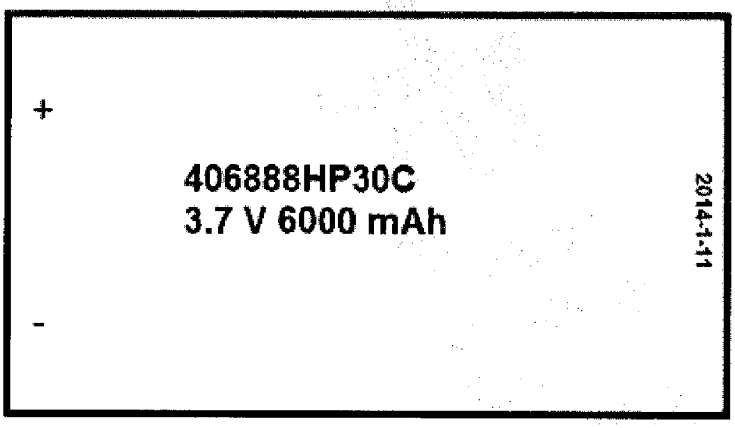
Battery Capacity: 6000mAh
Starting Current : 150A
Peak Current : 300A
Output : 5V⎓2A
Input : 12V⎓1A; 5V⎓2A

Made in China

Caution
Do not disassemble charger to avoid shock hazard!
Do not charge non-rechargeable batteries!

Remark: The marking plates of other models are of the same pattern.

For Lithium Battery cell:



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IPR2024-01219

Compliance test report for Saudi Arabia Report No: SZES140200030901

Date: 2014-04-21

Test Result:

Section A: Scope of Category Remark: IT Equipment	Verdict
This category applied to:	—
-- Mains-connected or battery-operated IT equipment and IT components	N/A

SECTION B: SASO Sanctioned Standard		
Saudi Sanctioned Standard	Joint Gulf Standard Or other Standard (If applicable)	Title
IEC 60950-1: 2005	--	Information technology equipment – Safety – Part 1: General requirements

SECTION C: KSA ICCP Registration Procedures and Essential Requirements		
ESSENTIAL REQUIREMENTS	REMARKS	Verdict
Mains voltage 127 or 220 V.		N/A
Mains frequency 60 Hz.		N/A
Appliances shall comply with the requirements of EMC CVG		N/A
Electrical mains plugs shall conform to the requirements specified in Appendix A of this CVG		N/A
National restriction of hazardous substances should be observed		P
Any pictures that may be offensive to the Islamic religion are forbidden on products and packaging. In particular pictures of pigs, pig shapes or crosses.		P

SECTION E		
Pre-Supply Tests For ICCP Approved Laboratories		
IEC 60950-1: 2005 Remark: IT Equipment		
CLAUSE	REMARKS	Verdict
1.7 Markings and instructions		P
2.1 Protection from electric shock and energy hazards		P
2.6 Provision for earthing and bonding		N/A
4.2 Mechanical strength		N/A

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IPR2024-01219

Compliance test report for Saudi Arabia Report No: SZES140200030901

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4.3.13	Radiation, when applicable	LEDs were tested according to IEC 62471 Exempt Risk Group	P
4.5.1	Maximum temperatures		P
5.1	Touch current and protective conductor current		N/A
5.2	Electric strength		N/A

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Date: 2014-04-21

Appendix To 218.CVG (AIR-218, April 2005) Additional Inspection Requirements		
Applicable Standard(s): IEC 60950-1 Information technology equipment - Safety - Part 1: General requirements IT Equipment		
1. Physical Requirement		
Standard Reference	Requirement	Complies
60950-1, 3.2.1	AC mains supply equipment to be provided with one of the following for safe and reliable connection to primary power supply: - terminals for permanent connection to supply - non-detachable power supply cord for permanent connection to supply or connection by means of a plug - appliance inlet for connection of detachable power supply cord - a mains plug that is part of direct plug-in equipment	N/A
60950-1, 3.2.4	Appliance inlets shall be: (a) located or enclosed so that parts at hazardous voltages are not accessible during insertion or removal of the connector (b) placed so that connector can be inserted without difficulty (c) placed so that after connector insertion the equipment is not supported by the connector when in normal use on a flat surface	N/A
60950-1, 3.2.5.1	AC power supply cords shall be of synthetic rubber or polyvinyl chloride. In the case of Class I equipment, the cord is to include a protective earthing conductor.	N/A
60950-1, 3.2.6	For equipment with a non-detachable power cord, a cord anchorage shall be supplied such that: (a) the connecting points of the cord are relieved from strain (b) the outer covering of the cord is protected from abrasion (c) it shall not be possible to push the cord back into the equipment if this can create a hazard	N/A
60950-1, 3.2.7	Power cords shall not be exposed to sharp points or cutting edges within or on the surfaces of the equipment, inlet opening or inlet bushing.	N/A
60950-1, 3.2.7	The sheath of a non-detachable power supply cord shall continue into the equipment through any inlet bushing or cord guard	N/A
60950-1, 3.2.7	Inlet bushings where used shall be reliably fixed and not be removable without the use of a tool.	N/A
60950-1, 3.2.8	Cord guards shall: (a) restrict the cord from excessive bending where it enters the equipment (b) be fixed in a reliable manner (c) project outside the equipment beyond the inlet opening for a distance of at least five times the overall diameter.	N/A
60950-1, 4.3.1	Edges or corners other than those required for proper equipment functioning shall be rounded and smoothed when they could otherwise be hazardous to operators because of their location or application in the equipment.	P
60950-1, 4.3.3	Equipment, which can be adjusted to suit different primary power supply	N/A

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IPR2024-01219

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	voltage, shall be so constructed that the changing of the setting requires the use of a tool if incorrect setting causes a hazard.	
	Plugs fitted to the supply cords shall have a configuration in accordance with Appendix A in this CVG	N/A
2. Marking Requirements:		
60950-1, 1.7.12	Instructions and equipment marking related to safety shall be in a language which is acceptable in the country in which the equipment is to be installed (i.e. English and/or Arabic)	P
60950-1, 1.7.13	Marking of the following shall be durable and legible:	P
60950-1, 1.7.1	Equipment shall be provided with the following marking: - Rated voltage or voltage range – incorporating 127V and/or 220V or 380V if applicable - Rated frequency or frequency range – incorporating 60 Hz, unless the equipment is designed for d.c only - Rated current in milliamperes (mA) or amperes (A). For equipment with multiple rated voltages, the corresponding different current ratings shall be marked accordingly. Note : If a unit is not provided with a means for direct connection to the AC mains supply, e.g. battery-operated only, it need not be marked with any electrical rating such as its rated voltage, rated current or rated frequency	P
60950-1, 1.7.1	Symbol for nature of supply, for d.c. only	P
60950-1, 1.7.1	Manufacturer's name, trademark or identification mark	P
60950-1, 1.7.1	Manufacturer's model or type reference (Note: During inspection of registered products the model or type reference shall be the same as on the current Statement for Registration)	P
60950-1, 1.7.1	Symbol for Class II construction for Class II equipment only.	N/A
60950-1, 1.7.1	For equipment to be installed by persons other than service personnel, the above markings shall be visible in an operator access area or located on an outside surface. If on an outside surface it must be discernible after the equipment has been installed for normal use.	N/A
60950-1, 1.7.1	Above markings not visible from the outside will still comply if directly visible when opening a door or cover. If this area is not a operator accessible area, a marker shall be attached to the equipment indicating where the markings are located. This marker may be a temporary one.	N/A
60950-1, 1.7.5	If any standard power outlet supply is accessible to the operator, it shall have a nearby marking to show the maximum permissible load to be connected to the outlet.	N/A
60950-1, 1.7.6	Marking shall be located on or adjacent to each fuse holder giving fuse rated current and fuse rated voltage (where visible).	N/A
60950-1, 1.7.8.1	Indicators, switches and other controls affecting safety shall indicate clearly which function they control.	N/A
60950-1, 1.7.8.1	Markings and indications for switches and other control shall be located either: - on or adjacent to the switch or control or - so that it is obvious to which switch or control it applies	N/A

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IPR2024-01219

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60950-1, 1.7.8.3	Where symbols are used on or near controls: - a switch shall be indicated as 'ON' with a line | and 'OFF' with a circle O - a push-push type switch shall be indicated by the symbol ⏻	N/A
60950-1, 1.7.8.4	If figures are used for indicating the positions of control, the 'OFF'	N/A
60950-1, 1.7.14	Marks shall not be placed on removable parts which can become misleading when the part is removed	P
60950-1, 1.7.15	If equipment is provided with a replaceable battery, and if replacement by an incorrect type could result in an explosion, the following applies: (a) if the battery is placed in an operator access area there shall be a marking close to the battery ora statement in both the operating and the servicing instructions (b) If the battery is placed elsewhere in the equipment there shall be marking close to the battery or a statement in the servicing instructions This marking or statement shall include the following or similar text: "CAUTION Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions."	P
60950-1, 1.7.16	If a tool is necessary to gain access to an operator access area, either all compartments within that area containing hazard shall be inaccessible to the operator by use of the same tool or such compartments shall be marked to discourage the operator.	N/A
60950-1, 3.4.11	When a unit receives power from more than one source (e.g. different Voltages / frequencies or as redundant power) there shall be prominent marking at each disconnection device giving adequate instructions for the removal of all power from the unit.	N/A
3. Instruction Manual		
60950-1, 1.7.2	If special precautions are required to avoid the introduction of hazards when operating, installing, maintaining, transporting or storing equipment, the manufacturer shall include necessary instructions.	P
60950-1, 1.7.4	For equipment intended for connection to multiple rated voltages or frequencies, the method of adjustment shall be fully described in the service or installation instructions. Unless the means of adjustment is a simple control near the power rating marking, and the setting of this control is visually obvious, the following instruction or a similar one shall appear in or near the power rating marking: "SEE INSTALLATION INSTRUCTIONS BEFORE CONNECTING TO THE SUPPLY."	N/A
Appendix A - Plugs of Electrical and Electronic Appliances		
SASO 2203/2003 SASO 2204/2003	All plugs whether shipped separately or supplied with, or fitted to appliances must comply with Figure 1 of "SASO 2203/2003: Plugs and socket-outlets for household and similar general use-220V" and with Figure 1 or 2 of "SASO 2204/2003: Plugs and socket-outlets for household and similar general use- 127V"	N/A

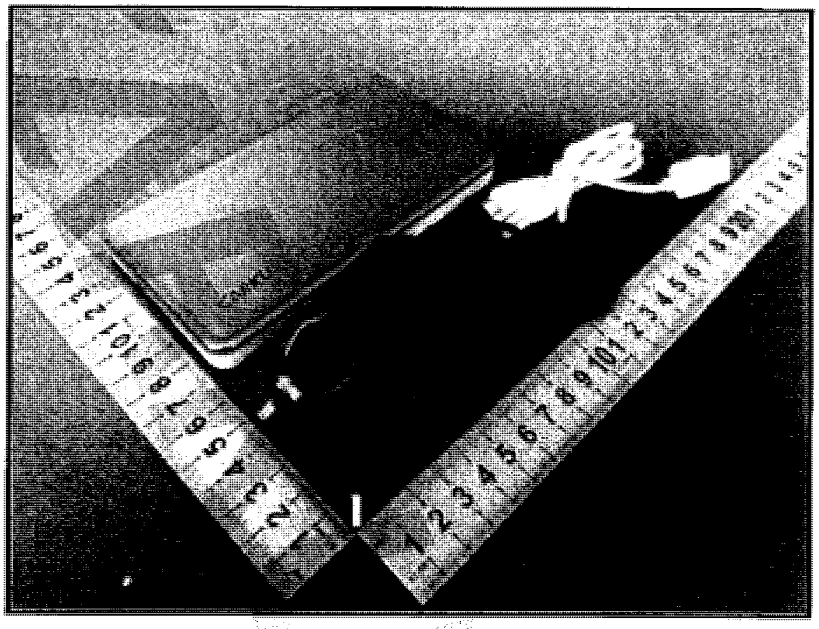
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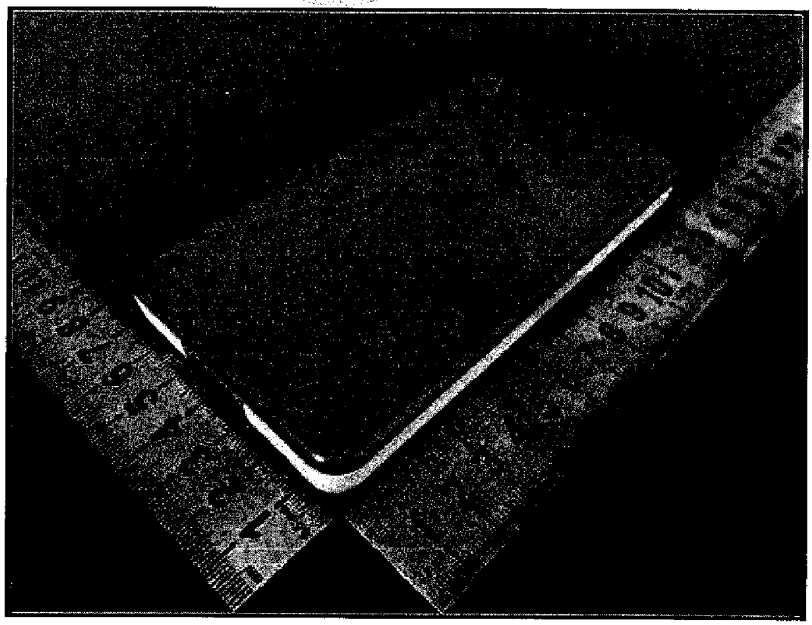
Compliance test report for Saudi Arabia Report No: SZES140200030901
Date: 2014-04-21

5. Photo document

Whole unit



Unit (for model Epower10)



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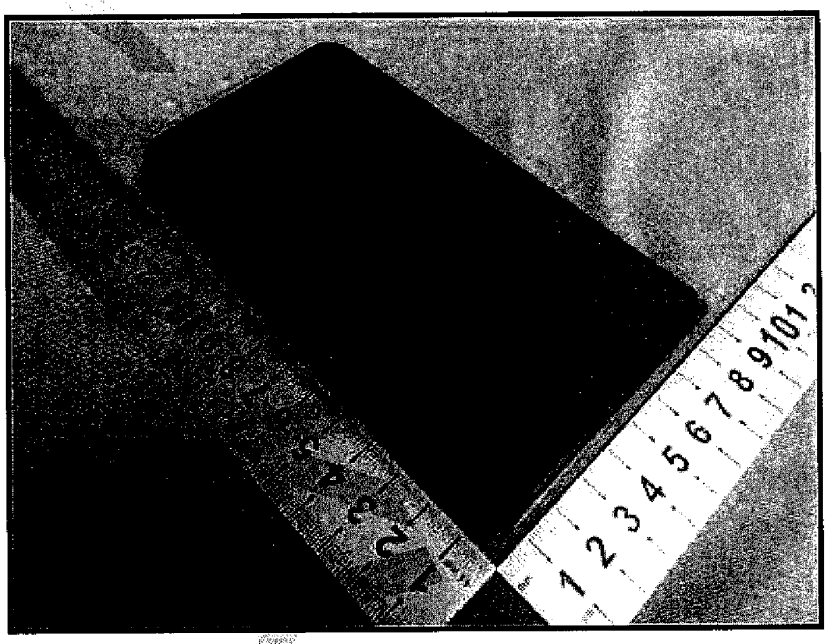
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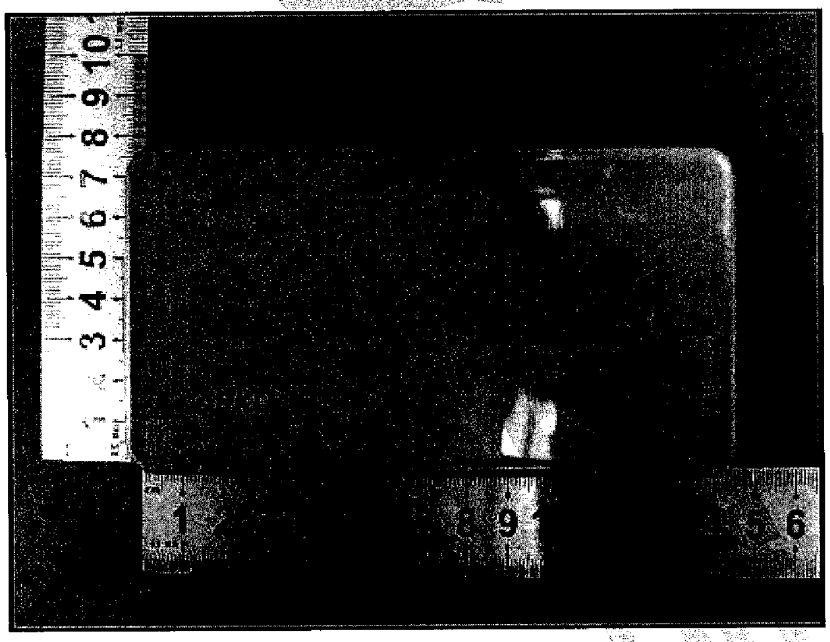
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Compliance test report for Saudi Arabia Report No: SZES140200030901
Date: 2014-04-21

Unit (for other models)



Front view



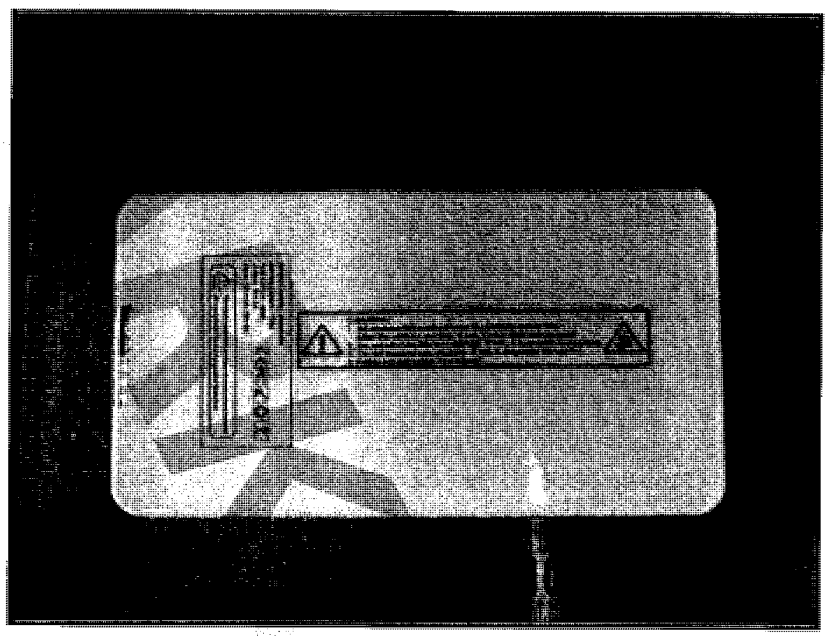
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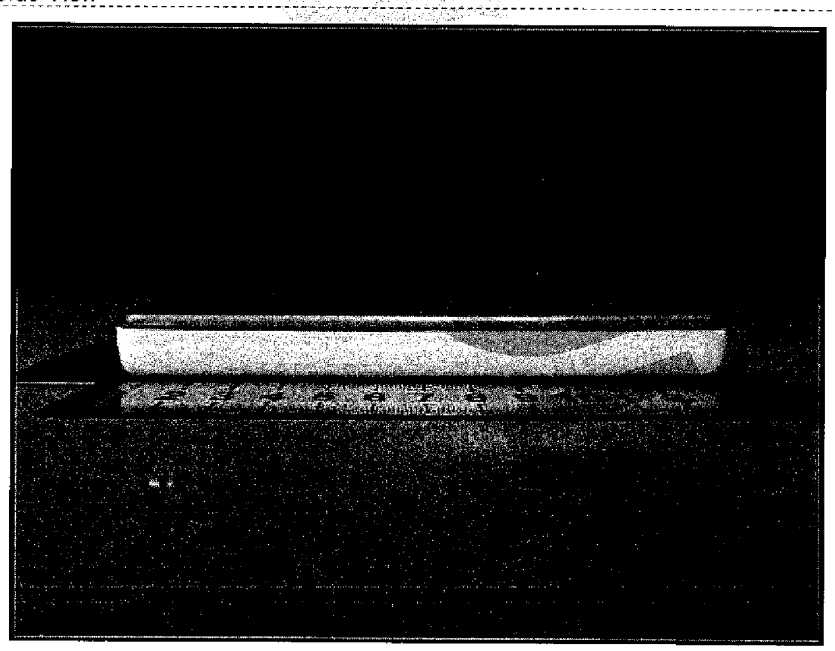
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Rear View



Side View



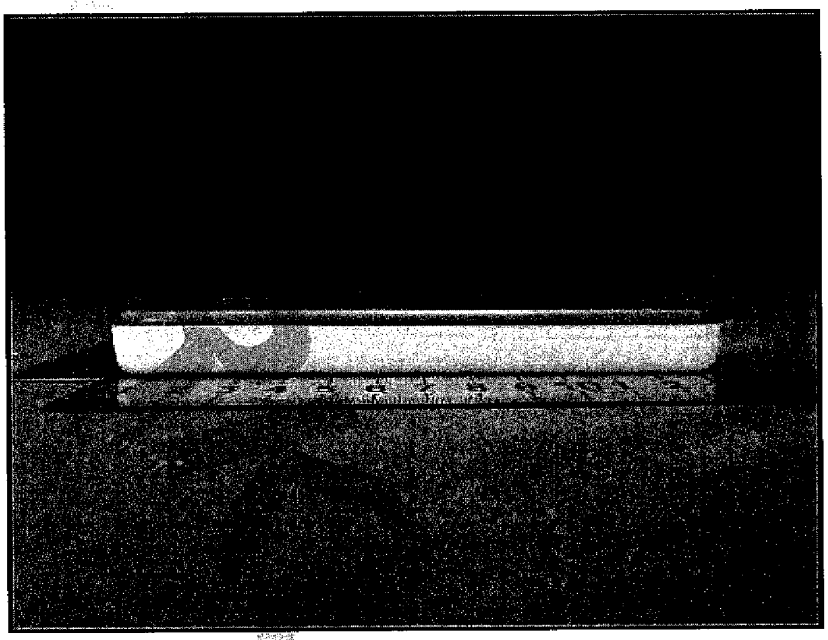
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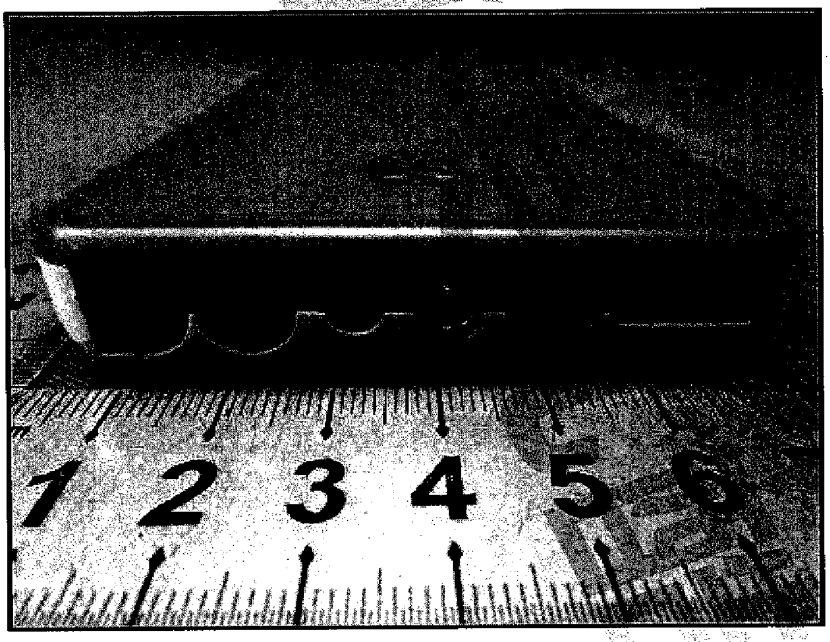
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Side view



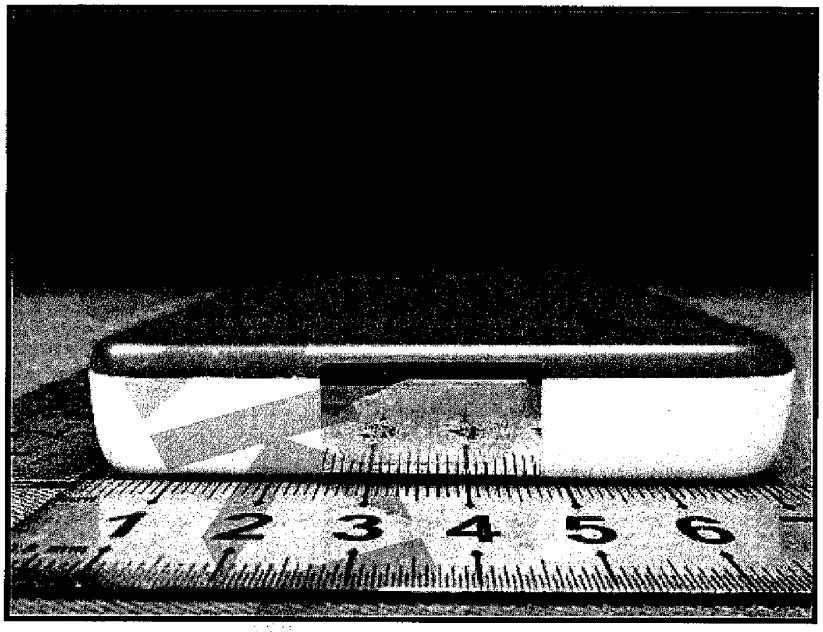
Side view



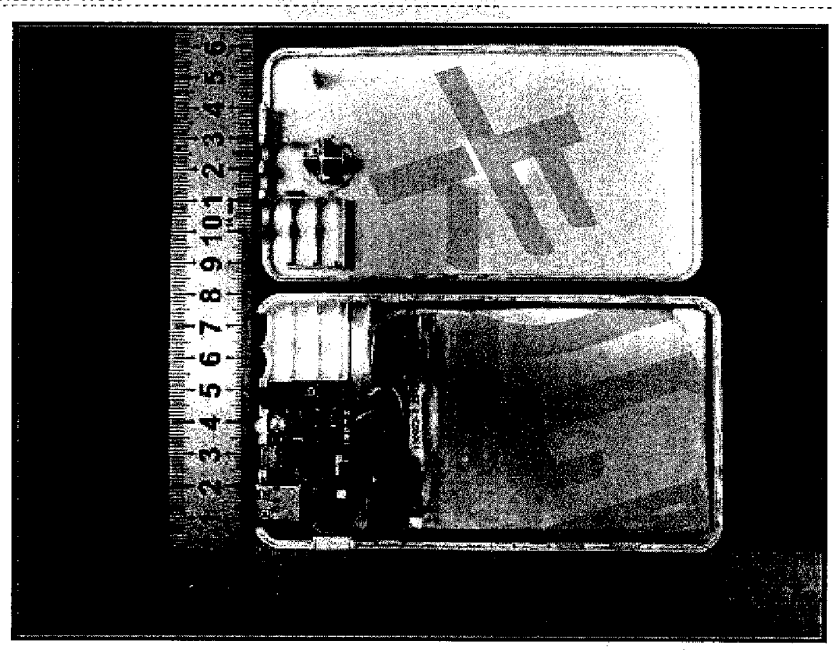
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Side view



Internal view



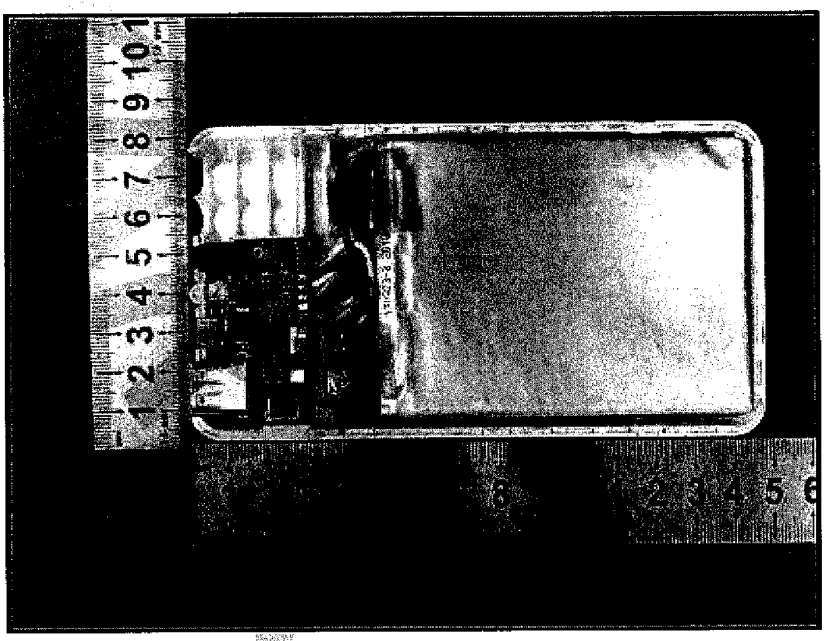
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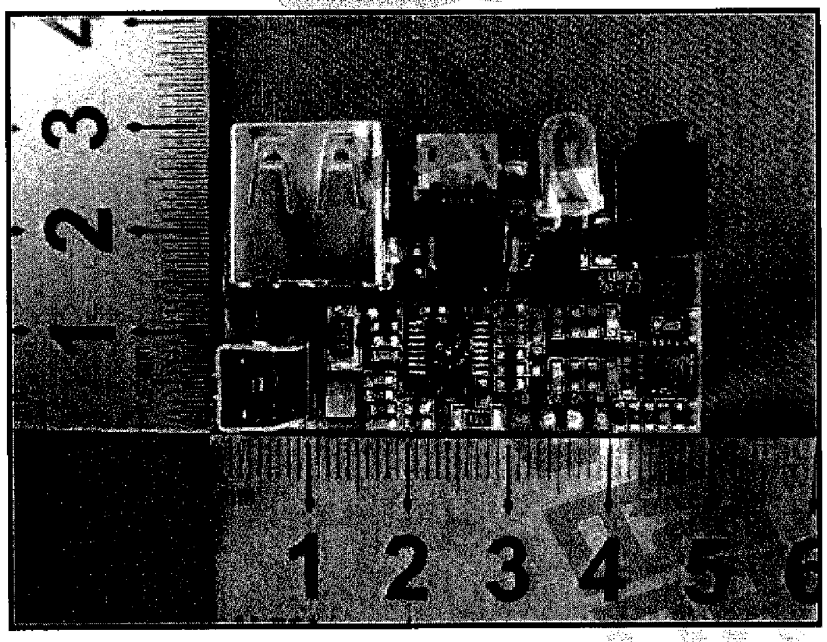
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Internal view



PWB

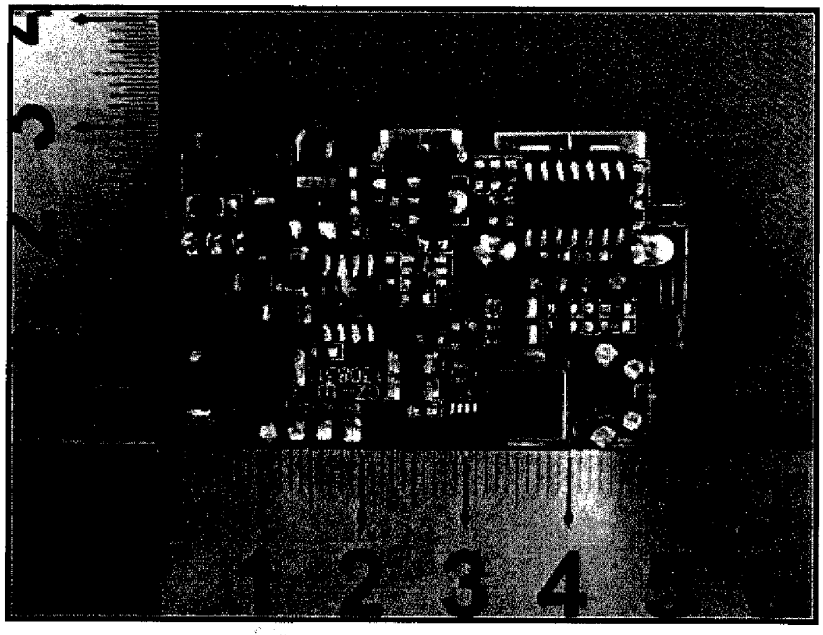


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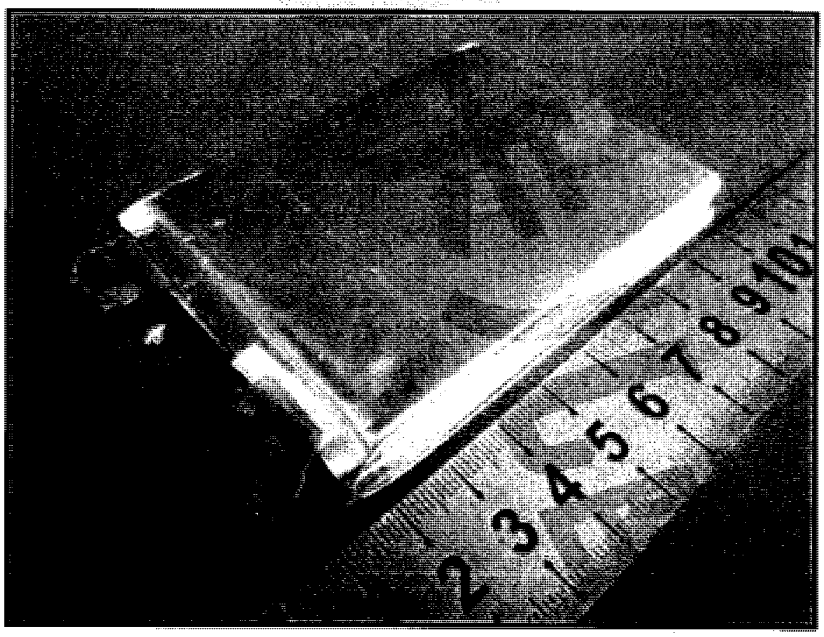
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PWB



Lithium Battery Pack (3 lithium battery cells in parallel)

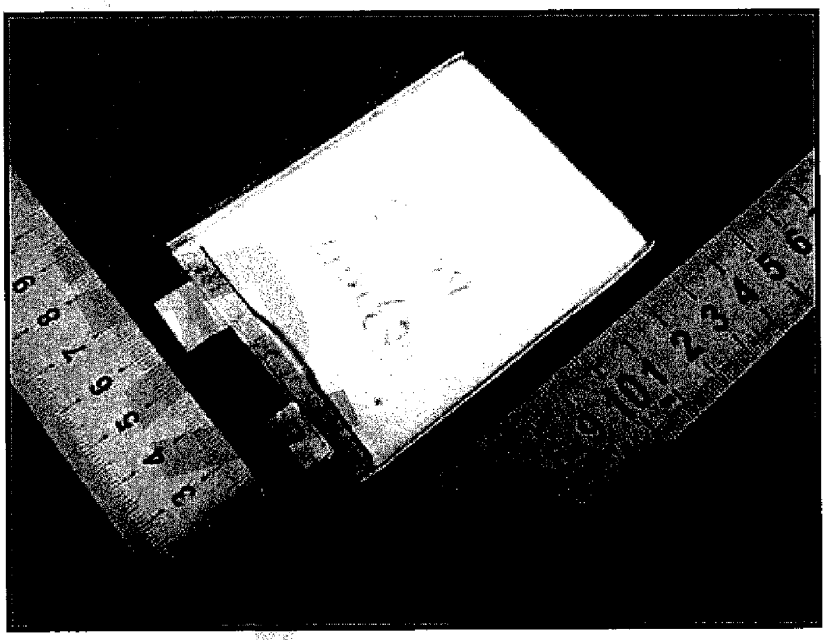


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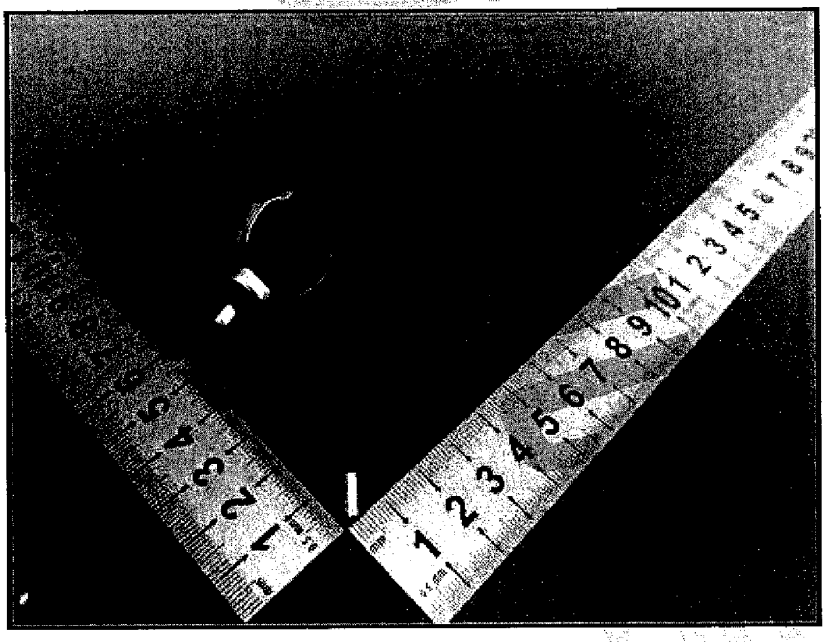
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Lithium battery cell (model: 406888HP30C)



Car adapter



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Compliance test report for Saudi Arabia Report No: SZES140200030901
Date: 2014-04-21

NOTES TO THIS TEST REPORT

1. The following language(s) of marking(s) and instruction sheets were submitted during the test application:
   - English
   - Arabic

   According to the standard, instruction sheets and other texts required by the standard should be written in the official language(s) of the country in which the product is to be sold. The applicant should ensure that the product in future production fulfils the receptive standard requirements.

2. The components performed satisfactorily during testing and are considered to be suitable for use in the sample tested. Acceptances of the safety critical components and materials were based on:
   - the certification record(s) and/or test report submitted by the applicant; or
   - component / material tested with the appliance

   Detail shall be referred to the component list on the appendix of this test report.

--- End of Report ---

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Eidesstattliche Versicherung

In Kenntnis der Folgen einer falschen eidesstattlichen Versicherung, insbesondere der Strafbarkeit auch einer fahrlässig falschen eidesstattlichen Versicherung, versichere ich, Patrick Bona, hiermit folgendes an Eides statt:

1. Ich bin Mitgeschäftsführer der r.d.i. Deutschland Autoteile + Vertriebs GmbH (**r.d.i.**) und als solcher u.a. verantwortlich für den Einkauf und den Vertrieb unserer Starthilfevorrichtungen der Produktreihe „Starthilfegerät mit Powerbank". Im Jahre 2013 war ich geschäftsführender Gesellschafter für den Bereich Vertrieb & Marketing.

2. Ich habe die Carku Technology Co., Ltd., (**Carku**) im Rahmen der Canton Messe (China) im Jahre 2013 als Hersteller und Lieferanten von u.a. Starthilfegeräten kennengelernt.

3. Carku hat unserem Unternehmen im Oktober 2013 einen Katalog mit Starthilfevorrichtungen per E-Mail zugeschickt (**Anlage A**). Die ursprüngliche E-Mail mit diesem Katalog konnte ich zwar bislang nicht finden. Ich habe den Katalog aber mit E-Mail vom 21.10.2013 an meinen Vater und Mitgeschäftsführer, Manfred Bona, intern weitergeleitet. Dieser E-Mail-Verkehr ist hier beigefügt (**Anlage B**).

   Der Katalog zeigt auf Blatt 6 das Gerät EPower10, das u.a. über einen Micro-USB-Ladeanschluss verfügt.

4. Im November 2013 hat r.d.i. jeweils Muster der für uns interessantesten Starthilfegeräte bei Carku bestellt. Die für Zollzwecke benötigte Rechnung zu diesem Vorgang („Proforma Invoice") vom 11.11.2013 liegt hier als **Anlage C** bei. Unter den bestellten Geräten befand sich u.a. das Modell Epower10 mit Micro-USB-Ladeanschluss.

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Der Zahlungsbelegt zu dieser Bestellung liegt hier als **Anlage D** bei, der Buchungsbeleg als **Anlage E**.

5. Da es sich um eine Musterbestellung handelte, wurde der Erhalt der Ware nicht bei uns im normalen Wareneingangssystem verbucht. Es gibt allerdings einen weiteren E-Mail-Verkehr mit Carku, der zeigt, dass die Muster bei r.d.i. mit etwas Lieferverzögerung im Dezember 2013 eingingen und dann von uns getestet wurden (mit gelben Hervorhebungen; **Anlage F**). Der Techniker aus unserem Hause & die Besitzerin des Testfahrzeugs haben mir im Vorfeld dieser eidesstattlichen Versicherung bestätigt, dass die damaligen Tests für den VW Polo mit drei Zylindern erfolgreich verliefen. Dieses Muster hatte r.d.i der Fahrzeugbesitzerin, Angestellte von r.d.i, geschenkt, als Dank für die Überlassung ihres Fahrzeugs zu Testzwecken.

6. Das Original-Muster von damals haben wir noch im Besitz der Fahrzeugbesitzerin aufgefunden. Es liegt mir jetzt wieder vor. Aus der fotografischen Dokumentation gemäß **Anlage G** lässt sich auch noch das Herstellungsdatum des Geräts (August/September 2013) ableiten. Das Gerät kann nicht ohne weiteres verschickt werden, weil sich die Batterie inzwischen aufgebläht hat. Es könnte aber auf Anfrage vorgelegt werden.

Herdecke, den 23.02.2021

Patrick Bona

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D28 in Nullity action of DE 20 2014 011 347.5

Affidavit

In knowledge of the consequences of a false affidavit, in particular the criminal liability of a negligent false affidavit, I, Patrick Bona, make the following affirmation in lieu of an oath:

1. I am co-director of r.d.i. Deutschland Autoteile + Vetriebs GmbH **(r.d.i.)** and as such responsible, among other things, for Purchasing and Sales of our choke devices of the series "choke device with power bank". In 2013, I was managing associate for the division Sales & Marketing.

2. I became familiar with Carku Technology Co., Ltd., **(Carku)** during Canton exhibition (China) in the year 2013 as manufacturer and supplier of iter alia choke devices.

3. In October 2013 Carku sent our company a catalog of choke devices via e-mail **(annex A)**. So far, I have not been able to find the initial e-mail with this catalog. I have forwarded the catalog via e-mail from 21.10.2013 to my father and co-director, Manfred Bona, internally. This e-mail communication is attached herewith **(annex B)**.

   The catalog presents on page 6 the device EPower 10, that iter alia has a Micro-USB charge connection.

4. In November 2013, r.d.i. ordered samples of each of the choke devices we were most interested in from Carku. The invoice of Nov. 11, 2013, necessary for custom purposes to this procedure is provided in **annex C**. Among those ordered devices was inter alia the type EPower 10 with Micro-USB charge connection.

   The payment documents to this order are attached herewith as **annex D**, the voucher as **annex E.**

5. Since this was a sample order, the receipt of the goods was not registered in the normal ware-house system. However, there is a further e-mail communication with Carku that indicates that the samples were received by r.d.i. with some delay in December 2013 and thereafter have being tested by us (yellow emphases; **annex F**). The technician in our company & and the holder of the test vehicle have confirmed to me beforehand this affidavit, that those tests with a VW Polo with three cylinders were successful. r.d.i gave this sample to the car's holder, employee of r.d.i., in return for providing her car for test purposes.

6. We have found the original sample from that time in possession of the car's holder. I have it now. The date of manufacture (August/September 2013) according to **annex G** can also be deduced from the photographic documentation. The device cannot be shipped without further ado because the battery has since inflated. However, it could be presented upon request.

Herdecke, dated 23.02.2021

Patrick Bona

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, DC

Before The Honorable Clark S. Cheney
Administrative Law Judge

In the Matter of **CERTAIN PORTABLE BATTERY JUMP STARTERS AND COMPONENTS THEROF**	**Investigation No. 337-TA-1256**

RESPONDENTS AUTOZONE, INC. AND BEST PARTS, INC.'S RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

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**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

RESPONSE TO THE AMENDED COMPLAINT[1]

Respondents AutoZone, Inc. and Best Parts, Inc. ("AutoZone") respectfully submit this Response to the Amended Complaint filed by Complainant The NOCO Company ("NOCO" or "Complainant") on February 3, 2021 and the corresponding March 18, 2021, Notice of Institution of Investigation issued by the U.S. International Trade Commission ("ITC"). To the extent not specifically admitted herein, the allegations of the Amended Complaint are denied. The headings used herein correspond and respond to the numbered paragraphs set forth in the Amended Complaint and the March 4, 2021 Supplement to the Amended Complaint. To the extent those headings contain any allegations, AutoZone denies such allegations.

I. INTRODUCTION

1. AutoZone admits that NOCO's Amended Complaint requests that the Commission commence an investigation under Section 337 and requests various forms of relief under Section 337, but AutoZone denies that NOCO is entitled to any of its requested relief. AutoZone denies that it has unlawfully imported into the United States, sold for importation, offered for sale, or sold within the United States after importation, certain portable battery jump starters and components thereof. AutoZone further denies that it infringes any claims of the Asserted Patents. Additionally, AutoZone denies that the Asserted Patents are valid or enforceable. AutoZone lacks information sufficient to form a belief as to the truth of the remainder of the allegations contained in this paragraph, and therefore denies them.

[1] NOCO submitted six supplements to its Amended Complaint, on February 4, 5, 8, 22, 23, and March 4, 2021. NOCO's supplements include its withdrawn allegations, additional allegations, and additional exhibits that were not submitted in either the Complaint or Amended Complaint. To the extent that any allegations set forth in NOCO's supplements and/or additional exhibits are not specifically addressed in the paragraphs herein, such allegations are denied.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

2. AutoZone denies that it has engaged in unfair acts in violation of Section 337. To the extent the remaining allegations contained in paragraph 2 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the remainder of the allegations contained in this paragraph, and therefore denies them.

3. AutoZone denies that its products infringe any claims of the '015 Patent or the '024 Patent. AutoZone admits that documents purporting to be the Asserted Patents are attached as Exhibits 1 and 2 to the Complaint. AutoZone is without information sufficient to form a belief as to the remaining allegations of this paragraph and therefore denies them.

4. AutoZone admits that documents purporting to be the Asserted Trademarks are attached as Exhibits 3 and 4 to the Complaint. AutoZone is without information sufficient to form a belief as to the remaining allegations of this paragraph and therefore denies them. NOCO has not alleged that AutoZone infringes the Asserted Trademarks.

5. AutoZone admits that NOCO is alleging that the Accused Products infringe the Asserted Claims of the Asserted Patents. AutoZone denies that its products infringe any claims of the Asserted Patents. AutoZone denies the remaining allegations of paragraph 5.

6. AutoZone admits that Complainant "states that a plain English description of the category of Accused Products is portable, battery-powered devices that are used to jump-start batteries such as those in automobiles, trucks and other vehicles, and related components, namely battery cables and clamps."

7. AutoZone denies that a domestic industry exists and is well established in the United States. AutoZone further denies that there are products and technology "protected by the Asserted Patents," as those patents are invalid and/or unenforceable. AutoZone is without

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

information sufficient to form a belief as to the remaining allegations of this paragraph and therefore denies them.

8. AutoZone admits that NOCO seeks a general exclusion order, cease and desist orders, and a bond. AutoZone denies that NOCO is entitled to any of its requested relief.

9. AutoZone admits that NOCO requests that limited exclusion orders be entered in the event the Commission finds that a general exclusion order is not appropriate. AutoZone denies that a limited exclusion order is appropriate as to AutoZone. AutoZone denies that NOCO is entitled to any of its requested relief.

II. THE PARTIES

A. Complainant NOCO

10. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in Paragraph 10. Accordingly, these allegations are denied.

11. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in Paragraph 11. Accordingly, these allegations are denied.

12. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in Paragraph 12. Accordingly, these allegations are denied.

13. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in Paragraph 13. Accordingly, these allegations are denied.

14. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in Paragraph 14. Accordingly, these allegations are denied.

B. Proposed Respondents

15. AutoZone admits that NOCO's Amended Complaint groups the Proposed Respondents by the entity the NOCO believes to be the manufacturer of a particular design and

DELTRAN EX1002
IPR2024-01219

the entities that NOCO believes to be related to the importation of that design. AutoZone denies that Section VI of the Amended Complaint and the Confidential Declaration of Anne Hurst contains information regarding any unfair acts purportedly committed by AutoZone. AutoZone denies that it has committed any unfair acts in violation of Section 337. AutoZone denies that its products infringe any claims of the Asserted Patents. AutoZone lacks knowledge or information sufficient to form a belief as to the remainder of the allegations of this paragraph and therefore denies them.

1. Carku Respondents

a) Advance Auto Parts, Inc.

16. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

17. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) Antigravity Batteries LLC

18. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

19. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

c) Aukey Technology Co., Ltd.

DELTRAN EX1002
IPR2024-01219

20. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

21. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

d) Autogen Technology Co., Ltd.

22. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

23. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

e) Gooloo Technologies LLC

24. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

25. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

f) Guangzhou Unique Electronics Co., Ltd.

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

26. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

27. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

g) Horizon Tool, Inc.

28. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

29. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

h) Huizhou Grepro E-Commerce

30. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

31. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

i) Medcursor, Inc.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

32. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

33. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

j) Nekteck, Inc.

34. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

35. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

k) PowerMax Battery (U.S.A.), Inc.

36. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

37. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

l) Prime Global Products, Inc.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

38. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

39. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

m) Shenzhen Carku Technology Co., Ltd.

40. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

41. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

n) Shenzhen Moock Technology Co., Ltd.

42. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

43. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

o) Shenzhen Take Tools Co., Ltd.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

44. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

45. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

p) Sictec Instruments Co., Ltd.

46. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

47. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

q) Walmart Inc.

48. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

49. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

r) 70mai Co., Ltd.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

50. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

51. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

2. Boltpower Respondents

a) Anker Technology (UK) Ltd.

52. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

53. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) Arteck Electronic Co., Ltd.

54. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

55. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

c) Best Parts, Inc.

DELTRAN EX1002
IPR2024-01219

56. AutoZone admits that Best Parts, Inc. is a company organized under the laws of the United States, with its principal place of business located at 123 S Front Street, Memphis, Tennessee 38103-3607.

57. To the extent the allegations contained in Paragraph 57 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the remaining allegations in Paragraph 57.

d) Circus Link, Inc.

58. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

59. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

e) Deltran USA, LLC

60. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

61. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

f) FlyLink Tech Technologies Co., Ltd.

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

62. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

63. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

g) Fconegy Co., Ltd.

64. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

65. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

h) Guangdong Boltpower Energy Co., Ltd.

66. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

67. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

i) Guangzhou Autolion Electric Technology Co., Ltd.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

68. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

69. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

j) Integrated Supply Network, LLC

70. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

71. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

k) K-Tool International

72. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

73. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

l) Lowe's Companies, Inc.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

74. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

75. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

m) Matco Tools Corporation

76. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

77. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

n) MonoPrice, Inc.

78. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

79. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

o) National Automotive Parts Association, LLC

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

80. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

81. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

p) O'Reilly Automotive, Inc.

82. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

83. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

q) Pep Boys

84. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

85. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

r) Schumacher Power Technology Ltd.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

86. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

87. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

Schumacher Electric Corp.

87a) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

87b) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

s) Shenzhen Chic Electrics Co., Ltd.

88. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

89. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

t) Shenzhen Dingjiang Technology Co., Ltd. LLLC

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

90. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

91. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

u) Shenzhen Lianfatong Technology Co., Ltd.

92. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

93. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

v) Shenzhen Li Feng Maoyiyouxiangongsi

94. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

95. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

w) Shenzhen MediatekTong Technology Co., Ltd.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

96. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

97. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

x) Shenzhen Topdon Technology Co., Ltd.

98. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

99. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

y) Shenzhen Valuelink E-Commerce Co., Ltd.

100. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

101. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

z) Smart Well Enterprise Limited

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

102. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

103. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

aa) Tii Trading Inc.

104. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

105. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

bb)Zhejiang Qingyou Electronic Commerce Co., Ltd.

106. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

107. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

3. Smartech Respondents

a) Smartech Products, Inc.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

108. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

109. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

4. Weego Respondents

a) Shenzhen Jieruijia Technology Co., Ltd.

110. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

111. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) Paris Corporation

112. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

113. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

5. WinPlus Respondents

a) Shenzhen Winplus Technology Co., Ltd.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

114. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

115. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) Winplus North America, Inc.

116. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

117. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

6. Great Neck Respondents

a) AutoZone, Inc.

118. AutoZone admits that AutoZone, Inc. is a company organized under the laws of the United States, with its principal place of business located at 123 S Front Street, Memphis, Tennessee 38103-3607.

119. To the extent the allegations contained in Paragraph 119 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the remaining allegations in Paragraph 57.

b) Great Neck Global, Inc. & Great Neck Saw Manufacturers, Inc.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

120. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

121. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

122. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

7. ThiEye Respondents

a) Dongguan Hangchebao Energy Technology Co., Ltd.

123. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

124. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) ThiEye Technologies Co., Ltd.

125. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

126. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

8. Energen/ Performance Tool Respondents

a) Best Buy Co., Inc.

127. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

128. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) Chao Fung Trading Co. Ltd.

129. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

130. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

c) Energen, Inc.

131. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

132. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

d) Wilmar Corporation

133. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

134. AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

9. Halo Respondents

a) Halo2Cloud, LLC

134a) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

134b) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

b) QVC, Inc.

134c) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

134d) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

c) Zagg Co. Rrd Gst

134e) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

134f) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

10. Jump-n-Carry Respondents

a) Clore Automotive, LLC

134g) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

134h) AutoZone lacks knowledge or information sufficient to from a belief as to the truth of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies all allegations in this paragraph.

III. THE PRODUCTS AT ISSUE

135. AutoZone admits that the accused products are portable battery jump starter packs that allow users to safely jump start vehicles without connecting to another vehicle. AutoZone denies that any features of the accused products are covered by any claims of the Asserted Patents. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

remainder of the allegations of this paragraph as they pertain to Respondents other than AutoZone, and therefore denies them.

136. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

137. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

138. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

A. Complainant's Jump Starters

139. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

140. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

141. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

142. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

B. Respondents' Jump Starters

143. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

144. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

145. AutoZone admits that it sells the Accused Products in its brick-and-mortar retail locations in the United States and/or on its website. AutoZone denies that any features of the accused products are covered by any claims of the Asserted Patents. To the extent the remaining allegations contained in paragraph 145 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the remainder of the allegations contained in this paragraph, and therefore denies them.

IV. THE ASSERTED PATENTS

146. AutoZone admits that the Asserted Patents speak for themselves. To the extent the remaining allegations contained in paragraph 146 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the remainder of the allegations contained in this paragraph, and therefore denies them.

147. AutoZone admits that in certain paragraphs of the Amended Complaint below, NOCO purports to discuss the identification, ownership, non-technical description, foreign counterparts, and licensees for each Asserted Patent. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of those allegations, and therefore denies them.

A. U.S. Patent No. 9,007,015

1. Identification of the Patent and Ownership

148. AutoZone admits that United States Patent No. 9,007,015 (the "'015 Patent") is titled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection," that it names Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill as inventors, and that it purports on its face to have issued on April 14, 2015 from an application filed on July 8, 2014, which purports to be a continuation of an application filed on July 3, 2014. The remainder

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

of the allegations of this paragraph are legal conclusions to which no response is required. To the extent a response is required, AutoZone denies such allegations.

149. Denied as stated. AutoZone admits that Appendix A1 to the Complaint purports to be a copy of at least a portion of the prosecution history of the '015 Patent and Appendix A2 purports to include copies of references cited therein. AutoZone denies that Appendix A1 and A2 contain complete and accurate copies of the entirety of the prosecution history of the '015 Patent.

150. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

2. Non-Technical Description of the Patent

151. AutoZone admits that the '015 Patent speaks for itself. To the extent that this paragraph purports to argue that the claims of the '015 Patent are valid—e.g., by describing an "improved" portable jump starter and a "novel" apparatus—such allegations are denied. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the remaining allegations of this paragraph, and therefore denies them.

152. AutoZone admits that NOCO purports to be asserting claims 1, 4, 11, 14, 18, 19, and 21.

3. Foreign Counterparts of the Patent

153. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

154. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

4. Licensees to the Patent

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

155. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

B. U.S. Patent No. 10,604,024

1. Identification of the Patent and Ownership

156. AutoZone admits that United States Patent No. 10,604,024 (the "'024 Patent") is titled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection," that it names Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill as inventors, and that it purports on its face to have issued on March 31, 2020 from an application filed on August 31, 2017, which purports to be a continuation of an application filed on February 11, 2015, which purports to claim priority to an application filed on July 3, 2014. The remainder of the allegations of this paragraph are legal conclusions to which no response is required. To the extent a response is required, AutoZone denies such allegations.

157. Denied as stated. AutoZone admits that Appendix B1 to the Complaint purports to be a copy of at least a portion of the prosecution history of the '024 Patent and Appendix B2 purports to include copies of references cited therein. AutoZone denies that Appendix B1 and B2 contain complete and accurate copies of the entirety of the prosecution history of the '024 Patent.

158. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

2. Non-Technical Description of the Patent

159. AutoZone admits that the '024 Patent speaks for itself. To the extent that this paragraph purports to argue that the claims of the '024 Patent are valid—e.g., by describing an "improved" portable jump starter and a "novel" apparatus—such allegations are denied. AutoZone

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

lacks knowledge or information sufficient to form a belief as to the truth of the remaining allegations of this paragraph, and therefore denies them.

160. AutoZone admits that NOCO purports to be asserting claims 1, 4, 5, 6, 16, 19, 23, 24, 26, 29, and 30.

3. Foreign Counterparts of the Patent

161. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

4. Licensees to the Patent

162. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

V. THE ASSERTED TRADEMARKS

163. NOCO has not accused AutoZone of infringing the Asserted Trademarks, so AutoZone is not required to respond to this paragraph. To the extent a response is required, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

164. NOCO has not accused AutoZone of infringing the Asserted Trademarks, so AutoZone is not required to respond to this paragraph. To the extent a response is required, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

165. NOCO has not accused AutoZone of infringing the Asserted Trademarks, so AutoZone is not required to respond to this paragraph. To the extent a response is required, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

166. NOCO has not accused AutoZone of infringing the Asserted Trademarks, so AutoZone is not required to respond to this paragraph. To the extent a response is required, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

VI. UNFAIR ACTS OF THE PROPOSED RESPONDENTS

A. Infringement of the Asserted Patents

167. AutoZone denies the allegations of this paragraph to the extent they relate to AutoZone's activities and AutoZone's Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the remainder of the allegations of this paragraph as they pertain to Respondents other than AutoZone and products other than AutoZone's Accused Products, and therefore denies them.

168. AutoZone denies the allegations of this paragraph to the extent they relate to AutoZone's activities and AutoZone's Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the remainder of the allegations of this paragraph as they pertain to Respondents other than AutoZone and products other than AutoZone's Accused Products, and therefore denies them.

169. AutoZone admits that NOCO has categorized the various accused products in this Investigation into ten separate groups, as set forth in its ten separate claim charts (Claim Chart 01 through Claim Chart 10). AutoZone denies that "the Accused Products within each design group are set forth on Exhibit 9" insofar as NOCO appears to have withdrawn Exhibit 9. *See* Amended Complaint, Table of Exhibits, at p. v (indicating that Exhibit 9 is withdrawn). AutoZone further denies that it infringes any claims of the Asserted Patents. AutoZone lacks knowledge or

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

information sufficient to form a belief as to the truth of the remainder of the allegations in Paragraph 169, and therefore denies them.

1. Claim Chart 01- Carku Accused Products

a) Carku Design

170. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

b) Infringement of the '015 Patent

171. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

172. AutoZone admits that Exhibit 111 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent and dependent claims 10, 11, 14, 18, 19, and 21 of the '015 to a product that NOCO characterizes as a representative Carku Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 111 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

173. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

174. AutoZone admits that Exhibit 111 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent and dependent claims 4, 5, 6,

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

16, 19, 23, 24, and 16 of the '024 Patent to a product that NOCO characterizes as a representative Carku Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 111 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

2. Claim Chart 02 – Boltpower Accused Products

a) Boltpower Design

175. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph to the extent they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent that the allegations pertain to AutoZone's accused products, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

b) Infringement of the '015 Patent

176. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent the allegations contained in Paragraph 176 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the allegations.

177. AutoZone admits that Exhibit 112 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Boltpower Design Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 112, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

c) Infringement of the '024 Patent

178. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent the allegations contained in Paragraph 178 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the allegations.

179. AutoZone admits that Exhibit 112 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative Boltpower Design Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 112, and therefore denies them.

3. Claim Chart 03- Smartech Accused Products

a) Smartech Design

180. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

b) Infringement of the '015 Patent

181. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

182. AutoZone admits that Exhibit 113 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Smartech Design Accused Product. AutoZone lacks knowledge or information

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

sufficient to form a belief as to the truth of the allegations set forth in Exhibit 113 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

183. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

184. AutoZone admits that Exhibit 113 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative Smartech Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 113 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

4. Claim Chart 04- Weego Accused Products

a) Weego Design

185. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

b) Infringement of the '015 Patent

186. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

187. AutoZone admits that Exhibit 114 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

a representative Weego Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 114 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

188. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

189. AutoZone admits that Exhibit 114 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative Weego Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 114 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

5. Claim Chart 05 – Winplus Accused Products

a) Winplus Design

190. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph to the extent that they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent that the allegations pertain to AutoZone's accused products, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

b) Infringement of the '015 Patent

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

191. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent the allegations contained in Paragraph 191 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the allegations.

192. AutoZone admits that Exhibit 115 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Winplus Design Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 115, and therefore denies them.

c) Infringement of the '024 Patent

193. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent the allegations contained in Paragraph 193 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the allegations.

194. AutoZone admits that Exhibit 115 to the Amended Complaint purports to be a claim chart comparing independent claim 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative Winplus Design Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 115, and therefore denies them.

6. Claim Chart 06 – Great Neck Accused Products

a) Great Neck Design

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

195. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph to the extent that they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent that the allegations pertain to AutoZone's accused products, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

b) Infringement of the '015 Patent

196. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them. To the extent the allegations contained in Paragraph 196 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone denies the allegations.

197. AutoZone admits that Exhibit 116 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Great Neck Design Accused Products. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 116, and therefore denies them.

7. Claim Chart 07- ThiEye Accused Products

a) ThiEye Design

198. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

b) Infringement of the '015 Patent

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

199. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

200. AutoZone admits that Exhibit 117 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Weego Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 117 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

201. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

202. AutoZone admits that Exhibit 117 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative ThiEye Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 117 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

8. Claim Chart 08- Energen/Performance Tool Accused Products

a) Energen/Performance Tool Design

203. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

b) Infringement of the '015 Patent

204. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

205. AutoZone admits that Exhibit 118 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Design 11 Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 118 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

206. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

207. AutoZone admits that Exhibit 118 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative Energen/Performance Tool Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 118 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

9. Claim Chart 09- HALO Accused Products

a) HALO Design

DELTRAN EX1002
IPR2024-01219

208. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

b) Infringement of the '015 Patent

209. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

210. AutoZone admits that Exhibit 119 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative HALO Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 119 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

211. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

212. AutoZone admits that Exhibit 119 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative HALO Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 119 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

10. Claim Chart 10- Clore Accused Products

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

a) Clore Design

213. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

b) Infringement of the '015 Patent

214. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

215. AutoZone admits that Exhibit 120 to the Amended Complaint purports to be a claim chart comparing independent claim 1 of the '015 Patent to a product that NOCO characterizes as a representative Clore Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 120 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

c) Infringement of the '024 Patent

216. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

217. AutoZone admits that Exhibit 120 to the Amended Complaint purports to be a claim chart comparing independent claims 1, 29, and 30 of the '024 Patent to a product that NOCO characterizes as a representative Clore Design Accused Product. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Exhibit 120 as they pertain to Accused Products other than AutoZone's Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

B. Infringement of the Asserted Trademarks

218. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

219. To the extent NOCO's allegations call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

220. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

221. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

222. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

223. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

224. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

225. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

226. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

227. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

228. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

229. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

230. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

231. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

VII. SPECIFIC INSTANCES OF IMPORTATION AND SALE

232. AutoZone denies that it has committed any acts that constitute a violation of Section 337. To the extent the remaining allegations contained in paragraph 232 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

sufficient to form a belief as to the truth of the remainder of the allegations contained in this paragraph, and therefore denies them.

A. Carku Brands

1. AllStart

233. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

234. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

235. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

236. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

2. Antigravity Batteries

237. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

238. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

239. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

240. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

3. Audew

241. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

242. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

243. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

244. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

4. Autogen

245. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

246. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

247. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

248. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

5. Freeman

249. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

250. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

251. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

252. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

6. Gooloo

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

253. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

254. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

255. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

256. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

7. Grepro

257. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

258. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

259. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

8. iClever

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

260. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

261. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

262. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

263. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

9. M Moock

264. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

265. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

266. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

267. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

10. Nekteck

268. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

269. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

270. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

271. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

11. PowerMax

272. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

273. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

274. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

275. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

12. Tacklife

276. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

277. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

278. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

279. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

13. Xiaomi

280. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

281. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

282. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

283. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

B. Boltpower Brands

1. Ampeak

284. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

285. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

286. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

287. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

2. Arteck

288. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

289. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

290. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

291. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

3. Autown

292. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

293. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

294. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

295. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

4. Battery Tender

296. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

297. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

298. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

299. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

5. Beatit

300. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

301. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

302. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

303. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

6. Boltpower

304. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

305. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

306. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

307. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

7. DB Power/Valuelink

308. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

309. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

310. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

311. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

8. DieHard

312. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

313. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

314. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

315. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

9. Duralast

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

316. To the extent the allegations contained in paragraph 316 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

317. To the extent the allegations contained in paragraph 317 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

318. To the extent the allegations contained in paragraph 318 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

319. To the extent the allegations contained in paragraph 319 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

10. EverStart

320. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

321. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

322. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

323. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

11. Fconegy

324. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

325. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

326. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

327. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

12. Flylinktech

328. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

329. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

330. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

331. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

13. Imazing

332. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

333. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

334. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

335. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

14. Jumtop

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

336. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

337. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

338. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

339. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

15. KTI (K-Tool International)

340. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

341. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

342. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

343. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

16. Lemsir

344. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

345. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

346. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

347. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

17. Loftek

348. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

349. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

350. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

351. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

18. Matco Tools

352. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

353. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

354. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

355. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

19. Nexpow

356. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

357. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

358. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

359. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

20. PowerCache

360. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

361. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

362. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

363. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

21. Roav

DELTRAN EX1002
IPR2024-01219

364. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

365. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

366. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

367. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

22. Sanrock

368. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

369. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

370. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

371. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

23. Schumacher

372. To the extent the allegations contained in paragraph 372 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

373. To the extent the allegations contained in paragraph 373 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

374. To the extent the allegations contained in paragraph 374 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

375. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

24. Tooliom

376. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

377. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

378. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

379. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

25. Topdon

380. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

381. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

382. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

383. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

26. Topvision

DELTRAN EX1002
IPR2024-01219

384. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

385. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

386. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

387. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

27. Trekpow

388. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

389. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

390. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

391. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

28. Vavofo

392. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

393. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

394. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

395. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

29. Vekkia

396. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

397. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

398. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

399. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

30. Yaber

400. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

401. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

402. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

403. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

C. Smartech Brands

1. Smartech

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

404. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

405. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

406. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

407. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

D. Weego Brands

2. Weego

408. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

409. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

410. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

411. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

E. Winplus Brands

1. Type S

412. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

413. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

414. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

415. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

2. Winplus

416. To the extent the allegations contained in paragraph 416 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

417. To the extent the allegations contained in paragraph 417 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

418. To the extent the allegations contained in paragraph 418 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

419. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

F. Great Neck Brands

1. OEM Tools

420. To the extent the allegations contained in paragraph 420 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

421. To the extent the allegations contained in paragraph 421 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

422. To the extent the allegations contained in paragraph 422 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

423. AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

G. ThiEye Brands

1. Buture

424. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

425. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

426. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

427. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

2. Fnnemge

428. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

429. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

430. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

431. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

3. Utrai

432. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

433. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

434. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

435. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

H. Energen & Performance Tool Brands

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

1. Energen

436. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

437. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

438. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

439. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

2. Performance Tool

440. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

441. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

442. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

443. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

I. Halo Brands

3. HALO

444. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

445. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

446. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

447. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

J. Clore Brands

1. Jump-N-Carry

448. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

449. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

450. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

451. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph as they pertain to Respondents and Accused Products other than AutoZone and its Accused Products, and therefore denies them.

VIII. HARMONIZED TARIFF SCHEDULE ITEM NUMBERS

452. To the extent the allegations contained in paragraph 452 call for a legal conclusion, no response is required. To the extent a response is required, AutoZone lacks information sufficient to form a belief as to the truth of the allegations contained in this paragraph, and therefore denies them.

IX. DOMESTIC INDUSTRY

453. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

A. Technical Prong

454. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

455. AutoZone admits that a claim chart purporting to show that NOCO's products practice the claims of the Asserted Patents is attached to the Complaint as Confidential Exhibit

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

10C. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

456. NOCO has not accused AutoZone of infringing the Asserted Trademarks, and so AutoZone is not required to respond to this paragraph. To the extent a response is required, AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

B. Economic Prong

457. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

458. AutoZone admits that Confidential Exhibit 105C is a document purporting to be a Declaration of Jeffrey Weiner. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

459. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

460. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

461. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

462. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

X. RELATED LITIGATION

463. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

464. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

465. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

466. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

XI. GEO

467. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

468. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

469. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

470. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

471. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

472. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

473. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

474. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

475. AutoZone denies that it infringes any claims of the Asserted Patents. NOCO has not accused AutoZone of infringing the Asserted Trademarks. AutoZone lacks knowledge or information sufficient to form a belief as to the truth of the allegations of this paragraph, and therefore denies them.

476. AutoZone denies that NOCO is entitled to any relief.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

RESPONSE TO THE NOTICE OF INSTITUTION

1. Pursuant to Commission Rule 210.13(b), AutoZone hereby responds to the Notice of Institution of Investigation (the "Notice") issued by the United States International Trade Commission (the "Commission") on March 17, 2021. Without admitting any of the specific or general allegations set forth in the Amended Complaint as referenced in the Notice, AutoZone provides the following response.

2. AutoZone admits that an Amended Complaint was filed on behalf of The NOCO Company with the Commission on February 3, 2021 pursuant to Section 337 of the Tariff Act of 1930, as amended. AutoZone admits that the Amended Complaint alleges certain violations of Section 337 of the Tariff Act based on the importation into the United States, the sale for importation, and the sale within the United States after importation of certain portable battery jump starters and components thereof by reason of alleged infringement of certain claims of the U.S. Patent No. 9,007,015 (the "'015 Patent) and U.S. Patent No. 10,604,024 (the "'024 Patent) (together, the "Asserted Patents") by certain Respondents and alleged infringement of U.S. Trademark Reg. Nos. 4,811,656 and 4,811,749 (collectively, the "Asserted Trademarks") by certain Respondents. AutoZone denies that it has violated Section 337.

3. AutoZone admits that the Amended Complaint alleges that an industry in the United States exists and required by subsection (a)(2) of Section 337, but AutoZone lacks sufficient information and knowledge to form a belief as to the truth of NOCO's allegation that it meets the domestic industry requirement, and therefore denies such allegation on that basis. AutoZone admits that NOCO requested that the Commission institute an investigation and, after the investigation, issue a general exclusion order and cease and desist order, as set forth in the Summary of the Notice. AutoZone denies that NOCO is entitled to any relief.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

4. AutoZone admits that the commission instituted an investigation as set forth in paragraphs (1) through (4) of the Notice, and that the Scope of Investigation as described in the Notice is consistent with the allegations in the Amended Complaint. AutoZone denies that there is a violation of Section 337 by reason of the alleged infringement of any asserted claim of the Asserted Patents. AutoZone further denies that a protectable domestic industry exists with respect to the Asserted Patents, and further denies that it is in the public interest to grant any relief to NOCO in connection with this Investigation.

5. Except as expressly admitted, AutoZone denies the allegations in the Notice.

DELTRAN EX1002
IPR2024-01219

CONTAINS CONFIDENTIAL BUSINESS INFORMATION, SUBJECT TO PROTECTIVE ORDER

INFORMATION REQUIRED UNDER COMMISSION RULE 210.13(b)

Pursuant to Commission Rule 210.13(b), AutoZone provides the following information with the sole intention of supplying statistical and other data required by 19 C.F.R. § 210.13(b). AutoZone specifically denies that any of the supplied data refers or relates to any unlawful act under Section 337 or otherwise, and AutoZone specifically denies that any of its products infringe any of the claims of the Asserted Patents. Discovery has only recently begun and is ongoing. AutoZone reserves the right to amend and/or supplement the information provided below.

1. Approximately 67,000 units of the Accused Products have been sold in the United States since January 1, 2020. The approximate value of such products is $ 8.8 million.

2. AutoZone's Accused Products may, upon information and belief, fall within the following classifications of the Harmonized Tariff Schedules of the United States: 8507.60.0020

3. AutoZone does not conduct any manufacturing. The names and addresses of the suppliers of Accused Products can be had from Co-Respondents Great Neck Global, Inc. (Taiwan), Great Neck Saw Manufacturers, Inc., Horizon Tool, Inc., Schumacher Power Technology Ltd., Schumacher Electric Corp., and Shenzhen Carku Technology Co., Ltd.

Great Neck Global, Inc. (Taiwan)
No. 19, Lane 96, Section 2, Zhongshan
North Road, Taipei City, Taiwan 104449
Room 1003, 96 Chung-Shan N. Road Sec.
Taipei City, Taiwan

Great Neck Saw Manufacturers, Inc.
165 East 2nd Street
Mineola, NY 11501

Horizon Tool, Inc.
7918 Industrial Village Rd.
Greensboro, North Carolina 27409

Schumacher Power Technology Ltd.
No. 30, Century Road, Binhai County,

DELTRAN EX1002
IPR2024-01219

Yancheng, Jiangsu, China 224500

Schumacher Electric Corp.
801 E Business Center Drive
Mount Prospect, Illinois 60056

Shenzhen Carku Technology Co., Ltd.
Building A, Qixing Creative Workshop
(Dalang), Lianrun Road, Gaofend
Community, Dalang Street, Longhua New
District, Shenzhen, China 518110

4. Because the Commission is currently not accepting paper copies of electronic filings in light of the COVID-19 pandemic, AutoZone will not submit physical samples of the subject articles as exhibits to this Response. *See* 19 C.F.R. § 210.13(c). However, AutoZone reserves the right to submit samples of its Accused Products at the hearing or at such other time as AutoZone reserves the right to submit samples of its Accused Products at the hearing or at such other time as AutoZone, the Administrative Law Judge, or the Commission determines is appropriate.

5. This information is preliminary in nature and will be supplemented and amended as appropriate.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

DEFENSES

AutoZone asserts the following affirmative and other defenses based on the information available to it at this time. AutoZone reserves the right to modify and/or amend the following defenses and/or raise additional defenses as discovery proceeds in this Investigation. Further, by identifying the following defenses, AutoZone does not admit that it has the burden of proof with respect to any of these defenses.

FIRST AFFIRMATIVE DEFENSE

(Non-Infringement of the '015 Patent)

1. AutoZone has not infringed, either directly, contributorily, or by inducement, any valid and enforceable claim of the Asserted Patent, either literally or under the doctrine of equivalents, and has not committed any acts in violation of 35 U.S.C. § 271 or 19 U.S.C. § 1337.

2. The products NOCO accuses of infringing the Asserted Patent have substantial non-infringing uses.

3. AutoZone reserves the right to amend its response, including offering claim charts under Rule 210.13(b)(1), after further discovery in this Investigation.

SECOND AFFIRMATIVE DEFENSE

(Non-Infringement of the '024 Patent)

4. AutoZone has not infringed, either directly, contributorily, or by inducement, any valid and enforceable claim of the Asserted Patent, either literally or under the doctrine of equivalents, and has not committed any acts in violation of 35 U.S.C. § 271 or 19 U.S.C. § 1337.

5. The products NOCO accuses of infringing the Asserted Patent have substantial non-infringing uses.

DELTRAN EX1002
IPR2024-01219

6. AutoZone reserves the right to amend its response, including offering claim charts under Rule 210.13(b)(1), after further discovery in this Investigation.

THIRD AFFIRMATIVE DEFENSE

(Prosecution History Estoppel And/Or Prosecution Disclaimer)

7. NOCO's claims against AutoZone are barred, in whole or in part, by prosecution history estoppel and/or prosecution disclaimer based on admissions, amendments, arguments, and statements made by the applicants during prosecution of the Asserted Patents.

FOURTH AFFIRMATIVE DEFENSE

(Equitable Defenses)

8. Some or all of NOCO's claims for relief are barred by the equitable doctrines of waiver, estoppel, unclean hands, and/or acquiescence.

FIFTH AFFIRMATIVE DEFENSE

(Exclusion Order Not in the Public Interest)

9. Even if it is found that some of the Respondents have engaged in an unfair act, an order excluding importation of battery jump starters would be injurious to the public interest. NOCO seeks to unfairly eliminate competition in the marketplace, thereby seeking to corner the market. This is contrary to the public interest and will result in a decrease in quality and choices and increase in costs and product prices being passed to the consumer. By allowing various battery jump starters to compete in the marketplace, including NOCO's products and AutoZone's Accused Products, consumers benefit from more options.

SIXTH AFFIRMATIVE DEFENSE

(No Unlawful Act)

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

10. No act of AutoZone constitutes an unfair method of competition or an unfair act in the importation, sale for importation, or sale after importation of infringing articles that warrants relief under Section 337 of the Tariff Act of 1930, as amended.

SEVENTH AFFIRMATIVE DEFENSE

(Additional Defenses)

11. As this Investigation has only just begun, AutoZone intends to rely upon further defenses as may become apparent during the proceedings in this Investigation. AutoZone further incorporates by reference any defenses asserted by other parties to this Investigation to the extent not inconsistent with the defenses already stated herein or later raised, and reserves any and all additional defenses available, now existing or later arising, as may be discovered during the course of this Investigation.

RELIEF REQUESTED

WHEREFORE, by reason of the foregoing, Respondents AutoZone, Inc. and Best Parts, Inc. respectfully requests that the ITC:

(1) Find that they have not violated on Section 337;

(2) Find that they have not infringed any asserted claim of the Asserted Patents;

(3) Find the Asserted Patents to be invalid and/or unenforceable;

(4) Find that Complainant has failed to satisfy the domestic industry requirement;

(5) Deny Complainant's requested relief as it relates to AutoZone and/or Best Parts;

(6) Terminate the investigation as it relates to AutoZone and/or Best Parts; and

(7) Provide such other relief to AutoZone and Best Parts as the Commission deems appropriate.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER**

Dated: April 22, 2021

Respectfully submitted,

/s/ Adam D. Swain

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Counsel for Respondents AutoZone, Inc. and Best Parts, Inc.

DELTRAN EX1002
IPR2024-01219

**CONTAINS CONFIDENTIAL BUSINESS INFORMATION,
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VERIFICATION

I, Maria Leggett, declare, in accordance with 19 C.F.R. §§ 210.4(c) and 210.13(b), under penalty of perjury, that the following statements are true:

1. The Response to the Notice of Institution and Complaint is not being presented for any improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of the investigation or related proceeding;

2. To the best of my knowledge, information, and belief based on reasonable inquiry, the Response to the Notice of Institution and Complaint contains claims, defenses, and other legal contentions that are warranted by existing law or by a non-frivolous argument for the extension, modification, or reversal of existing law or the establishment of new law;

3. The allegations and other factual contentions contained in the Response to the Notice of Institution and Complaint have evidentiary support or, if specifically, so identified, are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

4. The denials of factual contentions contained in the Response to the Notice of Institution and Complaint are warranted on the evidence or, if specifically, so identified, are reasonably based on a lack of information or belief.

Dated: April 22, 2021

Maria Leggett
Vice President, Assistant General Counsel &
Assistant Secretary, AutoZone, Inc.

DELTRAN EX1002
IPR2024-01219

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this day, a true and correct copy of the foregoing document was served by the indicated means to the persons at the addresses below:

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Dated: April 22, 2021

/s/*Emily S. Healy*

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Espacenet

CN202696190U Intelligent emergent start power source with self-equipped voice prompt function

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IPC ***G01R19/165; G01R31/02; H02J7/00;***

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Intelligent emergent start power source with self-equipped voice prompt function

Abstract

The utility model discloses an intelligent emergent start power source with a self-equipped voice prompt function. The intelligent emergent start power source comprises a battery pack, wherein the power supply end of the battery pack is connected with an alternation switch which is connected with an output electric clip through a direct current (DC) contactor. The intelligent emergent start power source further comprises a central processing unit (CPU) main control circuit, wherein an output end of the CPU main control circuit is connected with an audio broadcast system. An input end of the CPU main control circuit is connected with a sampling and driving control circuit which is connected with the alternation switch, the DC contactor and the output electric clip. The battery pack is connected with a charge port through a power source control circuit, and the power source control circuit and the charge port are connected with the CPU main control circuit. The output electric clip and the alternation switch are respectively connected with the power source control circuit. The output end of the CPU main control circuit also is connected with a display circuit, and the sampling and driving control circuit is connected with a force started button. The emergent start power source can timely and accurately send relative operation information to users under different environments.

DELTRAN EX1002
IPR2024-01219

CN202696190U

Intelligent emergent start power source with self-equipped voice prompt function

Abstract

The utility model discloses an intelligent emergent start power source with a self-equipped voice prompt function. The intelligent emergent start power source comprises a battery pack, wherein the power supply end of the battery pack is connected with an alternation switch which is connected with an output electric clip through a direct current (DC) contactor. The intelligent emergent start power source further comprises a central processing unit (CPU) main control circuit, wherein an output end of the CPU main control circuit is connected with an audio broadcast system. An input end of the CPU main control circuit is connected with a sampling and driving control circuit which is connected with the alternation switch, the DC contactor and the output electric clip. The battery pack is connected with a charge port through a power source control circuit, and the power source control circuit and the charge port are connected with the CPU main control circuit. The output electric clip and the alternation switch are respectively connected with the power source control circuit. The output end of the CPU main control circuit also is connected with a display circuit, and the sampling and driving control circuit is connected with a force started button. The emergent start power source can timely and accurately send relative operation information to users under different environments.

Claims

1.

An intelligent emergency starting power supply with a voice prompt function, including a battery pack, the battery pack The power supply terminal is connected with a transfer switch, and the transfer switch is connected to the output clamp through a DC contactor. Its characteristics Is that

It also includes a CPU master control circuit. The output of the CPU master control circuit is connected with an audio playback system. System

The input end of the CPU master control circuit is connected with a sampling and driving control circuit, the sampling and driving The control circuit is connected with the transfer switch, DC contactor and output electric clamp;

The battery pack is connected to the charging interface through a power control circuit, and the power control circuit is connected to the charging interface Connect to the CPU master control circuit;

The output electric clamp and the changeover switch are respectively connected with the power control circuit;

The output terminal of the CPU master control circuit is also connected with a display circuit;

The sampling and driving control circuit is connected with a forced start button.

2.

An intelligent emergency start power supply with a voice prompt function according to claim 1, which

The feature is that the audio playback system includes a voice storage control circuit, the voice storage control circuit The input terminal is connected to the CPU master control circuit, and the output terminal is connected to the audio control circuit, the audio control circuit Connect with speakers.

3.

The intelligent emergency start power supply with its own voice prompt function according to claim 1, which

It is characterized in that, the display circuit includes an LED digital tube display and LED indicators of different colors.

DESCRIPTION CN202696190U

An intelligent emergency starting power supply with voice prompt function Technical field

The utility model relates to an emergency starting power supply, in particular to an intelligent emergency starting power supply with a voice prompt function.

Background technique

12 The V/24V conversion emergency start power supply is difficult to be 100% correct under different operating environments. Without any protection and prompts, any misoperation may cause permanent damage to the product, or even cause the battery to explode in severe cases, endangering the personal and property safety of the user. Although some of the existing products are equipped with operating instructions and some simple sound and light alarm functions, the simple buzzer alarm and the wear and tear of the operation cause the defect or blur of the operation prompt content, so that the emergency start power supply lacks the necessary safety instructions , At the same time, the user is confused when the user cannot find the cause in time after the problem occurs. If you add necessary voice prompts and photoelectric instructions for each operation of the user at the same time, it can not only reduce the impact of different environments on the user, but also directly inform the user of the real-time operating status in time, which can more effectively prevent mistakes The generation of, allows users to operate more directly and clearly. Therefore, it is necessary to optimize the structure of the existing emergency power supply.

Utility model content

The purpose of the utility model is to provide an intelligent emergency starting power supply with its own voice prompt function, which uses voice to prompt the user's current operation to reduce misoperations, so that the emergency starting power supply can be safely protected during operation and extend its use life.

The technical scheme adopted by the utility model to solve its technical problems is:

An intelligent emergency starting power supply with a voice prompt function, including a battery pack, the power supply end of the battery pack is connected with a transfer switch, the transfer switch is connected to the output clamp through a DC contactor, and it also includes a CPU master control circuit, The output terminal of the CPU master control circuit is connected with an audio playback system, the audio playback system includes a voice storage control circuit, the input terminal of the voice storage control circuit is connected to the CPU master control circuit, and the output terminal is connected to the audio control circuit. The circuit is connected to the speaker;

The input end of the CPU master control circuit is connected with a sampling and driving control circuit, which is connected with the changeover switch, the DC contactor and the output electric clamp; the battery pack is connected with the charging interface through the power control circuit, and the power supply The control circuit and the charging interface are connected to the CPU master control circuit; the output clip and the switch are respectively connected to the power control circuit; the output end of the CPU master control circuit is also

connected to a display circuit, which includes an LED digital tube display And LED indicators of different colors; the sampling and driving control circuit is connected with a forced start button.

The advantage of the utility model is that the emergency start power supply can provide safety protection for gear selection, correct connection, wrong connection, and low voltage or high voltage, and at the same time, it can select charging gear, battery low voltage warning, output overcurrent protection, Electric clip output short-circuit protection and man-made forced start safety prompts are added with corresponding voice prompts and photoelectric prompts; in different use environments, they can promptly and accurately deliver relevant operating information to users, so that users can use sound, light, etc. The type of prompt method to obtain operating information allows users to more intuitively understand the real-time operating conditions and the reasons for use errors, facilitate better next operations or timely and effective corrective measures, ensure the personal safety of users, and make the entire product better Humanized and intelligent.

Description of the drawings

Figure 1 is an electrical schematic diagram of the emergency starting power supply proposed by the utility model;

Figure 2 is a power control circuit diagram;

Figure 3 is a circuit diagram of the CPU master control circuit and LED digital tube display;

Figure 4 is a circuit diagram of voice storage and audio control;

Figure 5 is a sampling and drive control circuit diagram.

Detailed ways

In order to make the technical means, creative features, goals and effects of the utility model easy to understand, the following figures and specific embodiments are combined to further explain the utility model.

As shown in Figure 1, the intelligent emergency starting power supply with its own voice prompt function proposed by the present invention includes a battery pack, the power supply end of the battery pack is connected with a switch, and the switch is connected to the output clip through a DC contactor. It also includes a CPU master control circuit. The output of the CPU master control circuit is connected to an audio playback system. The audio playback system includes a voice storage control circuit. The input of the voice storage control circuit is connected to the CPU master control circuit. The terminal is connected to the audio control circuit, and the audio control circuit is connected to the speaker;

The input end of the CPU master control circuit is connected with a sampling and driving control circuit, which is connected with the changeover switch, the DC contactor and the output electric clamp; the battery pack is connected with the charging interface through the power control circuit, and the power supply The control circuit and the charging interface are connected to the CPU master control circuit; the output clip and the switch are respectively connected to the power control circuit; the output end of the CPU master control circuit is also connected to a display circuit, which includes an LED digital tube display And LED indicators of different colors; the sampling and driving control circuit is connected with a forced start button.

At present, car batteries are mainly divided into two types: 12V and 24V. In the circuit design, the default is 12VDC battery within 0VDC～15.5VDC; the default is 24VDC battery within 15.5～30.0VDC. The switch connects the two batteries in parallel or in series, so that it can realize the function of two voltage outputs in one machine. At the same time, two small linkage switches are embedded in the transfer switch. The linkage switch is synchronized with the 12V and 24V gears, that is, when the transfer switch is in the 12V or 24V gear, the linkage opening is also closed synchronously, and the linkage switch is automatically turned off when the switch is in the OFF position. Open, used to realize the judgment of input or disconnection of external connection signal.

The emergency starting power supply uses a high-power DC contactor as an automatic control electronic switch, and controls its on and off states through a circuit. At the same time, the circuit judges the voltage drop across

the DC contactor after it is pulled in to determine whether the output clip appears One of the conditions for short circuit.

The emergency start power supply samples from the two ends of the battery pack, the small teeth of the electric clamp, the output end of the transfer switch, the two ends of the DC contactor, the charging interface, the internal voltage test reset switch, the forced start button and other key points to be sent to the CPU master control circuit. After processing and judging, and knowing the user's operating information, the corresponding pulse signal is sent to the voice storage control circuit, and the pre-stored voice content is retrieved, and after the power of the audio control circuit is amplified, the field sounder emits the corresponding voice message. The emergency start power supply can provide safety protection for gear selection, correct connection, wrong connection, and low or high voltage. At the same time, it can be used for charging gear selection, battery low voltage warning, output overcurrent protection, electric clip output short circuit protection, and artificial force The corresponding voice prompts and photoelectric prompts are added in aspects such as starting safety prompts. The voice is clear, loud, and standard pronunciation. In a 40dB noise environment, the effective sound transmission distance is more than 5 meters. In addition to the standard English prompts, two other languages are prepared for voice types, namely French and Spanish. Users can switch directly with simple buttons to improve the versatility of the product.

In one embodiment, the circuit configuration of the emergency start power supply is shown in Figure 2, Figure 3, Figure 4, and Figure 5. In this embodiment, the main key components used in the emergency start power supply are: IC1-7805 three-terminal integrated voltage regulator, IC2-MC96F32Q microcontroller, IC3-BLA4208 voice storage integrated chip, IC4-TDA2822 integrated audio power amplifier, LS1-full frequency band Speaker 2W/8 ohm, LED-LG5631AH seven-segment digital tube display, IC5 (IC6)-PC817 optocoupler, IC7-LM358 integrated operational amplifier, high-power DC contactor, high-current conversion switch (for 12/24V gear switching), linkage Switch, forced start button, output positive and negative electric clamp.

In this embodiment, the main functions that the emergency power supply can realize are:

1、

The 12V/24V gear position is automatically recognized and prompted when the emergency start power switch is operated, the corresponding gear position voice prompt and LED3/LED4 light up indication;

2、

Emergency start power supply battery low voltage automatic alarm prompt, when the battery voltage is lower than 8.0≤U＜10.0V, the voice automatic alarm prompt;

3、

The emergency start power supply battery voltage is too low automatic shutdown protection and prompts, when the battery voltage is continuously lower than 8V, the emergency start power supply automatically shuts off the output circuit of the electric clamp, and at the same time, the low-voltage shutdown protection voice prompt is issued;

4、

The output electric clamp is connected correctly to prompt the conduction, and it will automatically be turned on when it is correctly connected, with voice prompts and LED4 lights to prompt;

5、

The output electric clamp connection polarity is reversed wrongly to shut off protection and prompt. When the output electric clamp polarity is reversed, the DC contactor will produce shut-off protection. At the same time, the corresponding voice information prompt and reverse connection indication LED7 light will be lit to prompt. The nixie tube flashes and displays the error code "Er1";

6、

Output electric clamp connection voltage error shutdown protection and prompt, that is, the internal and external connection battery voltage does not match, generally means that the 12V and 24V battery are connected incorrectly or the 24V is connected to an external battery with a voltage higher than 30.0V, and the emergency start power supply automatically emits a wrong connection voice Information prompt and wrong connection indicator LED6 lights up, and the digital tube flashes to display the error code "Er2" information;

7、

Output electric clamp overload shutdown protection and prompt. When the output electric clamp has excessive current, it will automatically shut down for protection. The emergency power supply will send out corresponding voice information prompts and the digital tube flashes to display the overload protection code "P1" information;

8、

The output clip is short-circuited and automatically cut off protection and prompts. When the output clip is short-circuited again, the output is automatically turned off for protection, and the corresponding voice information prompts and the digital tube flashes to display the short-circuit protection code. "P2" information;

9、

Charging gear prompt and charging status indicator, the emergency start power charging of the conversion model is only charging at the 12V gear, that is, the two batteries must be connected in parallel and then charged together to ensure that the charging voltage of the two batteries is balanced, that is, after the charger is inserted, such as When the switch is not in the 12V position, the emergency start power supply will automatically send out a voice message prompt, and the charging indicator will not light up until the gear is selected correctly, the charging indicator LED2 will light up, and LED1 will light up when the charging is completed;

10、

Forced start output function, when there is no external battery voltage input or the input voltage signal is too low, the emergency start power can not be automatically recognized normally, after human judgment and correct and reliable connection, press the forced start button to force the emergency start power to pull in Conduction.

When the forced start button is pressed, the emergency start power supply will automatically send out a safety warning message voice and the digital tube will simultaneously display "10---9---8---.....0" countdown time counting prompt information to the user, reminding the user to pay attention to the external connection The polarity of the load and the safe working voltage need to be pressed continuously for 10 seconds before the emergency power supply is automatically turned on to ensure that the user has enough time to confirm the connection safely.

In this embodiment, the voice content stored in the voice storage control circuit is as follows (take the English version as an example):

A.12V

B.24V

C. Low voltage, recharging recommended

D. Power is connected

E. Wrong Voltage

F. Wrong Polarity

G. Recharging ON, Turn the switch at back to 12V

H.charge immediately

I. Overload

J. Short Circuit

The specific working process is as follows:

1、When the switch is switched from the OFF position to the 12V or 24V position, the switch will send the parallel or series voltage of the battery pack to the input terminal of the DC contactor, and the "OUT+" terminal has a high level (OUT+ sampling point is actually connected At the input end of the DC contactor, "BAT/External" is connected to the output end of the DC contactor), and after the voltage is limited by the diode D1, the current limiting resistor R1 and the Zener diode DW1, the switch Q1 is driven by the resistor R2 to make Relay JK1 is turned on; the battery BAT+ voltage is added to the input terminal of the three-stable integrated voltage regulator 7805 through the diode D4, so that pin 3 outputs a stable 5VDC voltage to supply power to the CPU and other circuits;

When the external electric clamp is correctly connected and the voltage is greater than 1.5V, after the voltage of the "BAT/external" terminal passes through the diode D6, it is also added to the base of the switch tube Q1 to turn on the relay, so that the 7805 enters the normal working state; Similarly, when the charging port "CH+" is connected to the power source, the 7805 also enters the normal working state.

2、After the MCU is powered on, it first detects whether the transfer switch is turned on. When the voltage at the "OUT+" terminal is detected to be less than 15.5VDC, then it is compared with the voltage from the positive terminal "BAT1+" of the single battery. When the voltage at the two reference points is basically the same At the same time, the CPU defaults that the switch has been placed in the 12V position at this time; on the contrary, when the voltage at this point is greater than or equal to 15.5V and the voltage value of the "BAT1+" terminal is significantly different, the CPU defaults that the switch has been placed in the 24V position; confirm the good gear After the position, the single-chip microcomputer outputs a high level from the P52 port or the P53 port to drive the corresponding gear indicator LED3 or LED4 to light up; at the same time, a pulse signal is output from the P21 port or the P23 port to drive the voice chip, and the corresponding voice information is extracted through the power amplifier , Speakers and other devices report the corresponding gear information to the user;

When the MCU detects that the voltage of "OUT+" is too low, and the voltage of the 12V file is lower than 10.0VDC (the voltage of the 24V file is lower than 20.0VDC), the emergency power supply automatically defaults to the battery is broken and should not be used anymore. The battery should be refilled in time ; The P16 pin of the single-chip microcomputer will automatically cycle the output pulse signal to the voice memory chip, extract the low-voltage alarm prompt voice, and promptly report the low-voltage information to the user through the speaker; at the same time, it will automatically shut off all loads, that is, turn off the cigarette lighter and DC contactor Output;

When the MCU detects that the voltage of "UOT+" is 0V and at the same time detects a certain positive voltage at the "OUT+/external" terminal, it means that the emergency start power switch is not turned on, but the user has correctly connected the output clamp to the external battery Connected; at this time, the emergency start power supply defaults that the user wants to test the external battery voltage through the JS digital display voltmeter, that is, the microcontroller will automatically display the actual voltage value read from the "OUT+/external" terminal through the digital tube;

When the microcontroller detects that the voltage of "UOT+" is 0V, and at the same time detects that the charger is connected to the "CH+" terminal, it means that the switch is not turned on at this time, but the charger is connected, and the microcontroller will automatically output a Pulse signal to the voice memory chip, extract the charging position limit prompt voice, and tell the user to place the switch at 12V when charging. If the switch is in other gears, the microcontroller will automatically output the trigger signal in a cycle until the user switches the switch Turn to the correct 12V gear position; when the emergency start power supply enters normal charging, the single-chip computer judges by detecting the voltage drop on the sampling resistor R31. When the charging current is less than 300mA, the voltage drop on the resistor is 0.03V, indicating the end of charging Otherwise, it means charging. When LED2 is on, it means charging, and when LED1 is on, it means charging is over.

3、Start, its working principle is as follows:

3.1、12V file is correctly connected, conduction and prompt: switch and start production and set it to 12V file. When the MCU detects that the voltages of "OUT+" point and "BAT1+" point are both within the range of 12V file, the emergency power supply will automatically report the 12V file prompt voice; At the same time, the voltage at both ends of the external 12V battery is sampled in two ways, one is connected to the output terminal of the DC contactor, so that the single-chip microcomputer can detect the effective voltage value within the range of 12V in the "BAT+/external" point; the other is sampled by the small teeth of the electric clamp 、Connect the internal

wire of the electric clamp wire to the "J1" port of the control board, and after the positive signal is converted through R5, D8 and IC5, the external positive signal "RIGHT-Ctrl" is sent to the P13 port of the MCU, and the MCU determines the emergency power supply It has switched to the 12V gear, and the electric clamp has been correctly and reliably connected. At this time, the single-chip microcomputer outputs a high level to the DC contactor control circuit to turn it on, and sends a pulse signal to the voice chip to extract the correct connection and conduction prompt Voice, promptly inform the user of the correct connection information; other indications: the 12V gear indicator is on; the corresponding correct connection indicator is on; the digital tube automatically displays the integrated voltage value of the internal and external batteries in parallel.

3.2、12V-range polarity reverse connection protection and prompt: the switch is turned to 12V, the corresponding gear detection and prompt content are the same as above; at the same time, the voltage at both ends of the external 12V (or 24V) battery is sampled by the small teeth of the electric clamp, and the electric clamp is inside The wire is connected to the "J1" port of the control board, after the reverse signal is converted through D9, IC6 and R5, the external reverse signal "Reverse-Ctrl" is sent to the P12 port of the single-chip microcomputer, and the single-chip microcomputer judges that the emergency start power has been transferred At the 12V gear, when the polarity of the external battery is detected to be reversed, the DC contactor will remain disconnected at this time, and continuously send pulse signals to the voice chip to extract the reverse connection prompt voice information, and inform the user of the reverse connection information in time; other Indication: The 12V gear indicator is on; the reverse connection alarm indicator LED7 is on; the digital tube displays the reverse connection error code "Er1" and flashes.

3.3、12V-range external voltage is too high error protection and prompt: the switch is turned to 12V, the corresponding detection and prompt content is the same as above; at the same time, the electric clamp is connected to the output terminal of the DC contactor from the voltage of both ends of the external battery, so that the MCU is in the "BAT+/ When "External" detects that the voltage of the connected battery at this time has exceeded the safety range of "12V", the microcontroller directly defaults that the voltage of the external battery does not match the gear selected by the emergency power supply, and the DC contactor remains closed for protection; The chip continuously sends pulse signals to extract the voltage error connection prompt voice information, and promptly informs the user of the error connection information; other indications: the 12V gear indicator lights up; the voltage error connection alarm indicator LED6 lights up; the digital tube displays reverse connection error The code "Er2" flashes.

3.4、24

The V file is connected correctly, and the prompt: Switch to the 24V file. The MCU detects that the voltage between the "OUT+" point and the "BAT1+" point is relatively related, and should belong to the 24V range.

The emergency start power supply automatically reports the 24V gear to prompt the voice; at the same time, the voltage at both ends of the external 24V battery is sampled in two ways, and one is connected to the output terminal of the DC contactor, so that the single-chip microcomputer can detect the validity within the range of 24 gears at the "BAT+/external" point Voltage value; No. 1 is sampled by the small teeth of the electric clamp, and the internal wire of the electric clamp is connected to the "J1" port of the control board. After the positive signal is converted through R5, D8 and IC5, the external positive signal "RIGHT-Ctrl" Send to the P13 port of the microcontroller, the microcontroller judges that the emergency start power has been turned to 24V, and the electrical clamps have been correctly and reliably connected. At this time, the microcontroller outputs a high level to the DC contactor control circuit to make it pull in and turn on, and voice The chip sends a pulse signal to extract the correct connection and conduction prompt voice, and promptly informs the user of the correct connection information; other instructions: the 24V gear indicator lights up; the corresponding correct connection indicator lights up; the digital tube automatically displays , The comprehensive voltage value after the external battery is connected in parallel.

3.5、24V-range polarity reverse connection protection and prompt: the switch is turned to 24V, and the corresponding gear detection and prompt content are the same as above; at the same time, the voltage at both ends of the external 24V (or 12V) battery is sampled by the small teeth of the electric clamp, and the electric clamp is internal After the wire is connected to the "J1" port of the control board, the reverse signal is converted through D9, IC6 and R5, and then the external reverse signal "Reverse-Ctrl" is sent to the P12 port of the single-chip microcomputer. The single-chip microcomputer judges that the emergency start power has been transferred When it reaches the 24V position, when the polarity of the external battery is detected to be reversed, the DC contactor will remain disconnected at this time, and continuously send pulse signals to the voice chip to extract the reverse connection prompt voice information, and inform the user of the reverse connection information in time; Other indications: the 24V gear indicator is on; the reverse connection alarm indicator LED7 is on; the digital tube displays the reverse connection error code "Er1" flashing.

3.6、24

V-range external voltage is too low (or too high, when it exceeds 30.0V) error protection and prompt: the switch is turned to 24V, the corresponding gear detection and prompt content are the same as above; at the same time, the electric clamp is connected to the DC voltage from both ends of the external battery The output terminal of the contactor makes the single-chip microcomputer detect at the "BAT+/external" point that the voltage of the connected battery at this time has exceeded the safety range of "24V". If the external voltage is lower than 15.5V or higher than 30.0V, the single-chip microcomputer directly The default external battery voltage does not match the gear selected by the emergency power supply, and the DC contactor remains closed for protection.

And continuously send pulse signals to the voice chip to extract the voltage error connection prompt voice information, and inform the user of the error connection information in time; other instructions: 24V gear indicator lights; voltage error connection alarm indicator LED6 lights up; digital tube display The reverse connection error code "Er2" flashes.

4、Start-up overload automatic shutdown protection: When the emergency start-up power supply is started, a large current is generated in the start-up system. The emergency start-up power supply takes a sample from the small teeth of the black electric clamp and reads the big tooth of the black electric clamp to the internal battery The voltage drop between the negative poles is sent to the "J1" port through the small teeth of the black electric clip and the internal signal line, and then amplified by the circuit such as D0, IC7, and the overcurrent signal "OVERLOAE-TEST" is sent to the P11 port of the microcontroller. When the voltage value is continuously higher than a set value for a certain period of time (the resistance between the big teeth of the black electric clip and the negative terminal of the battery is tested in advance, the reference voltage of the overcurrent protection is calculated by referring to the maximum discharge capacity of the battery of the emergency starter Value), the emergency start power supply defaults to the externally connected load being too heavy, and when the maximum endurance range of the entire system is exceeded, the microcontroller cuts off the DC contactor control signal to force the DC contactor to shut off the output; the microcontroller simultaneously extracts the corresponding The over-current protection prompts voice information and informs the user in time; other instructions: the digital tube displays the over-current protection code "P1" flashing.

5、Electric clamp output short circuit automatic shutdown protection: When the emergency start power supply is short-circuited after the electric clamp is turned on, a large current will be generated in the starting system. The emergency start power supply also takes samples from the small teeth of the black electric clamp, and read Take the voltage drop between the big tooth of the black electric clip and the negative electrode of the internal battery, and send it to the "J1" port through the small tooth of the black electric clip and the internal signal line, and then after the D0, IC7 and other circuits amplify, the overcurrent signal "OVERLOAE" -TEST" is sent to the P11 port of the MCU; at the same time, the MCU judges the voltage difference between the two points "OUT+" and "BAT/outside" at both ends of the DC contactor. When these two voltage values are continuously higher than a certain value for a certain period of time When the setting value is set, the emergency start power supply defaults that the external electric clamp connection has a short-circuit fault; the microcontroller will immediately cut off the DC contactor control signal to force the DC contactor to shut off the output; the microcontroller will simultaneously extract the corresponding short-circuit protection prompt voice to the voice memory Information and inform the user in time; other instructions: the digital tube displays the overcurrent protection code "P2" flashing.

6、Forced start output: When the external battery voltage is too low or there is no battery, the user can first turn on the switch to the required voltage range (the corresponding range detection and prompt content is the same as above), and then clamp the positive and negative electrodes Respectively connect to the positive and negative terminals of the input power supply of the load, pay attention to the reliable connection of the large and small teeth of the electric clamp at the same time, and confirm that the power required by the load is consistent with the voltage range selected by the emergency start power switch; press and hold the forced start switch, The forced start switch will short-circuit the "J3" port so that the internal 5V power supply will be sampled by the resistors R15 and R16, and then sent to the P25 port of the microcontroller. The microcontroller will automatically start timing and extract the forced start voice safety prompt from the voice chip. After continuously pressing for 10s, the MCU will automatically issue a switch-on command to force the DC contactor to be turned on; when the emergency start power supply is connected before the automatic pull-in (within 10s), there is an abnormal connection (such as reverse connection, high voltage misconnection)), the single chip microcomputer will automatically determine that the forced start operation is invalid, and it needs to be restored after troubleshooting; to ensure the safety of the user's operation; other tips: after pressing this switch, the digital tube will display "10s countdown timer" flashing within 10s, and the pull-in guide After the power is turned on, the emergency power supply will give a voice prompt for correct conduction, and at the same time, the correct connection indicator LED5 will light up.

7、The working principle of the voice control circuit: First, all the functional voices are stored in the voice storage chip in PCM compression mode. The voice chip uses the BLA4206 chip of the BLA series. The chip supports a total voice length of 42s and can store up to 30 different voice content. ; Voice reading is controlled by a total of 8 separate trigger pins S1-S8, and it also supports different pins for triggering in different combinations, so that it can support the needs of 30-segment voice triggering; then arbitrary extraction is controlled by the CPU For each segment of voice content, the voice signal is output through the 8th pin. After being amplified by the audio power amplifier IC4, it directly drives the speaker SL1 to pronounce; the voice trigger signal is active at high level. Each time the microcontroller sends out a pulse trigger signal, the voice chip will automatically extract the corresponding When the trigger is a continuous high level, the chip will automatically broadcast the same voice content in a loop.

8、Working principle of sampling circuit and control circuit: as shown in Figure 5, J1 is the positive and negative electric clamp small tooth sampling signal input terminal. When the external positive connection is connected, the voltage is converted through resistors R5, D8 and IC5, and the AD signal is sent to The P31 port of the stand-alone device is used as the basis for judging whether the external electric clamp is connected or disconnected; when the polarity of the external battery voltage is reversed, the microcontroller cannot directly read the negative pressure of the "BAT/external" terminal, but through J1, D9, IC6 After the conversion of R5, the reverse connection signal is sent to the P12 port of the single-chip microcomputer as a basis for judging the polarity of the external electric clamp connection; when the output electric clamp line has excessive load current, the large current will be in the negative electric clamp A certain voltage drop is generated on the line. This voltage will be taken out through the small teeth of the negative electric clip and sent to D0, R11 and IC7 for amplification and then sent to the P11 pin of the microcontroller for judgment. When it is detected that the voltage is continuously greater than a certain setting within 1s When setting the value, the single-chip microcomputer defaults that the external load is too heavy, and immediately shuts off the DC contactor for protection; in the same way, when it is detected that the voltage value is higher than the other set value in an instant, and the two DC contactors are separated from each other. When the voltage drop detected by the terminal is also greater than a certain set value, the emergency start power supply will automatically default to the short circuit of the output clamp, and immediately turn off the DC contactor for protection;

J5 is the charging power input terminal; J6 is the input terminal for internal output voltage detection and external voltage detection, as well as the sampling point of the voltage drop across the DC contactor; J7 is the DC contactor control coil interface; among them are the main components R25, R26 , Q2, JK2, and RT1 constitute the cigarette lighter output control circuit; the main components R29, R30, Q3 constitute the buzzer alarm control circuit; the main components R27, R28, Q3 constitute the DC contactor control circuit; the main components R17, R18, R31, C25, and C21 constitute the charging power sampling and charging current sampling circuit, which is used to judge the connection of the charger and the detection of the charging state; the main components are R19, R20, R21, R22, R23, R24, C22, C23, C20 constitutes the internal and external battery voltage sampling circuit and the conversion switch gear judgment sampling circuit; the main components LED, Q5, Q6, Q7, etc. constitute a digital display control circuit.

The above shows and describes the basic principles, main features and advantages of the present invention.

Those skilled in the industry should understand that the present utility model is not limited by the foregoing embodiments. The foregoing embodiments and descriptions only illustrate the principles of the present utility model, and the present utility model does not deviate from the spirit and scope of the present utility model. There will be various changes and improvements, and these changes and improvements fall within the scope of the claimed utility model.

The scope of protection claimed by the utility model is defined by the appended claims and their equivalents.

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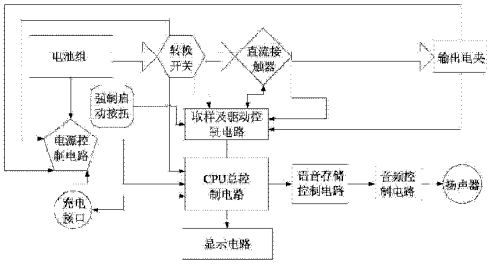
权利要求书 1 页 说明书 7 页 附图 4 页

(54)实用新型名称

一种自带语音提示功能的智能型应急启动电源

(57)摘要

本实用新型公开一种自带语音提示功能的智能型应急启动电源，包括有电池组，电池组的供电端连接有转换开关，转换开关通过直流接触器连接至输出电夹，还包括有 CPU 总控制电路，该 CPU 总控制电路的输出端连接有音频播放系统；CPU 总控制电路的输入端连接有取样及驱动控制电路，该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连；电池组通过电源控制电路与充电接口相连，电源控制电路与充电接口连接至 CPU 总控制电路；输出电夹及转换开关分别与电源控制电路相连；CPU 总控制电路的输出端还连接有显示电路；取样及驱动控制电路连接有强制启动按钮。该应急启动电源在不同的使用环境下，都能够及时准确地向用户传递相关操作信息。



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1. 一种自带语音提示功能的智能型应急启动电源，包括有电池组，该电池组的供电端连接有转换开关，转换开关通过直流接触器连接至输出电夹，其特征在于，

还包括有 CPU 总控制电路，该 CPU 总控制电路的输出端连接有音频播放系统；

所述 CPU 总控制电路的输入端连接有取样及驱动控制电路，该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连；

所述电池组通过电源控制电路与充电接口相连，电源控制电路与充电接口连接至 CPU 总控制电路；

所述输出电夹及转换开关分别与电源控制电路相连；

所述 CPU 总控制电路的输出端还连接有显示电路；

所述取样及驱动控制电路连接有强制启动按钮。

2. 根据权利要求 1 所述的一种自带语音提示功能的智能型应急启动电源，其特征在于，所述音频播放系统包括语音存储控制电路，该语音存储控制电路的输入端连接于 CPU 总控制电路，其输出端连接于音频控制电路，音频控制电路与扬声器相连。

3. 根据权利要求 1 所述的一种自带语音提示功能的智能型应急启动电源，其特征在于，所述显示电路包括 LED 数码管显示器和不同颜色的 LED 指示灯。

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IPR2024-01219

一种自带语音提示功能的智能型应急启动电源

技术领域

[0001] 本实用新型涉及应急启动电源，尤其涉及一种自带语音提示功能的智能型应急启动电源。

背景技术

[0002] 12V/24V 转换应急启动电源在不同的使用环境下，单靠人为控制操作难以做到百分之百正确。在没有任何保护和提示的前提下，任何出现一次误操作都将可能给产品带来永久损坏，严重时甚致可导致电池爆炸，危及到用户的人身财产安全。虽然现有的部分产品设有操作指导说明和一些简单的声光报警功能，但由于简单的蜂鸣器报警和使用的磨损导致操作提示内容的缺损或模糊，使应急启动电源缺少必要的安全指示，同时也给用户操作出现问题后却无法及时找到原因而困惑。如果在用户每一项操上同时增加必要的语音提示和光电指示，这样既能减少不同环境给用户带来的影响，同时也能及时地直接告知用户实时的操作状况，更能有效地预防失误的产生，让用户操作更直接、更清楚。因此，有必要对现有应急启动电源的结构进行优化。

实用新型内容

[0003] 本实用新型的目的是提供一种自带语音提示功能的智能型应急启动电源，用语音对用户的当前操作给予提示，以减少误操作，使应急启动电源在操作时得到安全防护，延长其使用寿命。

[0004] 本实用新型为解决其技术问题所采用的技术方案是，

[0005] 一种自带语音提示功能的智能型应急启动电源，包括有电池组，该电池组的供电端连接有转换开关，转换开关通过直流接触器连接至输出电夹，还包括有 CPU 总控制电路，该 CPU 总控制电路的输出端连接有音频播放系统，该音频播放系统包括有语音存储控制电路，语音存储控制电路的输入端连接于 CPU 总控制电路，其输出端连接于音频控制电路，音频控制电路与扬声器相连；

[0006] 所述 CPU 总控制电路的输入端连接有取样及驱动控制电路，该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连；所述电池组通过电源控制电路与充电接口相连，电源控制电路与充电接口连接至 CPU 总控制电路；所述输出电夹及转换开关分别与电源控制电路相连；所述 CPU 总控制电路的输出端还连接有显示电路，该显示电路包括 LED 数码管显示器和不同颜色的 LED 指示灯；所述取样及驱动控制电路连接有强制启动按钮。

[0007] 本实用新型的优点在于，该应急启动电源可对档位选择、正确连接、错误连接和电压过低或电压过高等进行安全保护，同时在充电档位选择、电池低压预警、输出过流保护、电夹输出短路保护以及人为强制启动安全提示等方面都加入相应的语音提示和光电提示；在不同的使用环境下，都能够及时准确地向用户传递相关操作信息，使用户通过声、光等不同类型的提示方式获取操作信息，使用户更加直观地了解实时的操作情况及使用错误的原因，便于更好地进行下一步操作或及时有效地纠正措施，确保使用者的人身安全，使整个产

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品更具人性化、智能化。

附图说明

[0008] 图 1 是本实用新型提出的应急启动电源的电气原理图；

[0009] 图 2 是电源控制电路图；

[0010] 图 3 是是 CPU 总控制电路及 LED 数码管显示器电路图；

[0011] 图 4 是语音存储及音频控制电路图；

[0012] 图 5 是取样及驱动控制电路图。

具体实施方式

[0013] 为了使本实用新型实现的技术手段、创作特征、达成目的与功效易于明白了解，下面结合图示与具体实施例，进一步阐述本实用新型。

[0014] 如图 1 所示，本实用新型提出的自带语音提示功能的智能型应急启动电源包括有电池组，该电池组的供电端连接有转换开关，转换开关通过直流接触器连接至输出电夹，还包括有 CPU 总控制电路，该 CPU 总控制电路的输出端连接有音频播放系统，该音频播放系统包括有语音存储控制电路，语音存储控制电 路的输入端连接于 CPU 总控制电路，其输出端连接于音频控制电路，音频控制电路与扬声器相连；

[0015] 所述 CPU 总控制电路的输入端连接有取样及驱动控制电路，该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连；所述电池组通过电源控制电路与充电接口相连，电源控制电路与充电接口连接至 CPU 总控制电路；所述输出电夹及转换开关分别与电源控制电路相连；所述 CPU 总控制电路的输出端还连接有显示电路，该显示电路包括 LED 数码管显示器和不同颜色的 LED 指示灯；所述取样及驱动控制电路连接有强制启动按钮。

[0016] 目前汽车电池主要分为 12V 和 24V 两种，在电路设计中以 0VDC ～ 15.5VDC 以内默认为是 12VDC 电池；以 15.5 ～ 30.0VDC 内默认为是 24VDC 电池。转换开关将两个电池实现并联或串联两种方式，使之能够实现一机两个电压输出的功能。同时在转换开关上镶入两个联动小开关，联动开关与 12V 档和 24V 档保持同步，即转换开关在 12V 或 24V 档时，联动开也同步闭合，在 OFF 档时，联动开关也自动断开，用于实现外部连接信号的输入或断开等判断。

[0017] 该应急启动电源利用大功率直流接触器作为自动控制电子开关，通过电路进行控制其通和断两种状态，同时电路在吸合后判断直流接触器两端电压降，作为判断输出电夹是否出现短接的条件之一。

[0018] 应急启动电源分别从电池组两端、电夹小齿、转换开关输出端、直流接触器两端、充电接口、内部电压测试复位开关、强制启动按扭等关键点分别取样送至 CPU 总控制电路处理、判断，从而得知用户的操作信息后，将对应的脉冲信号发到语音存储控制电路，调取预先保存好的语音内容，再经过音频控制电路功率放大后，由场声器发出相应的语音信息。该应急启动电源可对档位选择、正确连接、错误连接和电压过低或过高等进行安全保护，同时在充电档位选择、电池低压预警、输出过流保护、电夹输出短路保护以及人为强制启动安全提示等方面都加入相应的语音提示和光电提示。语音清晰、响亮，发音标准，在 40dB 噪声环境下，声音有效传输距离在 5 米以上。语音种类除了标准的英语提示外还预备另外两个

DELTRAN EX1002
IPR2024-01219

语种，即法语和西班牙语，用户可直接通过简单的按键任意切换，提高产品的通用性。

[0019] 在一个实施例中，该应急启动电源的电路构成如图2、图3、图4、图5所 示。本实施例中，该应急启动电源采用的主要关键器件有：IC1-7805 三端集成稳压器、IC2-MC96F32Q 单片机、IC3-BLA4208 语音存储集成芯片、IC4-TDA2822 集成音频功放、LS1- 全频段扬声器 2W/8 欧、LED-LG5631AH 七段数码管显示器、IC5（IC6）-PC817 光耦、IC7-LM358 集成运放、大功直流接触器、大电流转换开关（12/24V 档切换用）、联动开关、强制启动按钮、输出正、负极电夹。

[0020] 本实施例中，该应急启动电源可实现的主要功能有：

[0021] 1、应急启动电源转换开关操作时 12V/24V 档位自动识别提示，对应的档位语音提示及 LED3/LED4 点亮指示；

[0022] 2、应急启动电源电池低压自动报警提示，当电池电压低于 8.0 ≤ U ＜ 10.0V 时，语音自动报警提示；

[0023] 3、应急启动电源电池电压过低自动关断保护及提示，当电池电压持续低于 8V 时，应急启动电源自动关断电夹输出回路，同时发出低压关断保护语音提示；

[0024] 4、输出电夹正确连接导通提示，正确连接时自动吸合导通，并带语音提示及 LED4 灯点亮提示；

[0025] 5、输出电夹连接极性反向错误关断保护和提示，输出电夹极性接反时，直流接触器产关断保护，同时发出相应的语音信息提示及反接指示 LED7 灯点亮提示，同时数码管闪烁显示错误代码“Er1”信息；

[0026] 6、输出电夹连接电压错误关断保护和提示，即，内外连接的电池电压不匹配，一般指 12V 与 24V 电池对接错误或 24V 接外部电压高于 30.0V 的电池，应急启动电源自动发出错误连接语音信息提示和错接指示 LED6 灯点亮提示，同时数码管闪烁显示错误代码“Er2”信息；

[0027] 7、输出电夹过载关断保护和提示，当输出电夹出现电流过大时，自动关断而保护，应急启动电源发出相应的语音信息提示及数码管闪烁显示过载保护代码“P1”信息；

[0028] 8、输出电夹短路自动关断保护和提示，在吸合导通下，当输出电夹再次出现短接时，自动关断输出而保护，同时发出相应的语音信息提示及数码管闪烁显示短路保护代码“P2”信息；

[0029] 9、充电档位提示及充电状态指示，转换款应急启动电源充电仅现于 12V 档充电，即要把两电池并联后再一起充电，以确保两电池的充电电压平衡，即， 插入充电器后，如转换开关不在 12V 档位时，应急启动电源自动发出语音信息提示，同时充电指示灯也不会点亮，直到档位选择正确为止，正在充电指示灯 LED2 点亮、充电结束时 LED1 点亮；

[0030] 10、强制启动输出功能，当外部没有电池电压输入或输入电压信号过低，应急启动电源无法正常自动识别时，通过人为判断并正确可靠连接后，按下强制启动按扭，使应急启动电源强制吸合导通。当按下强制启动按开关后，应急启动电源自动发出安全预警信息语音和数码管同步显示“10—9—8—.....0”倒数时间计数提示信息给用户，提醒用户注意外接负载的极性和安全工作电压，需要持续按下 10s 后，应急启动电源才自动吸合，确保用户有足够的时间再对连接进行安全确认。

[0031] 本实施例中，语音存储控制电路中存储的语音内容如下（以英文版为例）：

DELTRAN EX1002
IPR2024-01219

[0032] A.12V

[0033] B.24V

[0034] C.Low voltage,recharging recommended

[0035] D.Power is connected

[0036] E.Wrong Voltage

[0037] F.Wrong Polarity

[0038] G.Recharging ON,Turn the switch at back to 12V

[0039] H.charge immediately

[0040] I.Overload

[0041] J.Short Circuit

[0042] 其具体工作过程如下：

[0043] 1、当转换开关由 OFF 档转入 12V 或 24V 档位时，转换开关将电池组并联或串联后的电压送至直流接触器的输入端，同时“OUT+”端有高电平（OUT+ 取样点实际连接于直流接触器的输入端，“BAT/ 外部”连接于直流接触器的输出端），并通过二极管 D1、限流电阻 R1 和稳压二极管 DW1 限压后，由电阻 R2 驱动开关管 Q1，使继电器 JK1 吸合导通；电池 BAT+ 电压经过二极管 D4 加入三稳集成稳压器 7805 的输入端，使 3 脚输出一个稳定的 5VDC 电压给 CPU 及其他电路供电；

[0044] 当外部电夹正确连接且电压大于 1.5V 时，“BAT/ 外部”端电压经过二极管 D6 后，同样也加到开关管 Q1 的基极使继电器吸合导通，从而使 7805 进入正常工作状态；同理，当充电接口“CH+”接入电源时，7805 也进入正常工作状态。

[0045] 2、单片机上电工作后，首先检测转换开关是否打开，当“OUT+”端检测到电压 ＜ 15.5VDC 时再与单电池正极“BAT1+”端取到的电压进行对比，当两个参考点的电压基本相同时，CPU 默认此时转换开关已置于 12V 档位；反之，当该点电压≥ 15.5V 且与“BAT1+”端的电压值相差较大时，CPU 默认转换开关已置于 24V 档；确定好档位后，单片机由 P52 端口或 P53 端口输出高电平，驱动对应的档位指示灯 LED3 或 LED4 点亮；同时由 P21 端口或 P23 端口输出一个脉冲信号驱动语音芯片，提取对应的语音信息经功放、扬声器等器件将对应的档位信息报告给用户；

[0046] 当单片机检测到“OUT+”的电压过低时，12V 档电压低于 10.0VDC（24V 档电压低于 20.0VDC）时，应急启动电源自动默认为电池已经溃电，不宜再使用，应及时补充电量；单片机 P16 脚将自动循环输出脉冲信号给语音存储芯片，提取低压报警提示语音，并通过扬声器及时地把低压信息报告给用户；同时将自动关断所有负载，即关闭点烟器和直流接触器的输出；

[0047] 当单片机检测到“UOT+”的电压为 0V，同时在“OUT+/ 外部”端检测到一定的正电压时，则表示应急启动电源的转换开关没有开，只是用户将输出电夹与外部电池已正确连接上；时此，应急启动电源默认用户想通过 JS 的数显电压表去测试外部电池电压，即单片机自动将从“OUT+/ 外部”端读到的实际电压值通过数码管显示出来；

[0048] 当单片机检测到“UOT+”的电压为 0V，同时在“CH+”端检测到充电器有接入电压时，表示此时转换开关没有开，只是充电器已接入，此时单片机自动将输出一个脉冲信号给语音存储芯片，提取充电档位置限制提示语音，告诉用户充电时请将转换开关置于 12V 档，

DELTRAN EX1002
IPR2024-01219

如转换开关在其他档位时，单片机将自动循环输出触发信号，直到用户将转换开关转到正确的12V档位为止；当应急启动电源进入正常充电后，单片机通过检测取样电阻R31上的压降进行判断，当充电电流小于300mA时该电阻上的压降为0.03V，表示充电结束，反之则表示正在充电，当LED2点亮表示正在充电，当LED1点亮时表示充电结束。

[0049] 3、启动，其工作原理如下：

[0050] 3.1、12V档正确连接导通和提示：转换开产置于12V档，单片机检测到“OUT+”点和“BAT1+”点的电压均在12V档范围内时，应急启动电源自动报12V档位提示语音；同时外部12V电池两端电压分两路取样，一路接入直流接触器的输端，使单片机在“BAT+/外部”点检到12V档范围内的有效电压值；另一路通过电夹小齿取样、电夹线内部导线接至控制板的“J1”端口，使正接信号通过R5、D8和IC5进行转换后，将外部正接信号“RIGHT-Ctrl”送至单片机的P13端口，单片机判断应急启动电源已转到12V档，同时电夹已经正确可靠连接，此时单片机再向直流接触器控制电路输出高电平使其吸合导通，并向语音芯片发送一个脉冲信号提取正确连接及导通提示语音，将正确连接接信息及时地告诉用户；其他指示：12V档位指示灯点亮；对应的正确连接指示灯点亮提示；数码管自动显示内、外池电并联后的综合电压值。

[0051] 3.2、12V档极性反向连接保护和提示：转换开关转到12V档，相应的档位检测和提示内容同上；同时外部12V（或24V）电池两端电压通过电夹小齿取样、电夹线内部导线接至控制板的“J1”端口，使反接信号通过D9、IC6和R5进行转换后，将外部反接信号“Reverse-Ctrl”送至单片机的P12端口，单片机判断应急启动电源已转到12V档，同时检测到外部电池极性接反，此时直流接触器将保持断开状态，并向语音芯片连续发送脉冲信号提取反接提示语音信息，并将反接信息及时地告诉用户；其他指示：12V档位指示灯点亮；反接报警指示灯LED7点亮；数码管显示反接错误代码“Er1”闪烁。

[0052] 3.3、12V档外接电压过高错误保护和提示：转换开关转到12V档，相应的检测和提示内容同上；同时电夹从外部电池两端电压接入直流接触器的输端，使单片机在“BAT+/外部”点检到此时连接的电池电压已超出“12V”的安全范围内时，单片机直接默认外接电池电压与应急启动电源所选择的档位不匹配，直流接触器保持关闭保护；并向语音芯片连续发送脉冲信号提取电压错误连接提示语音信息，并将错接信息及时地告诉用户；其他指示：12V档位指示灯点亮；电压错误连接报警指示灯LED6点亮；数码管显示反接错误代码“Er2”闪烁。

[0053] 3.4、24V档正确连接导通和提示：转换开产置于24V档，单片机检测到“OUT+”点和“BAT1+”点的电压相关较大，应属于24V档位。应急启动电源自动报24V档位提示语音；同时外部24V电池两端电压分两路取样，一路接入直流接触器的输端，使单片机在“BAT+/外部”点检到24档范围内的有效电压值；中一路通过电夹小齿取样、电夹线内部导线后接至控制板的“J1”端口，使正接信号通过R5、D8和IC5进行转换后，将外部正接信号“RIGHT-Ctrl”送至单片机的P13端口，单片机判断应急启动电源已转到24V档，同时电夹已经正确可靠连接，此时单片机再向直流接触器控制电路输出高电平使其吸合导通，并向语音芯片发送一个脉冲信号提取正确连接及导通提示语音，将正确连接接信息及时地告诉用户；其他指示：24V档位指示灯点亮；对应的正确连接指示灯点亮提示；数码管自动显示内、外池电并联后的综合电压值。

DELTRAN EX1002
IPR2024-01219

[0054] 3.5、24V 档极性反向连接保护和提示：转换开关转到 24V 档，相应的档位检测和提示内容同上；同时外部 24V（或 12V）电池两端电压通过电夹小齿取样、电夹线内部导线后接至控制板的“J1”端口，使反接信号通过 D9、IC6 和 R5 进行转换后，将外部反接信号“Reversc-Ctrl”送至单片机的 P12 端口，单片机判断应急启动电源已转到 24V 档，同时检测到外部电池极性接反，此时直流接触器将保持断开状态，并向语音芯片连续发送脉冲信号提取反接提示语音信息，并将反接信息及时地告诉用户；其他指示：24V 档位指示灯点亮；反接报警指示灯 LED7 点亮；数码管显示反接错误代码“Er1”闪烁。

[0055] 3.6、24V 档外接电压过低（或过高，超过 30.0V 时）错误保护和提示：转换开关转到 24V 档，相应的档位检测和提示内容同上；同时电夹从外部电池两端电压接入直流接触器的输端，使单片机在“BAT+/ 外部”点检到此时连接的电池电压已超出“24V”的安全范围内时，如外部电压低于 15.5V 或高于 30.0V 时，单片机直接默认外接电池电压与应急启动电源所选的档位不匹配，直流接触器保持关闭保护。并向语音芯片连续发送脉冲信号提取电压错误连接提示语音信息，并将错接信息及时地告诉用户；其他指示：24V 档位指示灯点亮；电压错误连接报警指示灯 LED6 点亮；数码管显示反接错误代码“Er2”闪烁。

[0056] 4、启动过载自动关断保护：当应急启动电源在启动的瞬间，整过启动系统中产生很大电流，应急启动电源通过从黑电夹小齿上取样，读取黑电夹的大齿到内部电池负极之间的压降，通过黑电夹小齿、内部信号线送到“J1”端口，再 经过 D0、IC7 等电路放大后，将过流信号“OVERLOAE-TEST”送到单片机的 P11 端口，当该电压值在一定时间内持续高于某一设定值（预先测试出黑电夹大齿到电池负极端子之间的电阻，参考应急启动电源电池最大放电能力计算出过流保护的参考电压值）时，应急启动电源就默认外部连接负载过重，已超出整个系统最大承受范围时，单片机切断直流接触器控制信号，使直流接触器强制关断输出；单片机同时向语音存片提取对应的过流保护提示语音信息，并将信息及时告知用户；其他指示：数码管显示过流保护代码“P1”闪烁。

[0057] 5、电夹输出短路自动关断保护：当应急启动电源在吸合导通后电夹出现短路时，整过启动系统中产生很大电流，应急启动电源同样通过从黑电夹小齿上取样，读取黑电夹的大齿到内部电池负极之间的压降，通过黑电夹小齿、内部信号线送到“J1”端口，再经过 D0、IC7 等电路放大后，将过流信号“OVERLOAE-TEST”送到单片机的 P11 端口；同时单片机判断直流接触器两端“OUT+”和“BAT/ 部外”两点之间压差，当这两个电压值在一定时间内持续高于某一设定值时，应急启动电源就默认外部电夹连接出现短路故障；单片机将立即切断直流接触器控制信号，使直流接触器强制关断输出；单片机同时向语音存片提取对应的短路保护提示语音信息，并将信息及时告知用户；其他指示：数码管显示过流保护代码“P2”闪烁。

[0058] 6、强制启动输出：当外部电池电压过低或没有电池时，用户可以先将转换开关打开到所需的电压档位（此时相应的档位检测和提示内容同上），再将正、负极电夹分别接到负载的输入电源正、负极上，注意电夹的大小齿同时可靠连接，并确认负载所需电源与应急启动电源转换开关选择的电压档位一致后；按持续按下强制启开关，强制启动开关将“J3”端口短接，使内部 5V 电源通过电阻 R15、R16 分压取样后，送至单片机的第 P25 端口，单片机将自动开始计时，并向语音芯片提取强制启动语音安全提示，持续按下 10S 后，单片机将自动发出接通指令，使直流接触器强制吸合导通；当应急启动电源在动自吸合之前（10S 内）

DELTRAN EX1002
IPR2024-01219

出现连接异常(如、反接、高压错接)时,单片机将自动判断强制启动操作无效,需要排除故障后恢复;确保用户的操作安全;其他提示:按下此开关后,在10s内数码管显示"10s倒数计时器"闪烁,吸合导通后,应急启动电源将发出正确导通语音提示,同时正确连接提示灯LED5点亮。

[0059] 7、语音控制电路工作原理:首先把所有的功能语音以PCM压缩模式存入语音存储芯片中,语音芯片选用BLA系列的BLA4208芯片,该芯片总共支持语音长度为42s,最多可存储30段不同的语音内容;语音的读取是通过S1-S8共8个单独触发引脚控制,同时还支持不同引脚以不同的组合方式进行触发,使其能够支持30段语音触发的需要;再通过CPU控制任意提取每一段语音内容,通过第8脚输出语音信号,经过音频功放IC4放大后,直接驱动扬声器SL1发音;语音触发信号为高电平有效,单片机每发出一个脉冲触发信号,语音芯片将自动提取一次相应的语音内容进行播报;当触发为持续高电平时,芯片将自动循环播报相同语音内容。

[0060] 8、取样电路及控制电路工作原理:如图5所示,J1为正、负极电夹小齿取样信号输入端,当外部正接时,电压通过电阻R5、D8及IC5进行转换后,将AD信号送入单机的第P31端口,作为判断外部电夹是否正接或断开的依据;当外接电池电压极性反向时,单片机无法直接读取"BAT/外部"端的负压,而通过J1、D9、IC6、R5进行转换后,将反接信号送入单片机的第P12端口,作为判断外部电夹连接极性反向依据;当输出电夹线出现负载电流过大时,大电流将会在负极电夹线上产生一定压降,这个电压将通过负极电夹的小齿取出送至D0、R11和IC7放大后送入单片机的第P11脚进行判断,当检测到该电压在1s内持续大于某一设定值时,单片机就默认为外接负载过重,立即关断直流接触器进行保护;同理,当检测到该电压值在瞬间内高于另一设定值,同时又分别从直流接触器两端检测到的压降也大于某一设定值时,应急启动电源就自动默认为输出电夹存在短路现象,立即关断直流接触器而保护;

[0061] J5为充电电源接入端;J6为内输出电压检测和外部电压检测输入端,同时也是直流接触器两端压降的取样点;J7为直流接触器控制线圈接口;其中由主要元件R25、R26、Q2、JK2、RT1组成点烟器输出控制电路;由主要元件R29、R30、Q3组成蜂鸣器报警控制电路;由主要元件R27、R28、Q3组成直流接触器控制电路;由主要元R17、R18、R31、C25、C21组成充电电源取样及充电电流取样电路,用于判断充电器的接入以及充电状态的检测;由主要元件R19、R20、R21、R22、R23、R24、C22、C23、C20组成了内、外电池电压取样电路及转换开关档位判断取样电路;由主要元件LED、Q5、Q6、Q7等组成数码显 示控制电路。

[0062] 以上显示和描述了本实用新型的基本原理、主要特征和本实用新型的优点。本行业的技术人员应该了解,本实用新型不受上述实施例的限制,上述实施例和说明书中描述的只是说明本实用新型的原理,在不脱离本实用新型精神和范围的前提下本实用新型还会有各种变化和改进,这些变化和改进都落入要求保护的本实用新型范围内。本实用新型要求保护范围由所附的权利要求书及其等同物界定。

DELTRAN EX1002
IPR2024-01219

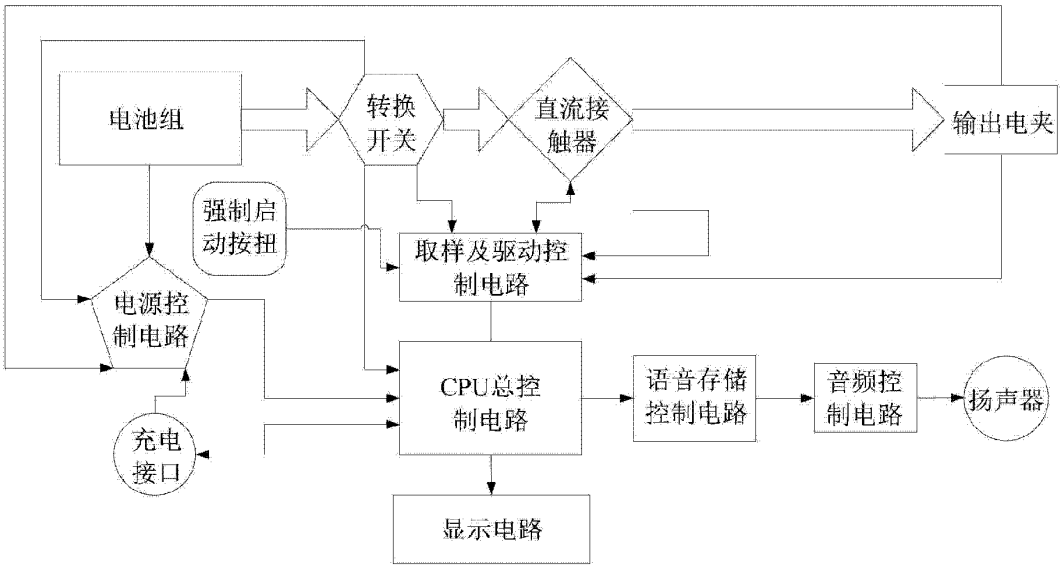


图 1

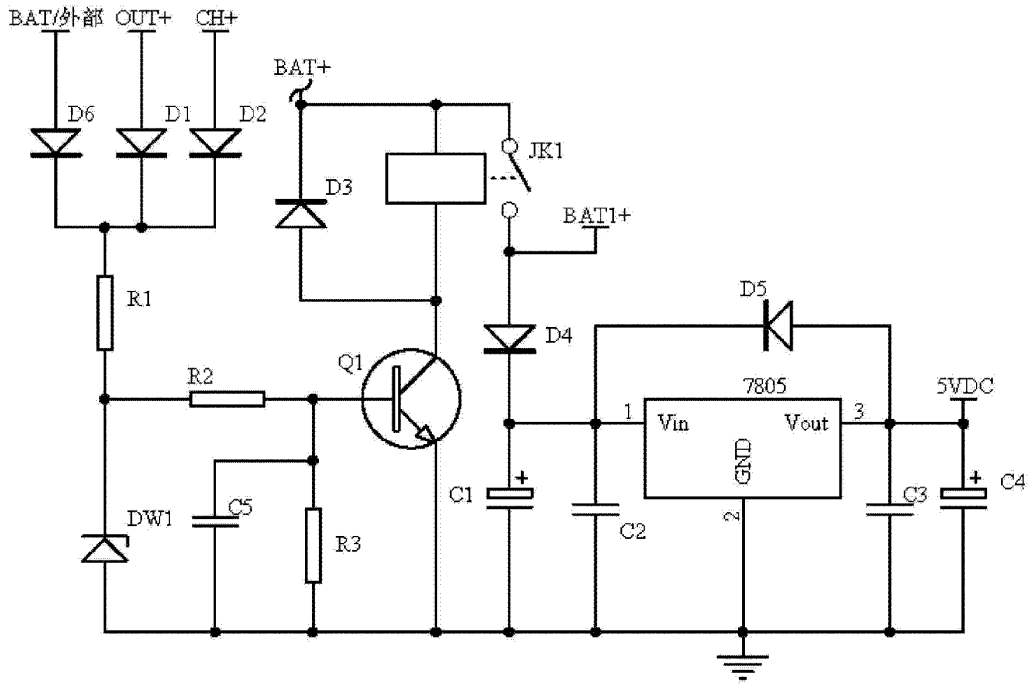


图 2

DELTRAN EX1002
IPR2024-01219

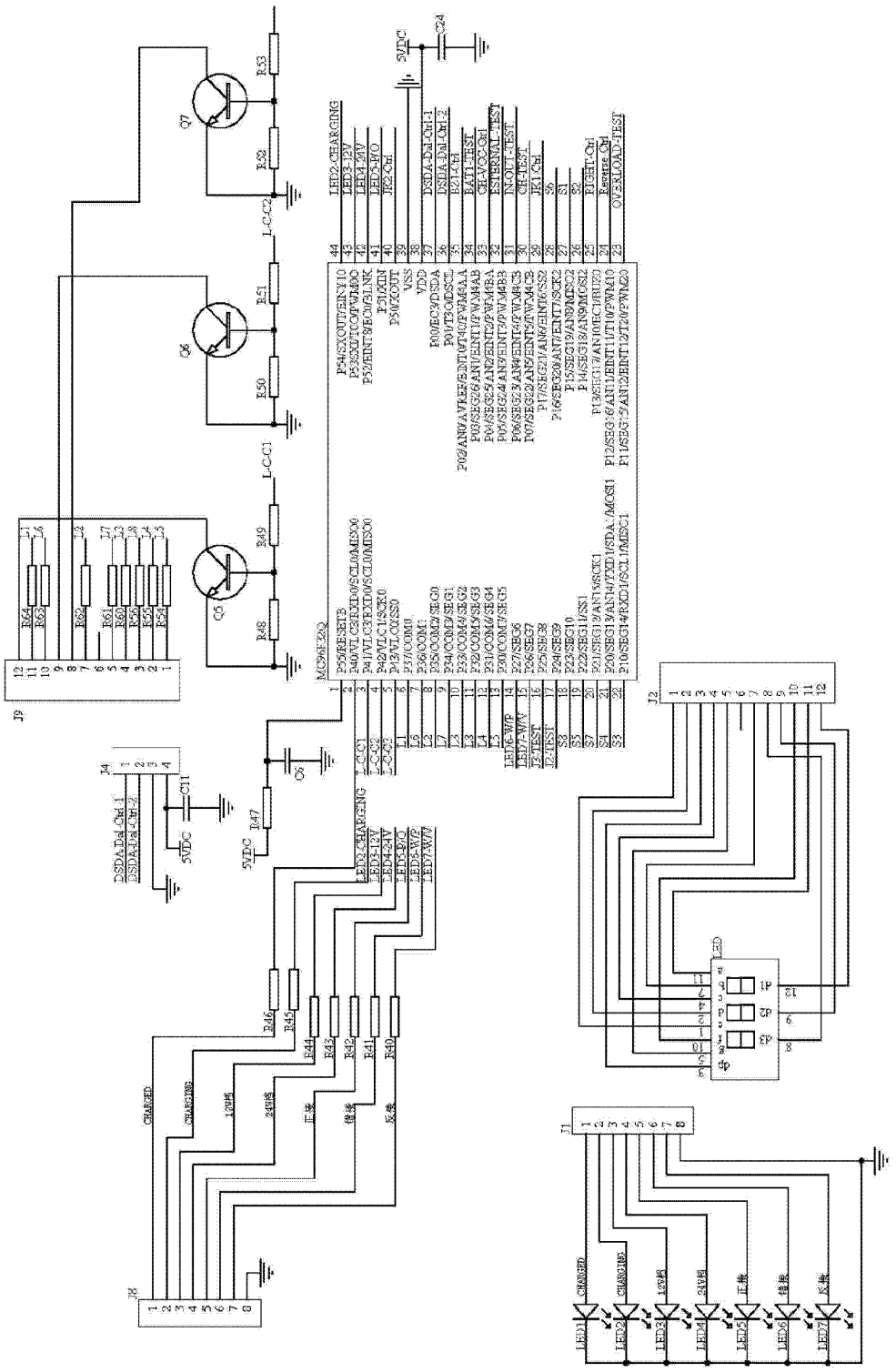


图 3

DELTRAN EX1002
IPR2024-01219

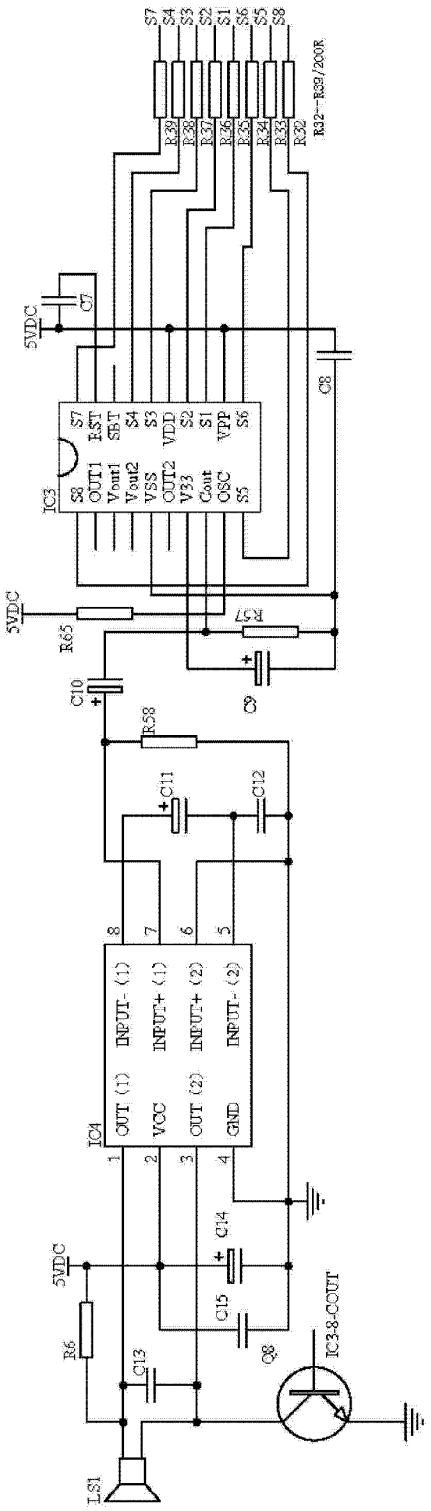


图 4

DELTRAN EX1002
IPR2024-01219

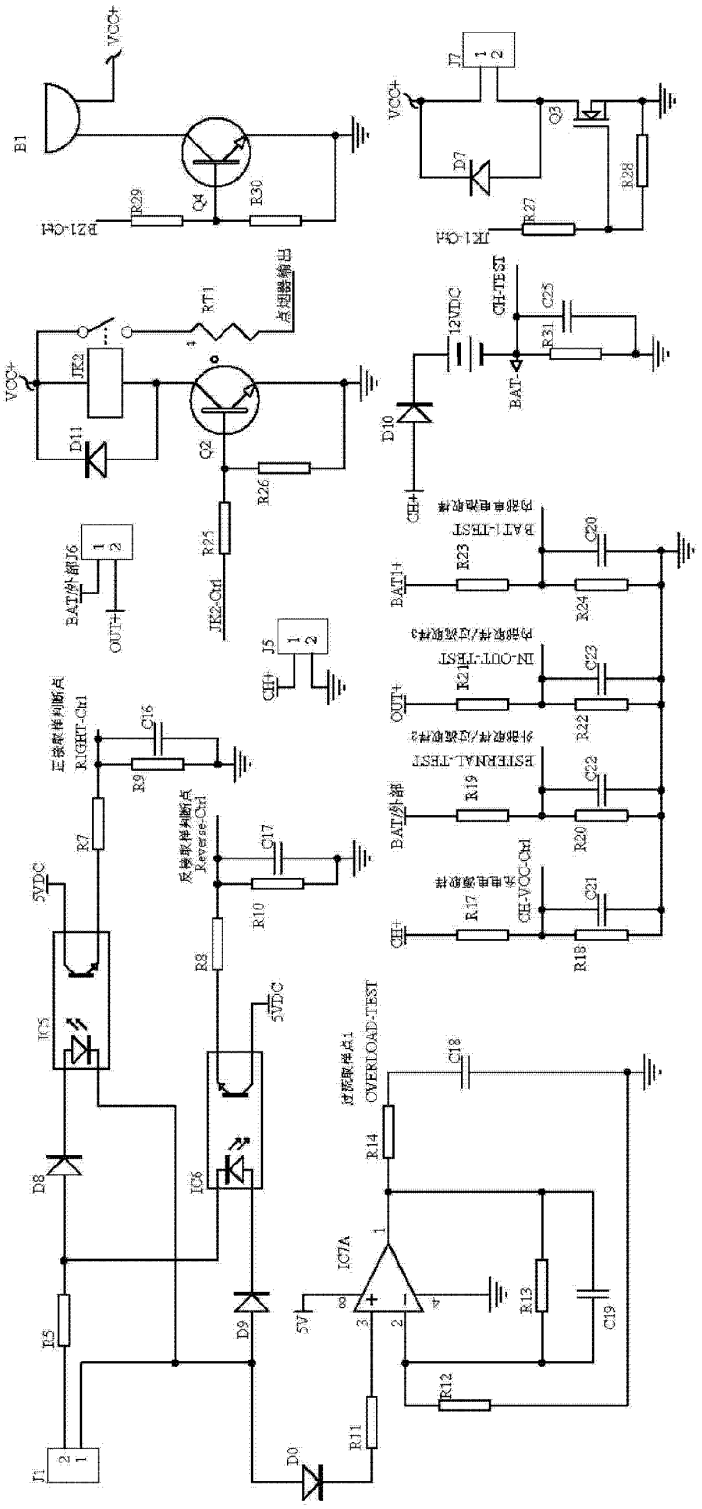


图 5

DELTRAN EX1002
IPR2024-01219

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(54) Lithium rechargeable battery

(57) A lithium rechargeable battery including: a bare cell including an electrode assembly disposed in a pouch, the electrode assembly including two electrodes, a separator, and first and second electrode tabs that extend from the electrodes, through a first side of the bare cell; a protecting circuit board electrically connected to the first and second electrode tabs; a first lead plate connected to the protecting circuit board and the first electrode tab, and a second lead plate connected to the protecting circuit board and the second electrode tab. The protecting circuit board is provided on a second side of the bare cell, which is adjacent to the first side. The first and second lead plates are bent to extend along the first and second sides of the pouch.

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DELTRAN EX1002
IPR2024-01219

Description

[0001] Aspects of the present invention relate to a lithium rechargeable battery, and more particularly, to a lithium rechargeable battery having a battery pack with an optimized structure.

[0002] In general, lithium rechargeable batteries can be classified as a cylindrical battery, a polygonal battery, and a pouch-type battery, in accordance with the shape of a case in which an electrode assembly and an electrolyte are accommodated. In a pouch-type battery, the electrode assembly is accommodated in a pouch, to form a bare cell, and the electrode assembly is connected to a protecting circuit board, to form a battery pack.

[0003] In the above-described pouch-type battery, in the electrode assembly, electrode tabs drawn from two electrodes are electrically connected to the protecting circuit board, via a lead plate. The protecting circuit board faces a surface from which the electrode tabs extend from the bare cell.

[0004] When the specification of an electrical device varies, or when the size of the protecting circuit board changes, the protecting circuit board can be provided on a surface from which the electrode tabs are not drawn. In such a case, since the electrode tabs are further separated from the protecting circuit board, the length of the lead plate increases. Therefore, the longer lead plate increases internal resistance of the battery.

[0005] As described above, in a lithium rechargeable battery, the structure of the lead plate has a large influence on optimizing the structure of the battery pack.

SUMMARY OF THE INVENTION

[0006] An aspect of the present invention is to provide a lithium rechargeable battery having an improved electrical connection between a bare cell and a protecting circuit board.

[0007] Another aspect of the present invention is to provide a lithium rechargeable battery having a minimized internal resistance, due to the structure of an electrical connection between a bare cell and a protecting circuit board.

[0008] According to the present invention, there is provided a lithium rechargeable battery comprising a bare cell comprising, an electrode assembly comprising first and second electrodes and a separator disposed therebetween, a pouch in which the electrode assembly is housed, and first and second electrode tabs extending from the first and second electrodes, through a first side of the bare cell. The battery further comprises a protecting circuit board electrically connected to the first and second electrode tabs, disposed on a second side of the bare cell; a first lead plate connected to the protecting circuit board and the first electrode tab; and a second lead plate connected to the protecting circuit board and the second electrode tab, wherein the first lead plate and the second lead plate are bent at an intersection of the first and second sides of the bare cell, so as to extend along the first and second sides of the bare cell.

[0009] In other words, there is provided a lithium rechargeable battery comprising: a bare cell comprising an electrode assembly including two electrodes and a separator, and a pouch in which the electrode assembly is accommodated; a protecting circuit board electrically connected to a first electrode tab and a second electrode tab, which extend from the two electrodes of the electrode assembly; and first and second lead plates to connect the protecting circuit board to the first and second electrode tabs. The protecting circuit board is provided on a surface adjacent to a surface from which the first and second electrode tabs project from the bare cell. The first and second lead plates are bent from the protecting circuit board, toward the surface from which the first and second electrode tabs project.

[0010] The first lead plate and the second lead plate may be perpendicular to a direction in which the first electrode tab and the second electrode tab extend. The first and second electrode tabs may be bent to respectively face the first and second lead plates

[0011] The first lead plate and the second lead plate may intersect the first electrode tab and the second electrode tab.

[0012] The first lead plate and the second lead plate can be in the same plane, i.e. the first and second lead plates extend in the same plane, across the first side of the bare cell.

[0013] The first lead plate and the second lead plate may be separated from each other. Insulating members are provided on surfaces of the first lead plate and the second lead plate. The insulating members can be insulating tapes. The insulating tapes can be formed of polyimide.

[0014] The first lead plate and the second lead plate can be disposed in parallel planes.

[0015] The first lead plate and the second lead plate can have the same width as a side surface of the bare cell. Insulating members are provided on the surfaces of the first lead plate and the second lead plate. The insulating members are insulating tapes. The insulating tapes are formed of polyimide.

[0016] An attachment sheet can be interposed between the first lead plate and the second lead plate, to attach the first lead plate to the second lead plate.

[0017] The first lead plate and the second lead plate can comprise connection tabs that are connected to the first electrode tab and the second electrode tab. The connection tabs extend perpendicularly from sides of each of the first lead plate and the second lead plate. The connection tabs are extend from sides of the first lead plate and the second plate, in the same direction as a direction in which the first electrode tab and the second electrode tab extend.

[0018] The connection tabs may have the same area as the electrode tabs. The connection tabs comprise wings that extend in a widthwise direction, so that the

DELTRAN EX1002
IPR2024-01219

area of the connection tabs can be larger than the electrode tabs.

[0019] The lead plates may be provided on the different surfaces of the bare cell, and are bent to be in the same plane, so that the structure of the battery pack is optimized.

[0020] The lead plates may extend in parallel planes, so that the internal resistance of the battery is minimized.

[0021] Additional aspects and/or advantages of the invention are subject matter of the dependent claims or may be learned form the description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and/or other aspects and advantages of the invention will become apparent, and more readily appreciated, from the following description of the exemplary embodiments, taken in conjunction with the accompanying drawings, of which:

FIG. 1 is an exploded perspective view of a lithium rechargeable battery, according to an exemplary embodiment of the present invention;

FIGS. 2A and 2B illustrate the lithium rechargeable battery of FIG. 1, as assembled;

FIG. 3 is an exploded perspective view of a lithium rechargeable battery, according to another exemplary embodiment of the present invention;

FIGS. 4A and 4B illustrate the lithium rechargeable battery of FIG. 3, as assembled;

FIG. 5 illustrates the enlargement of part V of FIG. 4B; and

FIG. 6 is an exploded perspective view of a lithium rechargeable battery, according to another exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0023] Reference will now be made in detail to the exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The exemplary embodiments are described below, in order to explain the aspects of the present invention, by referring to the figures.

[0024] FIG. 1 is an exploded perspective view of a lithium rechargeable battery 100, according to an exemplary embodiment of the present invention. FIGS. 2A and 2B illustrate the lithium rechargeable battery 100, as assembled.

[0025] Referring to FIGS. 1, 2A, and 2B the lithium rechargeable battery 100 includes a bare cell 110, a protecting circuit board 120 connected to the bare cell 110, and a lead plate 130 to connect the bare cell 110 to the protecting circuit board 120. The protecting circuit board 120 is provided on a second surface of the bare cell 110, which is adjacent to a first surface from which the electrode tabs 116 and 117 extend. The protecting circuit board 120 protects the battery 100 from over charges and over discharges. The lead plate 130 is bent and extends from the first side to the second side.

[0026] The bare cell 110 includes an electrode assembly 114, including a positive electrode plate 111, a negative electrode plate 112, and a separator 113 interposed therebetween. The bare cell 110 includes a pouch-type case 115 (hereinafter, referred to as a pouch) that accommodates an electrolyte and the electrode assembly 114. The bare cell 110 is a rectangular prism. The bare cell 110 includes a first short side 110a, a second short side 110c that faces the first short side 110a, a first long side 110b, a second long side 110d that faces the first long side 110b, a first main side 110e, and a second main side 110f that faces the first main side 110e.

[0027] The first electrode tab 116 is attached to the positive electrode plate 111, and the second electrode tab 117 is attached to the negative electrode plate 112. The first electrode tab 116 and the second electrode tab 117 extend out of the bare cell 110, through the first short side 110a.

[0028] The protecting circuit board 120 is provided on the first long side 110b. However, the present invention is not limited to the above. The protecting circuit board 120 can be provided on the second long side 110d, for example.

[0029] The lead plate 130 includes a first lead plate 131 and a second lead plate 132. One end of the first lead plate 131 is connected to the protecting circuit board 120, and the other end of the first lead plate 131 is connected to the first electrode tab 116. The first lead plate 131 is bent at the edge between the first short side 110a and the first long side 110b. The first lead plate 131 extends along the first short side 110a. The first lead plate 131 extends to the first electrode tab 116.

[0030] One end of the second lead plate 132 is connected to the protecting circuit board 120, and the other end of the second lead plate 132 is connected to the second electrode tab 117. The second lead plate 132 is bent at the edge between the first short side 110a and the first long side 110b. The second lead plate 132 extends along the first short side 110a. The second lead plate 132 extends to the second electrode tab 117.

[0031] The first lead plate 131 and the second lead plate 132 extend in parallel across the first short side 110a. The first lead plate 131 and the second lead plate 132 are connected to the protecting circuit board 120. Since the first lead plate 131 is connected to the first electrode tab 116 and the second lead plate 132 is connected to the second electrode tab 117, the first lead plate 131, and the second lead plate 132 are separated from each other.

[0032] Insulating tapes 140 are attached to opposing surfaces of the first lead plate 131 and the second lead plate 132. The insulating tapes 140 are generally formed of polyimide. However, the material of the insulating tapes 140 is not limited to polyimide.

[0033] The first lead plate 131 includes a first connec-

DELTRAN EX1002
IPR2024-01219

tion tab 133, and the second lead plate 132 includes a second connection tab 134. The first connection tab 133 extends from one side of the first lead plate 131, at a position corresponding to the first electrode tab 116. The second connection tab 134 extends from one side of the second lead plate 132, at a position corresponding to the second electrode tab 117.

[0034] The first connection tab 133 and the second connection tab 134 are bent perpendicularly from the sides of the first lead plate 131 and the second lead plate 132. The first connection tab 133 and the second connection tab 134 extend in parallel, away from the first short side 110a.

[0035] The first connection tab 133 and the second connection tab 134 can have the same width as the first electrode tab 116 and the second electrode tab 117. The width of the first connection tab 133 and the second connection tab 134 can be larger than the width of the first electrode tab 116 and the second electrode tab 117. Therefore, assembly dispersion can be reduced, due to the positions of the first electrode tab 116 and the second electrode tab 117.

[0036] Referring to FIG. 2A, ends of the first lead plate 131 and the second lead plate 132 are welded to the protecting circuit board 120, so that the first lead plate 131 and the second lead plate 132 are electrically connected to the protecting circuit board 120. The first lead plate 131 and the second lead plate 132 are bent at the edge between the first long side 110b and the first short side 110a, so as to extend to the first electrode tab 116 and the second electrode tab 117.

[0037] The first connection tab 133 and the second connection tab 134 extend in parallel with the first electrode tab 116 and the second electrode tab 117. The first electrode tab 116 and the first connection tab 133 are electrically connected to each other, by welding, for example. The second electrode tab 117 and the second connection tab 134 are electrically connected to each other, by welding, for example.

[0038] As illustrated in FIG. 2B, when the battery 100 is assembled, the first electrode tab 116 and the first connection tab 133 are folded toward the first lead plate 131. The second electrode tab 117 and the second connection tab 134 are folded toward the second lead plate 132. In this way, the bare cell 110 and the protecting circuit board 120 are connected to each other.

[0039] FIG. 3 is an exploded perspective view of a lithium rechargeable battery 200, according to another exemplary embodiment of the present invention. FIGS. 4A and 4B illustrate the lithium rechargeable battery 200, as assembled. FIG. 5 illustrates an enlargement of part V of FIG. 4B.

[0040] Referring to FIGS. 3 to 5, the lithium rechargeable battery 200 includes a bare cell 110, a protecting circuit board 120 connected to the bare cell 110, and a lead plate 230 connected to the bare cell 110 and the protecting circuit board 120. In the lithium rechargeable battery 200, the structure of the lead plate 230 is different from the structure of the lead plate 130 in the lithium rechargeable battery 100. Therefore, the lead plate 230 will mainly be described, and a description of similar elements is omitted.

[0041] In the lithium rechargeable battery 200, the lead plate 230 includes a first lead plate 231 and a second lead plate 232. The first lead plate 231 and the second lead plate 232 respectively extend from the first electrode tab 116 and the second electrode tab 117, and overlap one another along the first short side 110a of the bare cell 110. The first lead plate 231 and the second lead plate 232 are connected to the protecting circuit board 120. The first lead plate 231 and the second lead plate 232 are separated from each other.

[0042] Since the first lead plate 231 and the second lead plate 232 overlap, the widths of the first lead plate 231 and the second lead plate 232 can be as large as the width of the first short side 110a. Since the areas of the first lead plate 231 and the second lead plate 232 can be increased, due to the overlap, current flow can be increased, and the internal resistance of the battery 200 is reduced.

[0043] Insulating tapes 240 are attached to opposing surfaces of the first lead plate 231 and the second lead plate 232, to insulate the first and second lead plates 231 and 231. The insulating tapes 240 can be formed of polyimide. However, the material of the insulating tapes 240 is not limited to polyimide.

[0044] An attachment sheet 250 can be interposed between the first lead plate 231 and the second lead plate 232, to attach the first lead plate 231 to the second lead plate 232. The first lead plate 231 includes a first connection tab 233 that is connected to the first electrode tab 116. The second lead plate 232 includes a second connection tab 234 that is connected to the second electrode tab 117.

[0045] The first connection tab 233 extends from one side of the first lead plate 131, adjacent to the first electrode tab 116. The second connection tab 234 extends from one side of the second lead plate 232, adjacent to the second electrode tab 117.

[0046] The first connection tab 233 and the second connection tab 234 are bent perpendicularly from the sides of the first lead plate 231 and the second lead plate 232. The first connection tab 233 and the second connection tab 234 extend in parallel, away from the first short side 110a. The first connection tab 233 and the second connection tab 234 have larger widths as the first electrode tab 116 and the second electrode tab 117.

[0047] Referring to FIG. 4A, ends of the first lead plate 231 and the second lead plate 232 are welded to the protecting circuit board 120, so that the first lead plate 231 and the second lead plate 232 are electrically connected to the protecting circuit board 120. The first lead plate 231 and the second lead plate 232 are bent at the edge between the first long side 110b and the first short side 110a, so as to extend across the first short side 110a.

[0048] The first connection tab 233 and the second

DELTRAN EX1002
IPR2024-01219

connection tab 234 extend in parallel with the first electrode tab 116 and the second electrode tab 117. The first electrode tab 116 and the first connection tab 233 are electrically connected to each other, by welding, for example. The second electrode tab 117 and the second connection tab 234 are electrically connected to each other, by welding, for example.

[0049] As illustrated in FIG. 4B, when the battery 200 is assembled, the first electrode tab 116 and the first connection tab 233 are folded toward the first lead plate 231, and the second electrode tab 117 and the second connection tab 234 are folded toward the second lead plate 232. In this way, the bare cell 110 and the protecting circuit board 120 are connected to each other.

[0050] FIG. 6 is an exploded perspective view of a lithium rechargeable battery 300, according to a still another exemplary embodiment of the present invention. Referring to FIG. 6, the lithium rechargeable battery 300 includes a bare cell 110, a protecting circuit board 120 connected to the bare cell 110, and a lead plate 330 connected to the bare cell 110 and the protecting circuit board 120.

[0051] In the lithium rechargeable battery 300, the a first connection tab 333 and a second connection tab 334 of the lead plate 330 are different from the first connection tab 233 and the second connection tab 234 of the lithium rechargeable battery 200. Therefore, the lithium rechargeable battery 300 will be described with respect to the first connection tab 333 and the second connection tab 334 of the lead plate 330, and a description of similar elements is omitted.

[0052] The battery 300 includes a wing 333a that extends from the first connection tab 333, and a wing 334a that extends from the second connection tab 334. The area of the first connection tab 333 and the second connection tab 334 is increased by the wings 333a and 334a. Therefore, the first and second connection tabs 333 and 334 do not need to extend to the first and second electrode tabs 116 117.

Claims

1. A lithium rechargeable battery (100, 200, 300) comprising:

   a bare cell (110) comprising,

   an electrode assembly (114) comprising first and second electrodes and a separator (113) disposed therebetween,
   a pouch (115) in which the electrode assembly (114) is housed, and
   first and second electrode tabs (116, 117) extending from the first and second electrodes, through a first side of the bare cell (110);
   a protecting circuit board (120) electrically connected to the first and second electrode tabs (116, 117), disposed on a second side of the bare cell (110);
   a first lead plate (131, 231, 331) connected to the protecting circuit board (120) and the first electrode tab (116); and
   a second lead plate (132, 232, 332) connected to the protecting circuit board (120) and the second electrode tab (117),
   wherein the first lead plate (131, 231, 331) and the second lead plate (132, 232, 332) are bent at an intersection of the first and second sides of the bare cell (110), so as to extend along the first and second sides of the bare cell (110).

2. The lithium rechargeable battery of claim 1, wherein the first and second lead plates (131, 231, 331, 132, 232, 332) are separated from each other.

3. The lithium rechargeable battery of claims 1 or 2, wherein the first lead plate (231, 331) and the second lead plate (232, 332) overlap each other along the first side of the bare cell (110).

4. The lithium rechargeable battery of claim 3, wherein the first lead plate (231, 331) and the second lead plate (232, 332) have the same width as the first side of the bare cell (110).

5. The lithium rechargeable battery of claims 3 or 4, further comprising at least one insulating member to insulate the first lead plate (231, 331) and the second lead plate (232, 332) from each other.

6. The lithium rechargeable battery of claim 5, wherein the insulating member includes insulating tapes (240).

7. The lithium rechargeable battery of claim 6, wherein the insulating tapes (240) consist of or comprise polyimide.

8. The lithium rechargeable battery of any of claims 3 through 7, further comprising an attachment sheet (250) to attach the first lead plate (231) to the second lead plate (232).

9. The lithium rechargeable battery of any of the preceding claims, wherein:

   the first lead plate (131, 231, 331) comprises a first connection tab (133, 233, 333) that is connected to the first electrode tab (116); and
   the second lead plate comprises (132, 232, 332) a second connection tab (134, 234, 334) that is connected to the second electrode tab (117).

DELTRAN EX1002
IPR2024-01219

10. The lithium rechargeable battery of claim 9, wherein the first and second connection tabs (133, 233, 333, 134, 234, 334) respectively extend from edges of the first and second electrode tabs (116, 117) and are perpendicular to the first side of the bare cell (110).

11. The lithium rechargeable battery of claims 9 or 10, wherein the first and second connection tabs (133, 233, 333, 134, 234, 334) extend from sides of the first and second lead plates (131, 231, 331, 132, 232, 332), which face the first and second electrode tabs (116, 117) respectively.

12. The lithium rechargeable battery of any of claims 9 through 11, wherein the first and second connection tabs (133, 233, 333, 134, 234, 334) have a width which is larger than the width of the first and second electrode tabs (116, 117).

13. The lithium rechargeable battery of any of claims 9 through 12, wherein the first and second connection tabs (333, 334) comprise wings (333a, 334a) that extend therefrom, along the first side of the bare cell (110).

14. The lithium rechargeable battery of any of claims 9 through 13, wherein the first and second connection tabs (133, 233, 333, 134, 234, 334) and the first and second electrode tabs (116, 117) are bent to face the first side of the bare cell (110).

15. The lithium rechargeable battery of any of the preceding claims, wherein:

the bare cell (110) is a rectangular prism comprising the first side, an opposing third side, the second side, an opposing fourth side, and first and second main sides that are connected to opposing edges of the first, second, third, and fourth sides.

16. The lithium rechargeable battery of claim 15, wherein the first and third sides are shorter than the second and fourth sides.

Amended claims in accordance with Rule 137(2) EPC.

1. A lithium rechargeable battery (100, 200, 300) comprising:

a bare cell (110) comprising,
an electrode assembly (114) comprising first and second electrodes and a separator (113) disposed therebetween,
a pouch (115) in which the electrode assembly (114) is housed, and
first and second electrode tabs (116, 117) extending from the first and second electrodes, through a first side of the bare cell (110);
a protecting circuit board (120) electrically connected to the first and second electrode tabs (116, 117), disposed on a second side of the bare cell (110);
a first lead plate (231, 331) connected to the protecting circuit board (120) and the first electrode tab (116); and
a second lead plate (232, 332) connected to the protecting circuit board (120) and the second electrode tab (117),

wherein the first lead plate (231, 331) and the second lead plate (232, 332) are bent at an intersection of the first and second sides of the bare cell (110), so as to extend along the first and second sides of the bare cell (110),
wherein the first and second lead plates (231, 331, 232, 332) are separated from each other and overlap each other along the first side of the bare cell (110).

2. The lithium rechargeable battery of claim 1, wherein the first lead plate (231, 331) and the second lead plate (232, 332) have the same width as the first side of the bare cell (110).

3. The lithium rechargeable battery of claims 1 or 2, further comprising at least one insulating member to insulate the first lead plate (231, 331) and the second lead plate (232, 332) from each other.

4. The lithium rechargeable battery of claim 3, wherein the insulating member includes insulating tapes (240).

5. The lithium rechargeable battery of claim 4, wherein the insulating tapes (240) consist of or comprise polyimide.

6. The lithium rechargeable battery of any of claims 1 through 5, further comprising an attachment sheet (250) to attach the first lead plate (231) to the second lead plate (232).

7. The lithium rechargeable battery of any of the preceding claims, wherein:

the first lead plate (231, 331) comprises a first connection tab (233, 333) that is connected to the first electrode tab (116); and
the second lead plate comprises (232, 332) a second connection tab (234, 334) that is connected to the second electrode tab (117).

8. The lithium rechargeable battery of claim 7, wherein the first and second connection tabs (233, 333,

DELTRAN EX1002
IPR2024-01219

234, 334) respectively extend from edges of the first and second electrode tabs (116, 117) and are perpendicular to the first side of the bare cell (110).

9. The lithium rechargeable battery of claims 7 or 8, wherein the first and second connection tabs (233, 333, 234, 334) extend from sides of the first and second lead plates (231, 331, 232, 332), which face the first and second electrode tabs (116, 117) respectively.

10. The lithium rechargeable battery of any of claims 7 through 9, wherein the first and second connection tabs (233, 333, 234, 334) have a width which is larger than the width of the first and second electrode tabs (116, 117).

11. The lithium rechargeable battery of any of claims 7 through 10, wherein the first and second connection tabs (333, 334) comprise wings (333a, 334a) that extend therefrom, along the first side of the bare cell (110).

12. The lithium rechargeable battery of any of claims 7 through 11, wherein the first and second connection tabs (233, 333, 234, 334) and the first and second electrode tabs (116, 117) are bent to face the first side of the bare cell (110).

13. The lithium rechargeable battery of any of the preceding claims, wherein:

the bare cell (110) is a rectangular prism comprising the first side, an opposing third side, the second side, an opposing fourth side, and first and second main sides that are connected to opposing edges of the first, second, third, and fourth sides.

14. The lithium rechargeable battery of claim 13, wherein the first and third sides are shorter than the second and fourth sides.

DELTRAN EX1002
IPR2024-01219

FIG. 1

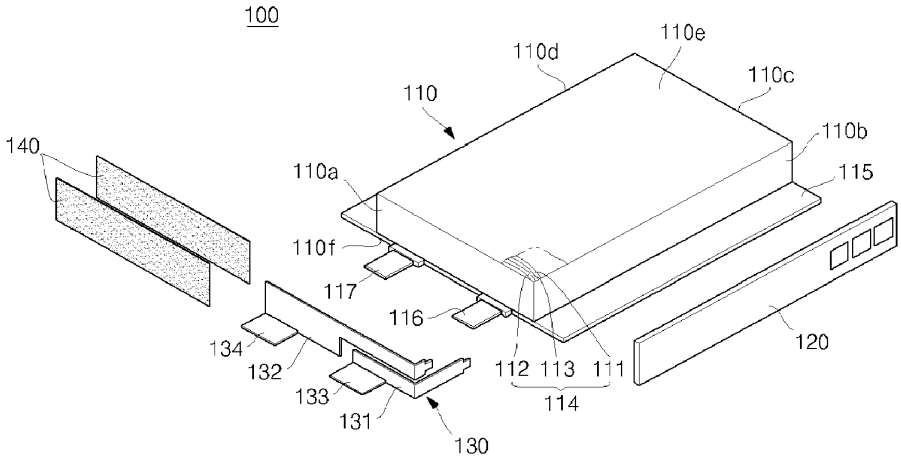

100
110e
110d
110c
110
110b
140
110a
115
110f
117
116
120
134
132
112 113 111
133
114
131
130

FIG. 2A

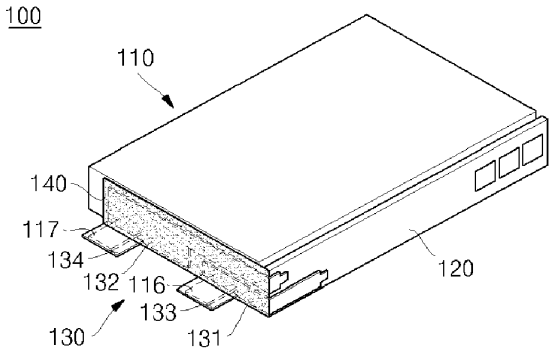

100
110
140
117
134
132
116
120
133
130
131

FIG. 2B

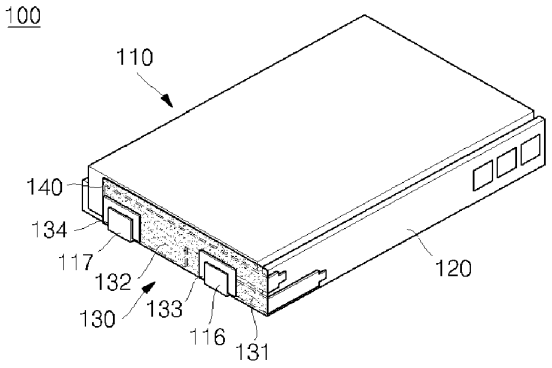
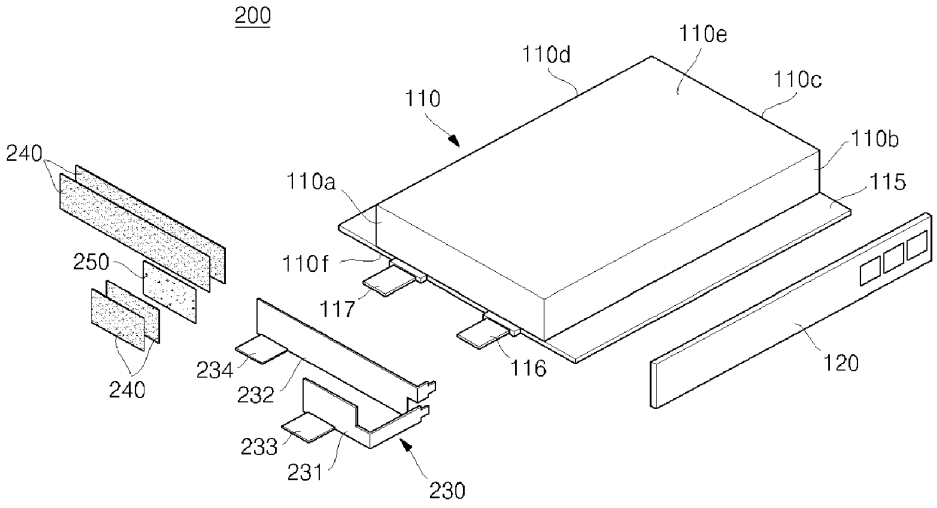


FIG. 3



DELTRAN EX1002
IPR2024-01219

FIG. 4A

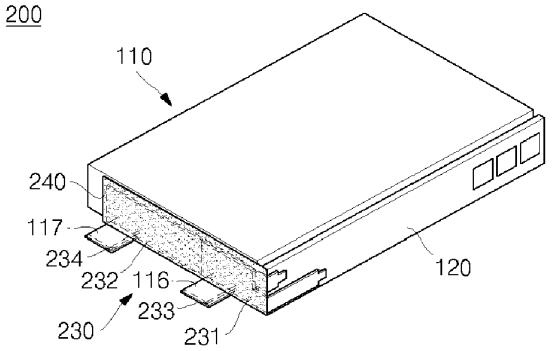
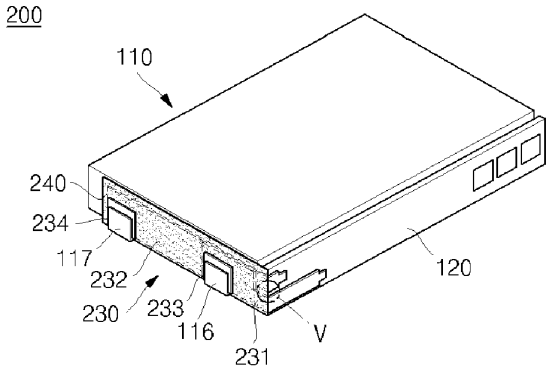


FIG. 4B



DELTRAN EX1002
IPR2024-01219

FIG. 5

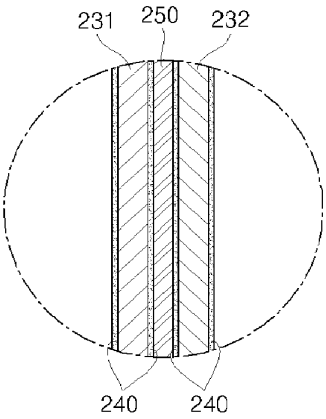
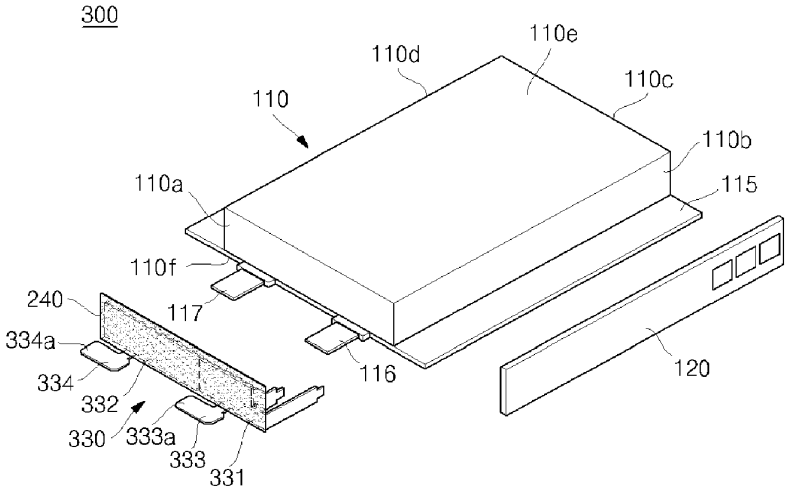


FIG. 6



DELTRAN EX1002
IPR2024-01219

EP 2 105 980 A1

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 15 6099

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 100 770 106 B1 (SAMSUNG SDI CO LTD [KR]) 24 October 2007 (2007-10-24) * abstract *	1-16	INV. H01M2/10 H01M2/22 H01M10/04
X	JP 2006 164558 A (SANYO ELECTRIC CO) 22 June 2006 (2006-06-22) * abstract *	1-16	H01M10/48

TECHNICAL FIELDS SEARCHED (IPC)

H01M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 May 2009	Cappadonia, Marcella

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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DELTRAN EX1002
IPR2024-01219

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 15 6099

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-05-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 100770106 B1	24-10-2007	CN 101170164 A	30-04-2008
		EP 1919009 A2	07-05-2008
		US 2008096101 A1	24-04-2008
JP 2006164558 A	22-06-2006	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

DELTRAN EX1002
IPR2024-01219

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

THE NOCO COMPANY, INC.,

Plaintiff,

v.

SHENZHEN LIANFA TONG TECHNOLOGY CO., LTD.,
Room 3A-E, Ganyutong Building, Qingji Road, Qinghu Community, Longhua Street, Longhua New District, Shenzhen, China 51800

and

SHENZHEN MEDIATEK TONG TECHNOLOGY CO., LTD.,
Room 3A-E, Qianyu Tong Building, Qingji Road Longhua Street, Longhua New District Shenzhen, China 51800

and

SHENZHEN BI TE YI TECHNOLOGY CO., LTD.,
701, New Chushang Apartment, #108, Team1 Shijing, Guanlan Street, Longhau New District Shenzhen, China 51800

Defendants.

Case No. 1:19-cv-01855

Judge Christopher A. Boyko

JURY TRIAL DEMANDED

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff The NOCO Company, Inc. ("NOCO"), for its first amended complaint against Defendants Shenzhen Lianfa Tong Technology Co., Ltd. ("Lianfa"), Shenzhen Mediatek Tong Technology Co., Ltd. ("Mediatek," and together with Lianfa, "Beatit"), and Shenzhen Bi Te Yi Technology Co., Ltd. ("Lemsir" and together with Beatit, the "Defendants") alleges as follows:

EXHIBIT 1016

DELTRAN EX1002
IPR2024-01219

Nature of the Action

1. This is an action for patent infringement under the Patent Laws of the United States, 35 U.S.C. §§ 101 *et seq*. and false advertising under the Lanham Act, 15 U.S.C. §§ 1051 *et seq.*

Jurisdiction and Venue

2. This Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338 and 15 U.S.C. § 1121.

3. Defendants are alien business entities subject to personal jurisdiction in this Court because they direct their infringing activities to the United States and the State of Ohio through, among other things, marketing their infringing products to residents of the United States and the State of Ohio through the Amazon.com online marketplace and other online marketplaces, and importing their infringing products into the United States.

4. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(c)(3) and 1400(b) because Defendants are alien business entities that import into, and offer to sell and sell the infringing products in, the United States and are deemed to be residents of this judicial district for purposes of venue.

Parties

5. NOCO is a corporation organized under the laws of the State of Ohio, with its principal place of business in Glenwillow, Ohio.

6. On information and belief, Lianfa is a business entity headquartered in China.

7. On information and belief, Mediatek is a business entity headquartered in China.

8. On information and belief, Lemsir is a business entity headquartered in China.

DELTRAN EX1002
IPR2024-01219

Background

NOCO and Its Genius Boost® Jump Starter

9. Founded in Cleveland, Ohio in 1914, and continuously owned and managed by the same family since then, NOCO designs and manufactures, among other products, premium consumer battery chargers, jump starters, and other portable power devices used primarily in the automotive and marine industries.

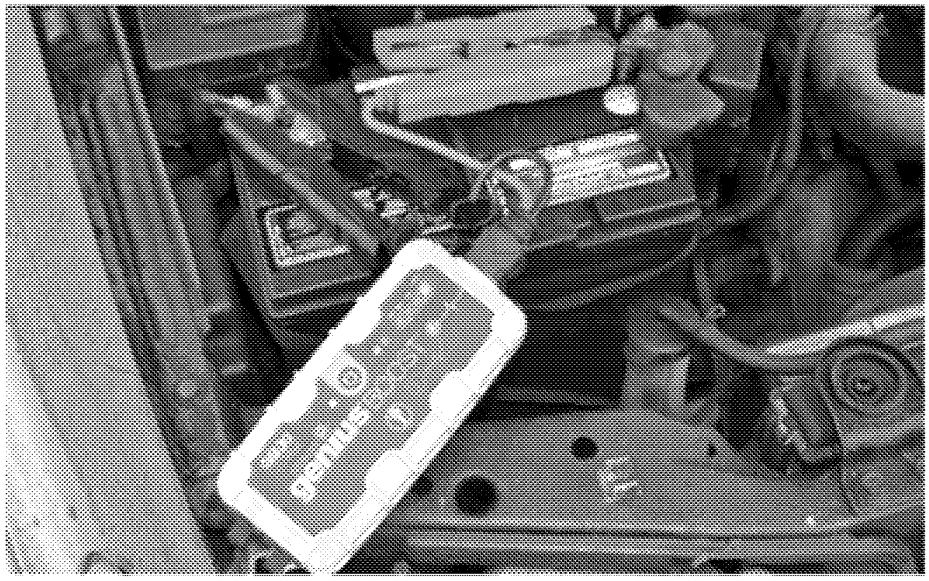
10. Since the early days of automobiles, the prevalent method to recharge a dead car battery has been through the use of "jumper cables," where two cables are run from a live battery in a running vehicle to a dead battery of a second vehicle. The many problems associated with jumper cables are well known, including the fact that a second car with a live battery is needed to perform a jump start, and the danger of sparking and short circuits, especially when the cables from the live battery to the dead battery are misconnected (referred to as "reverse polarity") or not fully connected.

11. Numerous efforts to improve the jump starting process have been undertaken over the years, most of which have had significant deficiencies such as lack of portability or failure to solve safety problems, and did not achieve significant popularity.

12. The advent of lithium ion batteries has permitted the introduction of compact jump starters that do not require the use of a second vehicle, providing consumer convenience as well as certain safety advantages over prior jump starting devices.

13. In 2014, NOCO introduced the Genius Boost® lithium jump starter, which incorporates the patented safety features described herein. A photograph of one model of NOCO's Genius Boost® jumping a dead battery is shown below, and a video demonstrating how the Genius Boost® operates can be found at https://www.youtube.com/watch?v=q7xWhyr-dDI.

DELTRAN EX1002
IPR2024-01219



14. NOCO manufactures and sells several models of the Genius Boost®, which vary based on, among other things, characteristics of the vehicles to be jump started and consumer preferences.

15. Since its introduction, the Genius Boost® has become known for its safety, ease of use, and reliability, among other features. As a result, the Genius Boost® has enjoyed tremendous popularity, becoming one of, if not the, market-leading compact lithium jump starters in the United States.

NOCO's U.S. Patent No. 9,007,015

16. On July 3, 2014, NOCO filed a utility patent application covering the Genius Boost®, which was granted and issued on April 14, 2015 as U.S. Patent No. 9,007,015 (the "'015 Patent"). A copy of the '015 Patent is attached as **Exhibit 1**.

17. The '015 Patent discloses and claims a handheld device for jump starting a vehicle engine that includes a lithium ion battery and a microcontroller (computer) as well as sensors to detect whether (a) the device is connected to both terminals of a vehicle battery, and

DELTRAN EX1002
IPR2024-01219

(2) whether the connection is the proper polarity—i.e., whether or not the positive charging clamp is connected to the positive battery terminal and the negative clamp is connected to the negative terminal. The microcontroller is configured (i.e., programmed) to instruct the charger to start only when the sensors provide signals that the charger is fully connected to the battery, and that the connection is in the correct polarity.

Defendants' Infringing Conduct

18. NOCO incorporates by reference the allegations in paragraphs 1–17 of this Complaint.

19. Claim 1 of the '015 Patent recites:

Apparatus for jump starting a vehicle engine, comprising:

an internal power supply;

an output port having positive and negative polarity outputs;

a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;

a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;

a power switch connected between said internal power supply and said output port; and

a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch, such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or

DELTRAN EX1002
IPR2024-01219

improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

20. Beatit infringes the '015 Patent in violation of 35 U.S.C. § 271 by making, using, offering to sell, and/or importing at least the following model of compact lithium jump starter sold under the brand name Beatit that have safety features claimed in the '015 Patent: B7 (1200A) Model; B10 (500A) Model; B10 Pro (800A) Model; BP101 (2200A) Model; D11 (800A) Model; G18 (2000A) Model; and G22 (1500A) Model (collectively, the "Infringing Beatit Models").

21. Based on information and belief, Beatit sells and has sold the Infringing Beatit Models through the Amazon.com online marketplace using at least the following trade names: Beatit Tech, Liejun-US, and BITEYI.

22. Each of the Infringing Beatit Models meets each element of at least claim 1 of the '015 Patent, as provided below:

23. Each of the Infringing Beatit Models has a lithium battery pack that acts as an internal power supply. For example, the Amazon page for the infringing D11 Model (the "D11 Amazon Page") states that it includes "1 Lithium Polymer batteries [sic]." D11 Amazon Page at 4. The D11 Amazon Page is attached as **Exhibit 2**.

24. Each of the Infringing Beatit Models has positive and negative polarity outputs. For example, the User Guide for the infringing D11 Model (the "D11 Guide") shows a picture of the jumper cable with positive and negative outputs, namely the red and black clamps. A copy of the D11 Guide is attached as **Exhibit 3**.

25. Each of the Infringing Beatit Models senses the presence of a vehicle battery in one of two ways:

a. they have a vehicle battery isolation sensor comprising a resistive divider that detects the presence of a vehicle battery connected between the positive and

DELTRAN EX1002
IPR2024-01219

negative polarity outputs: when a vehicle battery is connected between the positive and negative polarity outputs, the resistive divider sensor provides a signal to the microcontroller indicating the presence of the vehicle battery; or

b. they have a vehicle battery isolation sensor comprising a pulsing circuit that senses the presence of a vehicle battery: when a vehicle battery is not connected to the device's terminals, the pulsing circuit sends a relatively high amplitude pulsing signal to the microcontroller indicating the absence of a vehicle battery, and when a vehicle battery is connected to the device's terminals, the amplitude of the pulsing signal received at the microcontroller is significantly reduced (to near zero).

26. Each of the Infringing Beatit Models senses the polarity of a vehicle battery in one of three ways:

a. they have a reverse polarity sensor comprising an optocoupler that detects the polarity of a vehicle battery connected between the positive and negative polarity outputs: when a vehicle battery is connected between the positive and negative polarity outputs, the resistive divider sensor provides a signal to the microcontroller indicating whether the vehicle battery is connected with the correct or incorrect polarity;

b. they have a reverse polarity sensor comprising a resistive divider that sends a signal to the microcontroller indicating whether a battery is connected in proper polarity: when a vehicle battery is connected to the device's terminals with correct polarity, the reverse polarity sensor provides an input signal to the microcontroller that is proportional to the vehicle battery voltage, and when a vehicle battery is connected to the device's terminals with reverse polarity, the reverse polarity sensor provides an input signal to the microcontroller that is a slightly negative voltage; or

c. they have a reverse polarity sensor comprising a resistive divider that detects the polarity of a vehicle battery connected between the positive and negative polarity outputs: when a vehicle battery is connected between the positive and negative polarity outputs with reverse polarity, the resistive divider sensor provides a signal to the microcontroller indicating the reverse polarity connection of the vehicle battery.

27. Each of the Infringing Beatit Models has a transistor that controls the device's power switch.

28. Each of the Infringing Beatit Models has a microcontroller that receives signals from the above-described sensors and processes them such that the device is not turned on when

DELTRAN EX1002
IPR2024-01219

the sensors indicate that a battery is not connected to both outputs, or that the connection is in a reverse polarity state.

29. Lemsir infringes the '015 Patent in violation of 35 U.S.C. § 271 by making, using, offering to sell, and/or importing at least the following model of compact lithium jump starter sold under the brand name Lemsir by Beatit Innovations that has safety features claimed in the '015 Patent: L6 (800A) Model: V1 (2000A) Model; V3 (2200A) Model; and the V8 (800A) Model (collectively, the "Infringing Lemsir Models").

30. Based on information and belief, Lemsir sells and has sold the Infringing Lemsir Models through the Amazon.com online marketplace using at least the following trade names: Beatit Tech, Liejun-US, and HMINGTAI.

31. Each of the Infringing Lemsir Models meets each element of at least claim 1 of the '015 Patent, as provided below:

32. Each of the Infringing Lemsir Models has a lithium battery pack that acts as an internal power supply. For example, the Amazon page for the infringing V1 Model (the "V1 Amazon Page") states that it includes "1 Lithium Polymer batteries [sic]." V1 Amazon Page at 3. The V1 Amazon Page is attached as **Exhibit 4**.

33. Each of the Infringing Lemsir Models has positive and negative polarity outputs. For example, the V1 Amazon Page s shows a picture of the jumper cable with positive and negative outputs, namely the red and black clamps. V1 Amazon Page at 5.

34. Each of the Infringing Lemsir Models senses the presence of a vehicle battery in one of two ways:

a. they have a vehicle battery isolation sensor comprising a resistive divider that detects the presence of a vehicle battery connected between the positive and negative polarity outputs: when a vehicle battery is connected between the

DELTRAN EX1002
IPR2024-01219

positive and negative polarity outputs, the resistive divider sensor provides a signal to the microcontroller indicating the presence of the vehicle battery; or

b. they have a vehicle battery isolation sensor comprising a pulsing circuit that senses the presence of a vehicle battery: when a vehicle battery is not connected to the device's terminals, the pulsing circuit sends a relatively high amplitude pulsing signal to the microcontroller indicating the absence of a vehicle battery, and when a vehicle battery is connected to the device's terminals, the amplitude of the pulsing signal received at the microcontroller is significantly reduced (to near zero).

35. Each of the Infringing Lemsir Models senses the polarity of a vehicle battery in one of three ways:

a. they have a reverse polarity sensor comprising an optocoupler that detects the polarity of a vehicle battery connected between the positive and negative polarity outputs: when a vehicle battery is connected between the positive and negative polarity outputs, the resistive divider sensor provides a signal to the microcontroller indicating whether the vehicle battery is connected with the correct or incorrect polarity;

b. they have a reverse polarity sensor comprising a resistive divider that sends a signal to the microcontroller indicating whether a battery is connected in proper polarity: when a vehicle battery is connected to the device's terminals with correct polarity, the reverse polarity sensor provides an input signal to the microcontroller that is proportional to the vehicle battery voltage, and when a vehicle battery is connected to the device's terminals with reverse polarity, the reverse polarity sensor provides an input signal to the microcontroller that is a slightly negative voltage; or

c. they have a reverse polarity sensor comprising a resistive divider that detects the polarity of a vehicle battery connected between the positive and negative polarity outputs: when a vehicle battery is connected between the positive and negative polarity outputs with reverse polarity, the resistive divider sensor provides a signal to the microcontroller indicating the reverse polarity connection of the vehicle battery.

36. Each of the Infringing Lemsir Models has a transistor that controls the device's power switch.

37. Each of the Infringing Lemsir Models has a microcontroller that receives signals from the above-described sensors and processes them such that the device is not turned on when

DELTRAN EX1002
IPR2024-01219

the sensors indicate that a battery is not connected to both outputs, or that the connection is in a reverse polarity state.

COUNT ONE – PATENT INFRINGEMENT
Infringement Under 35 U.S.C. § 271 of U.S. Patent No. 9,007,015

38. NOCO incorporates by reference the allegations of paragraphs 1–37 of this Complaint.

39. In view of the foregoing, Defendants infringe the '015 Patent in violation of 35 U.S.C. § 271(a).

40. NOCO has at all relevant times been in compliance with 35 U.S.C. § 287 to the extent applicable.

41. Defendants will continue their acts of infringement unless and until enjoined by this Court.

42. Defendants' infringement has caused and, unless enjoined by this Court, will continue to cause, serious and irreparable harm to NOCO for which NOCO has no adequate remedy at law.

43. Defendants' infringement has also caused monetary damage to NOCO for which NOCO is entitled to be compensated by Defendant.

Prayer for Relief

WHEREFORE, NOCO prays for judgment as follows:

A. that Defendants be found to have infringed the '015 Patent;

B. that Defendants, their officers, directors, employees, agents, and affiliated entities, and all other parties in active participation or privity with them, be preliminary and permanently enjoined from infringing the '015 Patent;

DELTRAN EX1002
IPR2024-01219

C. that Defendants be ordered to pay NOCO damages adequate to compensate it for the infringement described in this Complaint;

D. that Defendants be ordered to pay NOCO damages adequate to compensate it for the unlawful advertising scheme described in this Complaint; and

E. that NOCO have such other and further relief as this Court may deem just and proper.

Jury Demand

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Plaintiff The NOCO Company, Inc. demands trial by jury for all claims and issues thus triable by right.

Dated: April 2, 2020

Respectfully submitted,

/s/ Aaron M. Williams

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DELTRAN EX1002
IPR2024-01219

Espacenet

JP2002141056A BATTERY TERMINAL CAP

Applicants: YAZAKI CORP

Inventors: OGINO YASUSHI

Classifications:

IPC ***H01M2/34; H01R4/70;*** (IPC1-7): H01M2/34; H01R4/70;

CPC Y02E60/10 (EP);

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BATTERY TERMINAL CAP

Abstract

PROBLEM TO BE SOLVED: To enable simply performing the installation of the bracket on the terminal on cable side without fitting forcibly. SOLUTION: The battery terminal cap is comprised of a bracket 70 that covers the connection part 58 of the cable side terminal 55 and the cable 10 by being installed on the cable side terminal 55 of L-shape in side view to be connected with the battery terminal 1 and a cap body 40 that covers the battery terminal 1 and the cable side terminal 55 by being installed on the bracket 70. The bracket 70 is formed in a box shape having a right and left both side wall 72 for structuring the receiving part 71 of the cable side terminal, a back side wall 74, and a ceiling wall 73, and is made in free opening and shutting in a right and left half split shape by a hinge 84 provided on the back side wall 74. Further, locking parts 82, 82 that lock the bracket 70 in a closed state are provided, and an engaging part 85 that engages with the engaged part 61 of the cable side terminal 55 inserted into the receiving part 71, when the bracket 70 is closed, is provided on the right and left both side walls 72.

DELTRAN EX1002
IPR2024-01219

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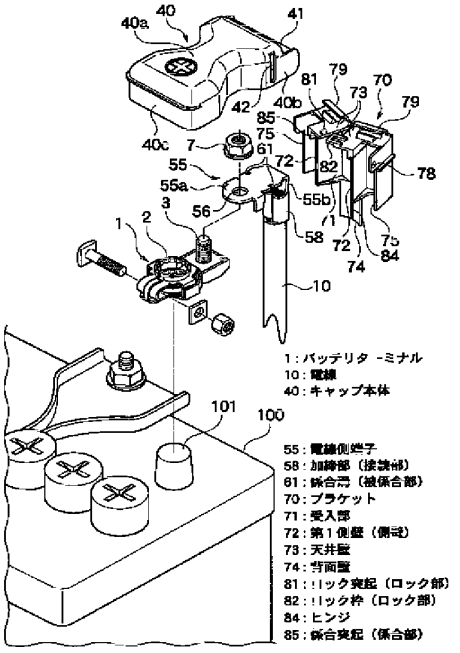
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(54)【発明の名称】　バッテリターミナル用キャップ

(57)【要約】
【課題】　電線側端子に対するブラケットの組み付けを、無理嵌めせずに簡単に行うことができるようにする。
【解決手段】　バッテリターミナル１に接続される側面視Ｌ形の電線側端子５５に装着されることで当該電線側端子５５と電線１０との接続部５８を覆うブラケット７０と、該ブラケット７０に装着されることでバッテリターミナル１及び電線側端子５５を覆うキャップ本体４０とからなるバッテリターミナル用キャップにおいて、ブラケット７０を、電線側端子の受入部７１を構成する左右両側壁７２と背面壁７４と天井壁７３とを有する箱形に形成すると共に、背面壁７４に設けたヒンジ８４により左右半割状に開閉自在となし、更に、ブラケット７０を閉状態でロックするロック部８１，８２を設けると共に、左右両側壁７２に、ブラケット７０を閉じたとき、受入部７１に挿入された電線側端子５５の被係合部６１と係合する係合部８５を設けた。



DELTRAN EX1002
IPR2024-01219

【特許請求の範囲】
【請求項１】　バッテリターミナルに接続される側面視Ｌ形の電線側端子に装着されることで当該電線側端子と電線との接続部を覆うブラケットと、該ブラケットに装着されることで前記バッテリターミナル及び電線側端子を覆うキャップ本体とからなるバッテリターミナル用キャップにおいて、
前記ブラケットを、前記電線側端子の受入部を構成する左右両側壁と背面壁と天井壁とを有する箱形に形成すると共に、前記背面壁に設けたヒンジにより左右半割状に開閉自在となし、更に、ブラケットを閉状態でロックするロック部を設けると共に、前記左右両側壁に、ブラケットを閉じたとき、前記受入部に挿入された電線側端子の被係合部と係合する係合部を設けたことを特徴とするバッテリターミナル用キャップ。
【請求項２】　請求項１記載のバッテリターミナル用キャップであって、
前記ブラケットの受入部に電線側端子を挿入したとき、電線側端子の後端が前記ヒンジを押すことでブラケットが閉じて、電線側端子の被係合部とブラケットの係合部が係合するように、前記電線側端子の被係合部から後端までの長さを設定したことを特徴とするバッテリターミナル用キャップ。
【請求項３】　請求項１または２記載のバッテリターミナル用キャップであって、
前記キャップ本体とブラケットとに、互いに嵌合することで直線状のヒンジを構成するヒンジ構成部をそれぞれ設けると共に、ブラケット側のヒンジ構成部を前記半割状に開閉するブラケットの左右の天井壁または左右の背面壁に跨って設けることで、ブラケットが適正に閉じたときにのみ、キャップ本体側の直線状のヒンジ構成部をブラケット側のヒンジ構成部に嵌合できるようにしたことを特徴とするバッテリターミナル用キャップ。
【請求項４】　請求項１～３のいずれかに記載のバッテリターミナル用キャップであって、
前記キャップ本体を、前記ブラケットが適正に閉じたときにのみ、ブラケットに嵌合できる大きさに形成すると共に、該キャップ本体に、適正に閉じた状態のブラケットの左右両側壁の開きを阻止する側壁を設けたことを特徴とするバッテリターミナル用キャップ。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、例えば、自動車に搭載されたバッテリの端子接続部を覆うバッテリターミナル用キャップに関する。
【０００２】
【従来の技術】一般に、車載バッテリの陽極側ポストやこれに接続されるターミナルには、車体との短絡を防止するために、絶縁樹脂からなるターミナルキャップを被せている。
【０００３】図７は従来のバッテリターミナル用キャップと、バッテリターミナル及び電線側端子との関係を示す分解斜視図、図８はバッテリターミナル用キャップを構成するブラケットと電線側端子の組み合わせ状態を示す図、図９はブラケットと電線側端子を組み合わせるときの作用説明図である。
【０００４】図７において、符号１は図示しないバッテリポストに接続されるバッテリターミナル、５は電線側端子である。バッテリターミナル１は、バッテリポストに対する嵌合部２と、電線側端子５を接続するためのスタッドボルト３とを有する。電線側端子５は、側面視Ｌ字形に基板を折り曲げ、水平板部５ａにスタッドボルト３に嵌める貫通孔６を形成し、垂直板部５ｂに電線１０に対する加締部８を形成したＬＡ端子であり、水平板部５ａの左右両側縁には、係合溝１１が設けられている。
【０００５】キャップは、これらバッテリターミナル１とバッテリポストの接続部、バッテリターミナル１と電線側端子５のナット７による接合部、電線側端子５と電線１０の加締接合部（電線接続部）、等の金属が露出した部分をすべて覆うように被せられるものであり、別部材として樹脂成形されたブラケット２０とキャップ本体４０とから構成されている。
【０００６】ブラケット２０は、電線側端子５に装着されることで、電線側端子５と電線１０との接続部（加締部８）を主に覆うものである。また、キャップ本体４０は、ブラケット２０に装着されることで、バッテリポストに接続されたバッテリターミナル１、及び、バッテリターミナル１にナット７で接続された電線側端子５を主に覆うものである。
【０００７】ブラケット２０は、電線側端子５の受入部２１を有する箱形のもので、左右の第１側壁２２と、それらの更に外側に配された左右の第２側壁２５と、天井壁２３と、背面壁２４とを有する。電線側端子５の受入部２１は、左右の第１側壁２２の間に確保されている。受入部２１の天井壁２３の下面には、受入部２１に電線側端子５を挿入したとき、電線側端子５の水平板部５ａの両側縁をガイドするスライド溝２６が設けられている。このスライド溝２６には、図９に示すように水平板部５ａがスライドしてきたとき、水平板部５ａの側縁に形成した係合溝１１と係合する係合突起３１が設けられている。
【０００８】また、図７，図８に示すように、ブラケット２０の天井壁２３の上面後端部には、キャップ本体４０の後端部に設けたロッド部４１を嵌合するＣ環部２９が設けられている。このＣ環部２９にロッド部４１を嵌合することで、キャップ本体４０をブラケット２０に回動自在に連結する直線状のヒンジが構成されるようになっている。
【０００９】キャップ本体４０は、天井壁４０ａと側壁４０ｂと前壁４０ｃとを有するもので、側壁４０ｂの後

DELTRAN EX1002
IPR2024-01219

端には、キャップ本体４０をバッテリターミナル１に被せたとき、ブラケット２０の第２側壁２５に設けたロック突起２８とロックするロック孔４２が設けられている。

【００１０】上記構成のバッテリターミナル用キャップを使用する場合には、まず、図８に示すように、電線側端子５にブラケット２０を組み付ける。即ち、図９（ａ）に示すように、ブラケット２０の受入部２１のスライド溝２６に電線側端子５の水平板部５ａを挿入する。そうすると、挿入するに従い、ブラケット２０の係合突起３１が電線側端子５の水平板部５ａの両側縁に衝合し、更に挿入することにより、係合突起３１の高さｄ分だけブラケット２０の側壁２２が外側に撓み、更に挿入することで、係合突起３１が係合溝１１に到達し、側壁２２が元の位置に弾性復帰して、係合溝１１と係合突起３１が係合する。これにより、電線側端子５とブラケット２０とがロックされる。

【００１１】次いで、図８に示すように電線側端子５と組み合わせたブラケット２０のＣ環部２９に、キャップ本体４０のロッド部４１を嵌合し、キャップ本体４０をブラケット２０に回動可能に取り付ける。

【００１２】あとは、バッテリポストに接合したバッテリターミナル１のスタッドボルト３に電線側端子５を接続し、キャップ本体４０をブラケット２０に被さるように倒して、バッテリターミナル１や電線側端子５を覆う。これにより、バッテリの端子接続部分をすべて絶縁材で覆うことができる。

【００１３】

【発明が解決しようとする課題】ところで、上記従来のキャップの場合、電線側端子５とブラケット２０のロックを、電線側端子５の側縁の係合溝１１にブラケット２０側の係合突起３１を無理嵌めすることで行っている。つまり、係合突起３１を係合溝１１に係合させる際に、ブラケット２０の側壁２２の撓みを利用しながら行っている。従って、ロックさせるために大きな力が必要であり、作業性が悪かった。また、無理嵌めするため、嵌合時に係合突起３１が破損し、ブラケット２０が脱落するおそれもあった。また、ロック及びロック解除するための挿入力や離脱力を、係合突起３１の高さｄで調整することになるため、ブラケット２０を成形する段階での寸法公差を厳しくしなければならず、金型加工費や成形品の管理費が高騰する問題もあった。

【００１４】本発明は、上記事情を考慮し、電線側端子に対するブラケットの組み付けを、無理嵌めせずに簡単に行うことができ、しかも、ブラケットの精度を緩めに設定できて、成形加工コストを抑制することのできるバッテリターミナル用キャップを提供することを目的とする。

【００１５】

【課題を解決するための手段】請求項１の発明は、バッテリターミナルに接続される側面視Ｌ形の電線側端子に装着されることで当該電線側端子と電線との接続部を覆うブラケットと、ブラケットに装着されることでバッテリターミナル及び電線側端子を覆うキャップ本体とからなるバッテリターミナル用キャップにおいて、前記ブラケットを、電線側端子の受入部を構成する左右両側壁と背面壁と天井壁とを有する箱形に形成すると共に、背面壁に設けたヒンジにより左右半割状に開閉自在となし、更に、ブラケットを閉状態でロックするロック部を設けると共に、前記左右両側壁に、ブラケットを閉じたとき、前記受入部に挿入された電線側端子の被係合部と係合する係合部を設けたことを特徴とする。

【００１６】このキャップにおいて、電線側端子にブラケットを組み付けるには、開いた状態のブラケットの受入部に電線側端子を挿入してブラケットを閉じる。そうすると、ブラケットの左右両側壁に設けた係合部が電線側端子の被係合部に係合し、同時に、ブラケットがロック部によって閉ロックされる。

【００１７】請求項２の発明は、請求項１記載のバッテリターミナル用キャップであって、前記ブラケットの受入部に電線側端子を挿入したとき、電線側端子の後端が前記ヒンジを押すことでブラケットが閉じて、電線側端子の被係合部とブラケットの係合部が係合するように、電線側端子の被係合部から後端までの長さを設定したことを特徴とする。

【００１８】このキャップにおいて、電線側端子にブラケットを組み付けるには、開いた状態のブラケットの受入部に電線側端子を挿入し、電線側端子の後端でブラケットの背面壁のヒンジを押す。そうすると、受入部の空間内に出っ張った状態にあったヒンジが押されることで、自動的にブラケットが閉じ、ブラケットの左右両側壁に設けた係合部が電線側端子の被係合部に係合し、同時に、ブラケットがロック部によって閉ロックされる。

【００１９】請求項３の発明は、請求項１または２記載のバッテリターミナル用キャップであって、前記キャップ本体とブラケットとに、互いに嵌合することで直線状のヒンジを構成するヒンジ構成部をそれぞれ設けると共に、ブラケット側のヒンジ構成部を前記半割状に開閉するブラケットの左右の天井壁または左右の背面壁に跨って設けることで、ブラケットが適正に閉じたときにのみ、キャップ本体側の直線状のヒンジ構成部をブラケット側のヒンジ構成部に嵌合できるようにしたことを特徴とする。

【００２０】このキャップでは、ブラケット側のヒンジ構成部を、左右半割状に開閉するブラケットの天井壁または背面壁に跨って設けているので、ブラケットが適正に閉じた状態にないと、左右のヒンジ構成部が直線状とならない。つまり、ブラケットが適正に閉じたときにのみ、天井壁または背面壁に設けた左右のヒンジ構成部が直線状となり、キャップ本体側のヒンジ構成部を嵌合で

DELTRAN EX1002
IPR2024-01219

きる状態となる。そして、その状態で、ブラケット側のヒンジ構成部にキャップ本体側のヒンジ構成部を嵌合することにより、キャップ本体をブラケットに対して開閉自在に連結するヒンジを構成することができる。

【００２１】従って、ヒンジを構成するために、ブラケット側のヒンジ構成部とキャップ本体側のヒンジ構成部とを互い嵌合した際の嵌合拘束力によって、ブラケットを閉状態でロックすることができる。また、ブラケット側のヒンジ構成部に対してキャップ本体側のヒンジ構成部を嵌合できない場合には、ブラケットが適正に閉じていないとみなすことができ、それにより、電線側端子とブラケットとが半嵌合状態にあることを簡単に発見することができる。

【００２２】請求項４の発明は、請求項１～３のいずれかに記載のバッテリーターミナル用キャップであって、前記キャップ本体を、前記ブラケットが適正に閉じたときにのみ、ブラケットに嵌合できる大きさに形成すると共に、該キャップ本体に、適正に閉じた状態のブラケットの左右両側壁の開きを阻止する側壁を設けたことを特徴とする。

【００２３】このキャップでは、ブラケットが適正に閉じた状態でないと、キャップ本体をブラケットに嵌合できない。従って、キャップ本体をブラケットに嵌合できないことをもって、ブラケットと電線側端子の組み付け不良を簡単に発見することができる。また、適正に閉じた状態のブラケットに対してキャップ本体を嵌合した場合には、キャップ本体の側壁でブラケットの左右側壁の開きを阻止することができる。従って、ブラケットのロックを強化することができる。

【００２４】

【発明の実施の形態】以下、本発明の実施形態を図面に基づいて説明する。なお、図７～図９に示した従来例と同じ構成要素には同一符号を付して説明を簡略化する。

【００２５】図１は実施形態のバッテリーターミナル用キャップと、バッテリポスト、バッテリーターミナル、及び電線側端子との関係を示す分解斜視図である。

【００２６】図１において、１００はバッテリ、１０１はバッテリポスト、１はバッテリーターミナル、５５は電線側端子である。

【００２７】電線側端子５５は、側面視Ｌ字形に基板を折り曲げ、水平板部５５ａにスタッドボルト３に嵌める貫通孔５６を形成し、垂直板部５５ｂに電線１０に対する加締部５８を形成したＬＡ端子であり、水平板部５５ａの左右両側縁には係合溝（被係合部）６１が設けられている。

【００２８】キャップは、バッテリーターミナル１とバッテリポストの接続部、バッテリーターミナル１と電線側端子５５のナット７による接合部、電線側端子５５と電線１０の加締接合部（電線接続部）、等の金属が露出した部分をすべて覆うように被せられるものであり、別部材として樹脂成形されたブラケット７０とキャップ本体４０とから構成されている。

【００２９】ブラケット７０は、電線側端子５５に装着されることで、電線側端子５５と電線１０との接続部（加締部５８）を主に覆うものである。また、キャップ本体４０は、ブラケット７０に装着されることで、バッテリポスト１０１に接続されたバッテリターミナル１、及び、バッテリターミナル１にナット７で接続された電線側端子５５を主に覆うものである。

【００３０】ブラケット７０は、図２，図３に示すように、電線側端子５５の受入部７１を有する箱形のもので、左右の第１側壁７２と、それらの更に外側に配された左右の第２側壁７５と、天井壁７３と、背面壁７４とを有している。電線側端子５５の受入部７１は、左右の第１側壁７２の間に確保されている。

【００３１】このブラケット７０は、背面壁７４に設けた上下に延びるヒンジ８４（本例では、樹脂の肉を局部的に薄くすることでヒンジが構成されている）により、左右半割状に開閉自在に構成されている。図２（ａ），図３は成形したままの開いた状態を示している。

【００３２】ブラケット７０は、このように左右に開閉できるものであり、開いたときに左右に分かれ且つ閉じたときに一つに合わさる天井壁７３の前部には、ブラケット７０を閉じた状態でロックするためのロック部として、互いに係合するロック突起８１とロック枠８２が設けられている。

【００３３】また、左右の両第１側壁７２の前端には、ブラケット７０を閉じたときに、受入部７１に挿入された電線側端子５５の係合溝６１と係合する係合突起８５が設けられている。この係合突起８５は、天井壁７３の下面側に設けられているスライド溝７６の前端に位置している。

【００３４】この場合、ヒンジ８４から係合突起８５までの長さと、電線側端子の後端から係合溝６１までの長さとの関係は、ブラケット７０の受入部７１に電線側端子５５を挿入したとき、電線側端子５５の後端がヒンジ８４を押すことで、ブラケット７０が閉じて、電線側端子５５の係合溝６１とブラケット７０の係合突起８５が係合するように設定されている。

【００３５】また、キャップ本体４０とブラケット７０には、互いに嵌合することで直線状のヒンジを構成するロッド部４１とＣ環部（ヒンジ構成部）７９がそれぞれ設けられている。この場合、Ｃ環部７９は、半割状に開閉するブラケット７０の左右の天井壁７３に跨って設けられている。それにより、ブラケット７０が適正に閉じたときにのみ、左右の天井壁７３のＣ環部７９が直線状になって、キャップ本体４０側の直線状のロッド４１を嵌合できるようになっている。そして、直線状になったＣ環部７９にキャップ本体４０のロッド部４１を嵌合することで、キャップ本体４０をブラケット７０に回動自

DELTRAN EX1002
IPR2024-01219

在に連結する直線状のヒンジが構成されるようになっている。

【００３６】キャップ本体４０は、図７の従来例に示したものと同様に、天井壁４０ａと側壁４０ｂと前壁４０ｃとを有し、側壁４０ｂの後端部に、キャップ本体４０をバッテリターミナル１に被せたときに、ブラケット７０の第２側壁７５に設けたロック突起７８とロックするロック孔４２が設けられている。この場合、キャップ本体４０は、ブラケット７０が適正に閉じたときにのみ、ブラケット７０に嵌合できる大きさに形成されており、キャップ本体４０の側壁４０ｂによって、適正に閉じた状態のブラケット７０の左右両第２側壁７５の開きを阻止するようになっている。

【００３７】以上の構成のバッテリターミナル用キャップを使用する場合には、まず、図４に示すように、電線側端子５５にブラケット７０を組み付ける。即ち、図５（ａ）に示すように、開いた状態のブラケット７０の受入部７１に電線側端子５５を矢印Ｐで示すように挿入し、電線側端子５５の後端でブラケット７０の背面壁７４のヒンジ８４の部分を押す。そうすると、受入部７１の空間内に出っ張った状態にあったヒンジ８４が押されることで、図５（ｂ）に示すように自動的にブラケット７０が閉じ、ブラケット７０の左右両第１側壁７２に設けた係合突起８５が電線側端子５５の係合溝６１に係合し、電線側端子５５の水平板部５５ａがスライド溝７６に嵌まる。同時に、図２（ｂ）及び図４（ａ），（ｂ）に示すように、ブラケット７０がロック突起８１とロック枠８２の係合によって閉ロックされる。

【００３８】このように、電線側端子５５を、開いた状態のブラケット７０の受入部７１に挿入し、電線側端子５５の後端でヒンジ８４を押すだけで、電線側端子５５に対してブラケット７０をロックすることができる。従って、従来のようにブラケットを電線側端子に無理嵌めしなくてよく、組み付け作業性が向上する。また、無理な力を加えながら組み付ける必要がないから、ブラケット７０の係合突起８５が破損するおそれもなく、破損によるブラケット７０の脱落や紛失の心配も全くない。また、ブラケット７０は閉状態で確実にロック突起８１及びロック枠８２によりロックされるので、電線側端子５５とブラケット７０の係合が外れるおそれもない。また、従来のようにブラケットの撓みを利用しながら電線側端子とブラケットをスライド係合させるのではないから、係合突起８１と係合溝６１の係合代を厳しく管理する必要がなく、寸法公差を緩めに設定することができる。

【００３９】次に、図６に示すように、電線側端子５５と組み合わせたブラケット７０のＣ環部７９に対して、キャップ本体４０のロッド部４１を嵌合し、キャップ本体４０をブラケット７０に回動可能に取り付ける。

【００４０】あとは、バッテリポスト１０１に接合したバッテリターミナル１のスタッドボルト３に電線側端子５５を接続し、キャップ本体４０を倒して、バッテリターミナル１や電線側端子５５を覆う。このとき、キャップ本体４０の側壁４０ｂに設けたロック孔４２が、ブラケット７０の第２側壁７５に設けたロック突起７８に嵌まり、キャップ本体４０がロックされる。これにより、バッテリの端子接続部分をすべて絶縁材で覆うことができる。

【００４１】上記のようにキャップ本体４０をブラケット７０に装着する際に、ブラケット７０側のＣ環部７９をブラケット７０の左右の天井壁７３に跨って設けているので、ブラケット７０が適正に閉じた状態にないと、左右のＣ環部７９が直線状とならない。つまり、ブラケット７０が適正に閉じたときにのみ、Ｃ環部７９が直線状となり、キャップ本体４０側のロッド部４１を嵌合できる状態となる。従って、ヒンジを構成するために、ブラケット７０側のＣ環部７９とキャップ本体４０側のロッド部４１とを互い嵌合した際の嵌合拘束力によって、ブラケット７０を閉状態でロックすることができる。

【００４２】また、適正に閉じた状態のブラケット７０に対してキャップ本体４０を嵌合した場合には、キャップ本体４０の側壁４０ｂでブラケット７０の左右両第２側壁７５の開きを阻止することができる。従って、ブラケット７０のロックを強化することができる。

【００４３】このように、ロック突起８１とロック枠８２によるロックと、Ｃ環部７９とロッド部４１によるロックと、キャップ本体４０の側壁４０ｂによるロックの三重のロックによって、ブラケット７０を閉状態に保持しておくことができるので、電線側端子５５とブラケット７０の組み付け強度を極めて高く維持することができ、組み付け信頼性が向上する。

【００４４】また、キャップ本体４０のロッド部４１は、ブラケット７０が適正に閉じた状態にないと、Ｃ環部７９に嵌まらない上、キャップ本体４０も、ブラケット７０が適正に閉じた状態にないと、ブラケット７０に嵌まらないので、それらのことをもって、ブラケット７０と電線側端子５５の組み付け状態が半嵌合であることを簡単に発見することができ、不良品の発生を未然に防止することができる。

【００４５】なお、上記実施形態では、キャップ本体４０のロッド部４１を嵌合するＣ環部７９を、ブラケット７０の天井壁７３に設けているが、背面壁７４に設けてもよい。その場合も、左右の背面壁７４に跨ってＣ環部を設けることで、上記と同様の作用効果を奏することができる。

【００４６】また、上記実施形態では、キャップ本体４０をブラケット７０に対してヒンジ結合するようにした場合を示したが、必ずしもヒンジ結合する必要はない。

【００４７】

【発明の効果】以上説明したように、請求項１の発明に

よれば、ブラケットを左右に開閉可能に構成し、開いた状態のブラケットに電線側端子を入れてブラケットを閉じるだけで、電線側端子に対してブラケットを係止状態に組み付けることができるようにしたので、従来のようにブラケットを電線側端子に無理嵌めしなくてよく、組み付け作業性が向上する。また、無理な力を加えながら組み付ける必要がないから、ブラケットの係合部が破損するおそれもなく、破損によるブラケットの脱落や紛失の心配がない。また、ブラケットは閉状態で確実にロックされるので、電線側端子とブラケットの係合が外れるおそれもない。また、従来のようにブラケットの撓みを利用しながら電線側端子とブラケットをスライド係合させるのではないから、係合部と被係合部の係合代を厳しく管理する必要がなく、寸法公差を緩めに設定することができる。従って、ブラケットを成形する場合の金型の精度や成形品の管理を緩やかにすることができ、その分、ブラケットの成形コストの低減が図れる。

【００４８】請求項２の発明によれば、電線側端子をブラケットの受入部に挿入し、電線側端子の後端でヒンジを押すだけで、電線側端子に対してブラケットを組み付けることができるので、組み付け作業性が一層向上する。

【００４９】請求項３の発明によれば、ブラケット側のヒンジ構成部とキャップ本体側のヒンジ構成部とを互い嵌合することにより、ブラケットを閉状態でロックすることができる。従って、ロック部に加えたヒンジによる二重ロックが可能となることで、電線側端子とブラケットの組み付け信頼性が向上する。また、ブラケット側のヒンジ構成部に対してキャップ本体側のヒンジ構成部を嵌合できないことにより、電線側端子とブラケットの半嵌合を簡単に発見することができるので、不良品の発生を未然に防止することができる。

【００５０】請求項４の発明によれば、適正に閉じた状態にあるブラケットにキャップ本体を嵌合することにより、ブラケットをロックすることができ、ロック部に加えたロックの強化により、電線側端子とブラケットの組み付け信頼性を向上させることができる。また、キャップ本体をブラケットに嵌合できないことをもって、ブラケットと電線側端子の組み付け不良を簡単に発見することができるので、不良品の発生を未然に防止することができる。

【図面の簡単な説明】

【図１】本発明の実施形態のバッテリターミナル用キャップと、バッテリポスト、バッテリターミナル、及び電線側端子との関係を示す分解斜視図である。

【図２】前記バッテリターミナル用キャップを構成するブラケットと電線側端子の関係を示す斜視図で、（ａ）はブラケットを電線側端子に組み付ける前の状態を示す図、（ｂ）は組み付けた後の状態を示す図である。

【図３】前記ブラケットの構成図で、（ａ）は正面図、（ｂ）は平面図、（ｃ）は側面図、（ｄ）は（ａ）図のＩＩＩｄ－ＩＩＩｄ矢視断面図である。

【図４】前記ブラケットを電線側端子に組み付けた後の状態を示す図で、（ａ）は平面図、（ｂ）は側面図で、（ａ）図は（ｂ）図のＩＶａ－ＩＶａ矢視図である。

【図５】前記ブラケットと電線側端子の組み付け時の作用説明図で、（ａ）はロックする前の状態を示す要部断面図、（ｂ）はロックした後の状態を示す要部断面図である。

【図６】前記電線側端子にブラケットを組み付けた上で更にブラケットにキャップ本体を組み付けた状態を示す図であり、（ａ）は要部平面図、（ｂ）は要部側面図、（ｃ）は（ｂ）図のＶｃ－ＶｃＶｃ矢視断面図である。

【図７】従来のバッテリターミナル用キャップと、バッテリターミナル及び電線側端子との関係を示す分解斜視図である。

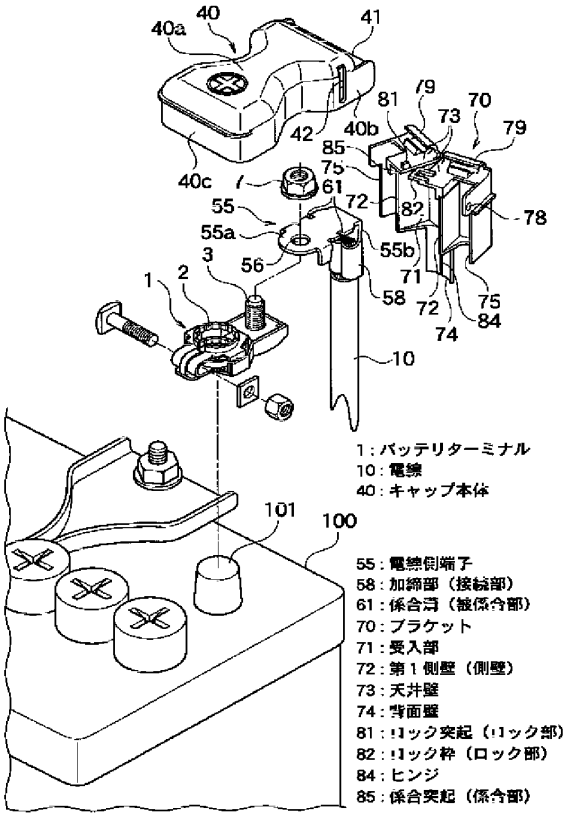
【図８】従来のバッテリターミナル用キャップのブラケットを電線側端子に組み付けた後の状態を示す図で、（ａ）は平面図、（ｂ）は側面図で、（ａ）図は（ｂ）図のＶＩＩＩａ－ＶＩＩＩａ矢視図である。

【図９】従来のバッテリターミナル用キャップのブラケットを電線側端子に組み付ける時の作用説明図で、（ａ）はロックする直前の状態を示す要部断面図、（ｂ）はロックした後の状態を示す要部断面図である。

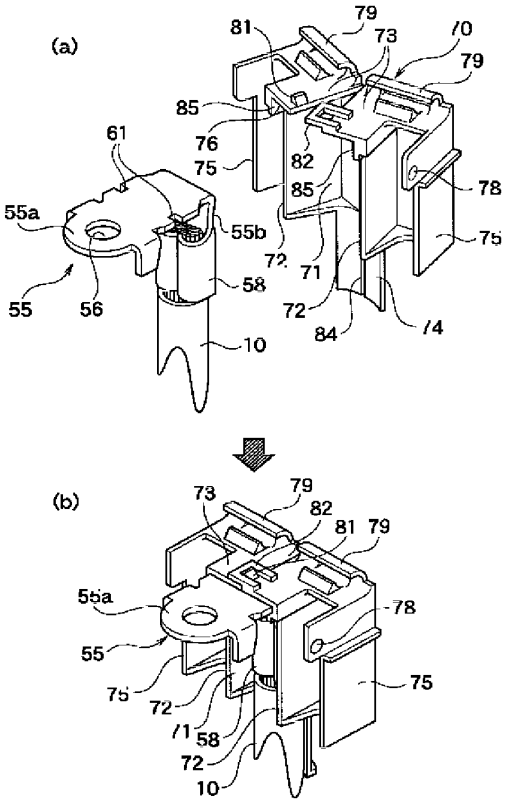
【符号の説明】

１　バッテリターミナル
１０　電線
４０　キャップ本体
４０ｂ　側壁
４１　ロッド部（ヒンジ構成部）
５５　電線側端子
５８　加締部（接続部）
６１　係合溝（被係合部）
７０　ブラケット
７１　受入部
７２　第１側壁（側壁）
７３　天井壁
７４　背面壁
７９　Ｃ環部（ヒンジ構成部）
８１　ロック突起（ロック部）
８２　ロック枠（ロック部）
８４　ヒンジ
８５　係合突起（係合部）

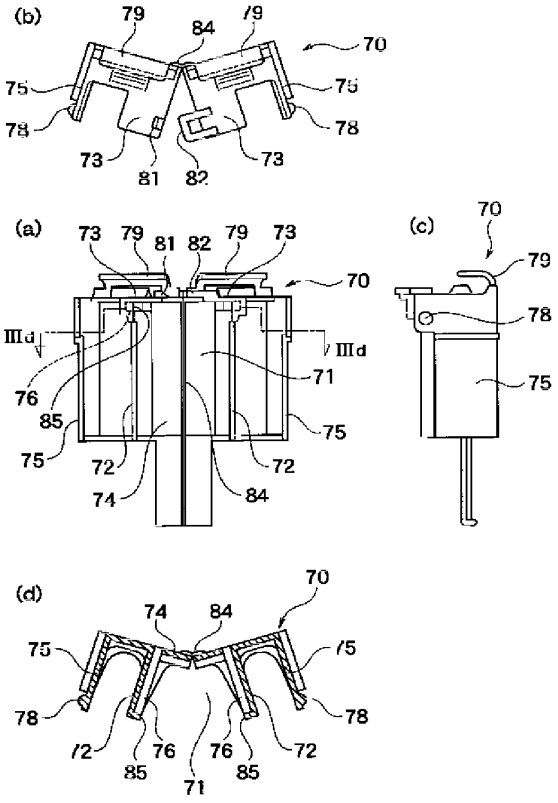
【図１】


40a
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40b
40c
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78
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55a
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55b
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72
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84
74
3
1
2
10
101
100
1：バッテリーターミナル
10：電線
40：キャップ本体
55：電線側端子
58：加締部（接続部）
61：係合爪（被係合部）
70：ブラケット
71：受入部
72：第１側壁（側壁）
73：天井壁
74：背面壁
81：ロック突起（ロック部）
82：ロック枠（ロック部）
84：ヒンジ
85：係合突起（係合部）

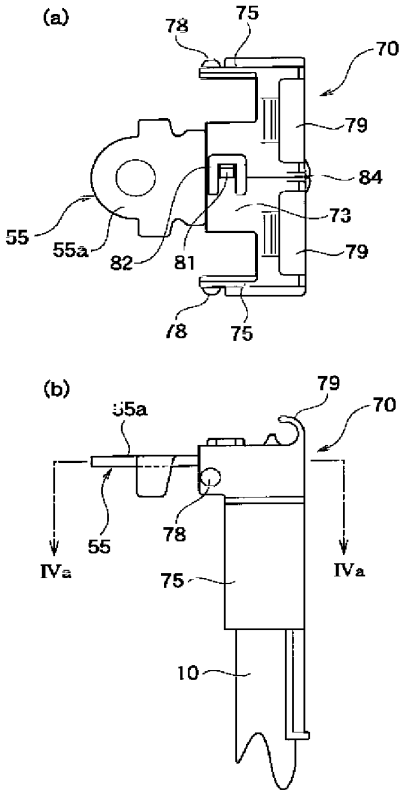
【図２】


(a)
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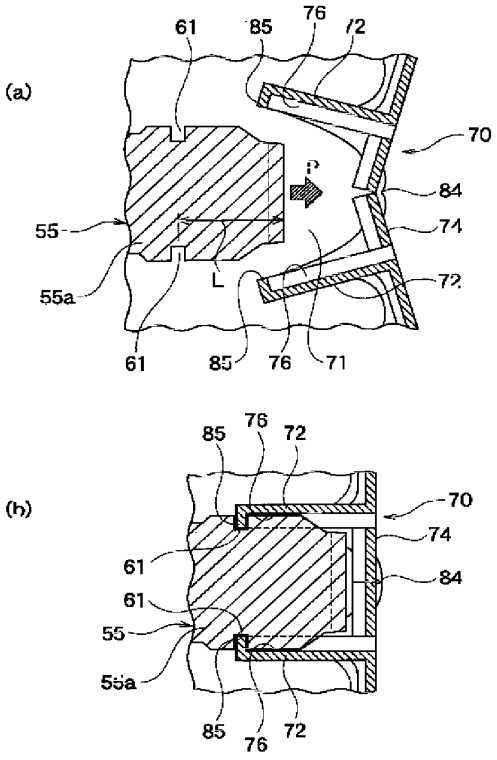
【図3】


(b)
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84
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81
82
(a)
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81
82
79
73
70
IIId
IIId
71
76
85
75
75
72
72
74
84
(c)
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(d)
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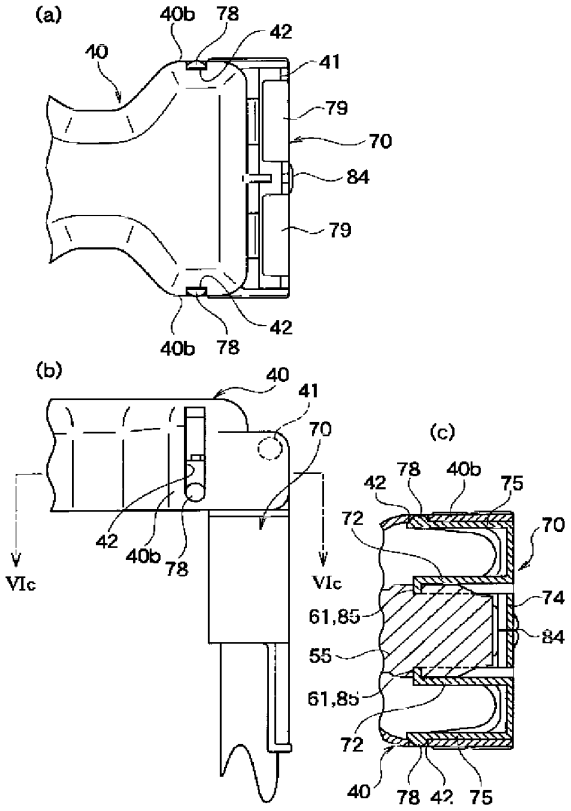
【図4】


(a)
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IVa
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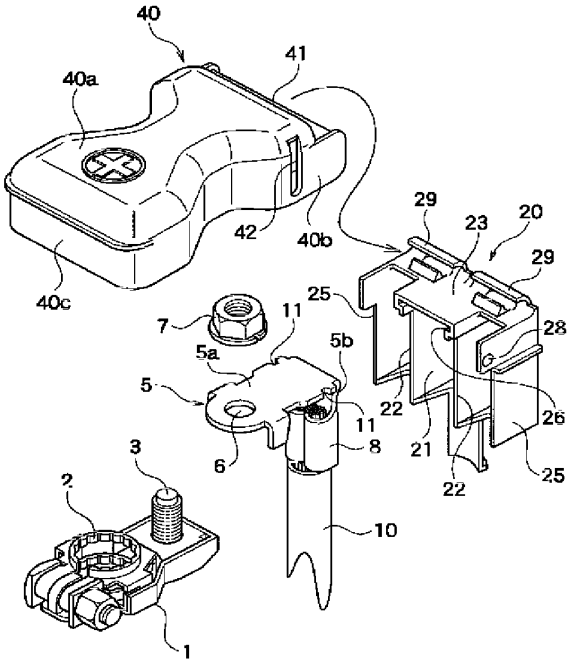
【図5】


(a)
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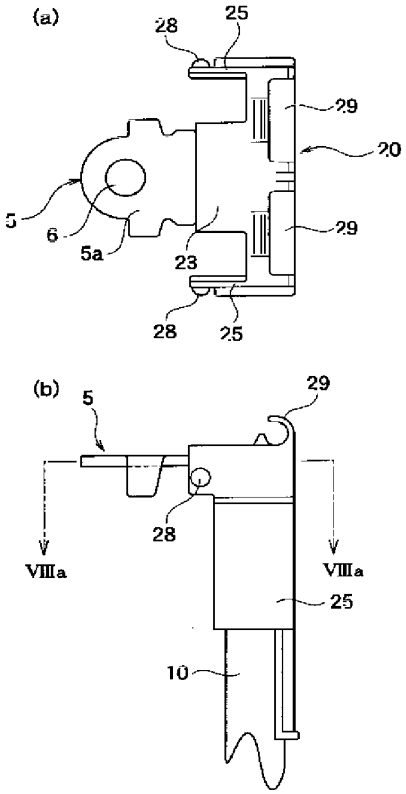
【図6】


(a)
40b
78
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(b)
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41
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42
40b
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VIc
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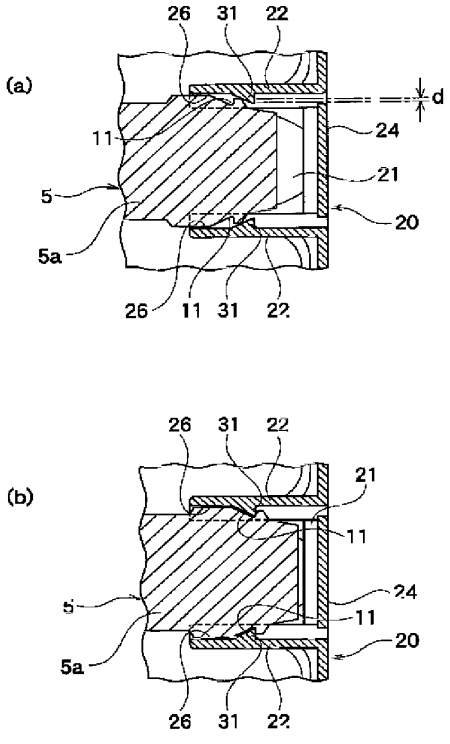
【図7】


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5a
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【図8】


(a)
28
25
29
20
5
6
5a
23
29
28
25
(b)
5
29
28
VIIIa
VIIIa
25
10

【図9】


(a)
26
31
22
d
11
24
21
5
20
5a
26
11
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(b)
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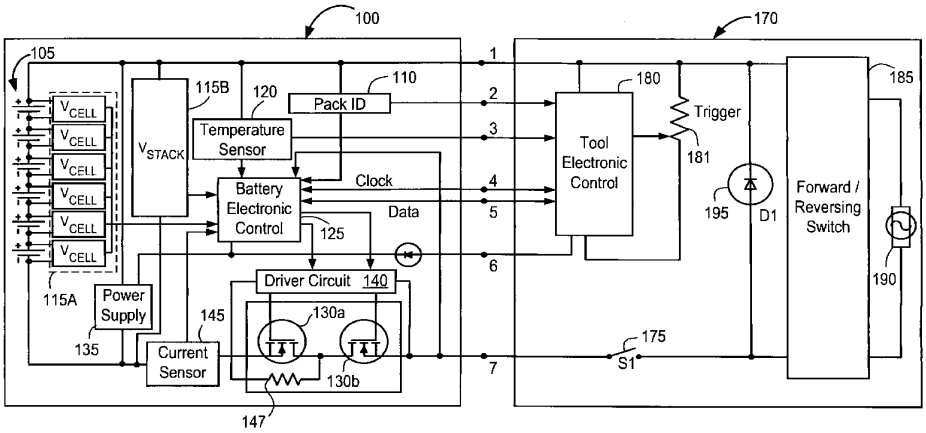
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[Continued on next page]

(54) Title: PROTECTION METHODS, PROTECTION CIRCUITS AND PROTECTIVE DEVICES FOR SECONDARY BATTERIES, A POWER TOOL, CHARGER AND BATTERY PACK ADAPTED TO PROVIDE PROTECTION AGAINST FAULT CONDITIONS IN THE BATTERY PACK



(57) Abstract: In a cordless power tool system, protection methods, circuits and devices are provided to protect against fault conditions within a battery pack that is operatively attached to a power tool or charger, so as to prevent internal or external damage to the battery pack or attached tool or charger. The exemplary methods, circuits and devices address fault conditions such as over-charge, over-discharge, over-current, over-temperature, etc.

WO 2005/038952 A2

DELTRAN EX1002
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PROTECTION METHODS, PROTECTION CIRCUITS AND PROTECTIVE DEVICES FOR SECONDARY BATTERIES, A POWER TOOL, CHARGER AND BATTERY PACK ADAPTED TO PROVIDE PROTECTION AGAINST FAULT CONDITIONS IN THE BATTERY PACK

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims domestic priority under 35 U.S.C. §120 to the following related U.S. Provisional patent applications filed in the United States Patent & Trademark Office: U.S. Provisional Application Serial No. 60/510,128, filed October 14, 2003, and U.S. Provisional Application Serial No. 60/551,803, filed March 11, 2004. The entire contents of the disclosures for each of these provisional applications are incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to protection methods, protection circuits and protective devices for rechargeable batteries, to a power tool and charger adapted to provide protection for cells of an attached battery pack, and to a battery pack including protection control therein, each protecting the battery back against various potential fault conditions.

Description of Related Art

[0003] Over the past few years, lithium-ion (Li-ion) batteries have begun replacing nickel-cadmium (NiCd), nickel-metal-hydride (NiMH), and lead-acid batteries in low-voltage, portable electronic devices such as notebook-type personal computers. As compared to NiCd and NiMH batteries, Li-ion batteries are lighter but have a larger capacity per unit volume. For this reason, the Li-ion batteries have been typically suitable to low-voltage devices that are preferably light and which are required to endure continuous use for a long time. In an over-discharged state, however, the Li-ion batteries deteriorate rapidly, thus Li-ion batteries require over-discharge protection.

DELTRAN EX1002
IPR2024-01219

[0004] A battery pack used in a portable electronic device typically has a plurality of battery cells connected in series. The maximum number of battery cells connected in series in one battery pack is determined by the output voltage of the battery pack. For instance, the typical output voltage of one NiCd battery cell or one NiMH battery cell is 1.2 V. Assuming that an 18V output voltage from a battery pack is suitable for most general purpose electronic devices, the maximum number of NiCd or NiMH battery cells connected in series in the battery pack is 15. On the other hand, the typical output voltage of one Li-ion battery cell is approximately 3.6 V. Accordingly, the maximum number of Li-ion battery cells connected in series in one fictional 18V Li-ion battery pack would be 5.

[0005] Unlike a NiCd battery pack and a NiMH battery pack, the Li-ion battery pack may include functionality to protect against fault conditions inside and outside the Li-ion battery pack. This prevents cells in the Li-ion battery pack from deteriorating and shortening useful life of the pack. For instance, if a fault condition such as short-circuiting occurs inside or outside the Li-ion battery, a fuse may be provided to cut off an over-discharging current or an overcharging current, if the discharging current or charging current becomes larger than a given current level.

[0006] Currently, protection circuits in battery packs such as Li-ion battery packs are designed primarily for low-voltage portable electronic devices such as notebook-type personal computers, cellular phones, etc., which require voltage generally on the order of 2 to 4 volts. Such devices are characterized by using battery packs composed of cells (such as Li-ion, NiCd, NiMH cells) that provide a maximum output voltage of about 4.2 volts/cell. For Li-ion battery cells, care must be taken to prevent damage from electrical and mechanical stresses, since lithium is a highly reactive substance.

[0007] Conventional protection circuits for these low-voltage battery packs may monitor cell voltages to prevent a given cell from over-charging or over-discharging, and may monitor current to keep current from rising too high.

DELTRAN EX1002
IPR2024-01219

Other protection circuits may have one or more temperature inputs to disable current during charge or discharge until the battery pack cools down. Still other protection circuits may be designed to help maintain the balance of charge on the cells, commonly known as equalization circuits. A typical protection circuit may be connected to a given battery cell or group of cells in the battery pack to avoid these situations. For example, a conventional protection circuit may typically include a pair of MOSFET's or other semiconductors that can stop current flow in either direction.

[0008] However, much higher voltages than described above are required for higher-power electronic devices such as cordless power tools. Accordingly, higher-power battery packs may be in the process of being developed for cordless power tools. Such "high-power" battery packs may provide higher voltage outputs than conventional NiCd and NiMH battery packs (and substantially higher power than conventional Li-ion packs used for PCs and cell phones), and at a much reduced weight (as compared to conventional NiCd or NiMH battery packs used as power sources in conventional cordless power tools). A characteristic of these battery packs is that the battery packs may exhibit substantially lower impedance characteristics than conventional NiCd, NiMH and/or even the lower power Li-ion packs.

[0009] Further, as these battery technologies advance, the introduction of lower impedance chemistries and construction styles to develop secondary batteries generating substantially higher output voltages (of at least 18 V and up, for example) may possibly create several additional protection issues. Battery packs having lower impedance also means that the pack can supply substantially higher current to an attached electronic component, such as a power tool. As current through a motor of the attached power tool increases, demagnetization forces (e.g., the number of armature turns of the motor times the current, ampere-turns) could substantially increase beyond a desired or design limit in the motor. Such undesirable demagnetization could thus potentially burn up the motor.

DELTRAN EX1002
IPR2024-01219

[0010] For example, a lower impedance electrical source could cause damage to a tool's motor when the tool is held at stall condition. During motor stall, the motor and battery impedances are the only mechanisms to limit the current since there is no back-EMF created by the motor. With a lower impedance pack, the currents would be higher. Higher currents through the motor will increase the likelihood of de-magnetization of the permanent magnets within the tool's motor.

[0011] Additionally, start-up of the tool could produce excessive starting currents and cause demagnetization of the motor. Thermal overload could also be a result of using a low impedance electrical source in an existing power tool, as the new batteries may be designed to run longer and harder than what the original cordless tool system was designed.

[0012] Accordingly, different protection controls may need to be in place to address potential fault conditions that could occur in high power battery packs that are adapted for use with both existing cordless power tools, and developing lines of power tools that are manufactured for use with these higher power battery packs. In particular, protection controls need to be developed to handle fault conditions such as over-charge, over-discharge, over-current, over-temperature and cell imbalance which could occur in one or more cells of a battery pack (such as a Li-ion or NiCd pack), so as to prevent internal or external damage to the pack, an attached device such as a charger or tool or to a user in the vicinity of a pack connected to a charger or tool.

SUMMARY OF THE INVENTION

[0013] In a cordless power tool system including a battery pack, exemplary embodiments of the present invention are directed to protection methods, protection arrangements and/or devices designed to protect against fault conditions in the battery pack operatively attached to the power tool or charger, so as to prevent internal or external damage to the battery pack or attached tool or charger. The exemplary methods, circuits and devices

DELTRAN EX1002
IPR2024-01219

address fault conditions in the battery pack such as over-charge, over-discharge, over-current, over-temperature, etc.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The exemplary embodiments of the present invention will become more fully understood from the detailed description given herein below and the accompanying drawings, wherein like elements are represented by like reference numerals, which are given by way of illustration only and thus are not limitative of the exemplary embodiments of the present invention.

[0015] FIG. 1 illustrates a partial block diagram of a protection circuit arrangement in accordance with an exemplary embodiment of the present invention.

[0016] FIG. 2 illustrates a partial block diagram of a protection circuit arrangement in accordance with another exemplary embodiment of the present invention.

[0017] FIG. 3A is a block diagram illustrating components and connections between an exemplary battery pack and an exemplary battery charger in accordance with an exemplary embodiment of the present invention.

[0018] FIG. 3B is a block diagram illustrating components and connections between an exemplary battery pack and an exemplary power tool in accordance with an exemplary embodiment of the present invention.

[0019] FIG. 4 is a partial block diagram of connections between a battery pack and charger to illustrate over-charge protection in accordance with an exemplary embodiment of the present invention.

[0020] FIG. 5 is a partial block diagram of connections between a battery pack and charger to illustrate over-charge protection in accordance with another exemplary embodiment of the present invention.

[0021] FIG. 6 is a graph of voltage versus time to illustrate an automatic shutdown for over-discharge protection invoked by a protection circuit in accordance with an exemplary embodiment of the present invention.

DELTRAN EX1002
IPR2024-01219

[0022] FIG. 7 is a graph of voltage versus time to illustrate a modified threshold for over-discharge protection in accordance with an exemplary embodiment of the present invention.

[0023] FIGS. 8A and 8B illustrate exemplary devices used for over-current protection in accordance with an exemplary embodiment of the present invention.

[0024] FIG. 9 illustrates a device providing over-temperature protection in accordance with the exemplary embodiments of the present invention.

[0025] FIG. 10 illustrates a connection arrangement for a thermistor in accordance with an exemplary embodiment of the present invention.

[0026] FIG. 11 is a flow diagram illustrating a method of alerting an operator of a power tool of an impending fault condition in the battery pack.

[0027] FIG. 12 is a block diagram illustrating an exemplary arrangement for determining SOC and varying motor current switching frequency in accordance with an exemplary embodiment of the present invention.

[0028] FIG. 13A is an isometric view of a single laminate battery cell.

[0029] FIGS. 13B and 13C illustrate a device for protecting against an overcharge condition in accordance with an exemplary embodiment of the present invention.

[0030] FIGS. 14A and 14B illustrate a device for protecting against an overcharge condition in accordance with another exemplary embodiment of the present invention.

[0031] FIGS. 15A and 15B illustrate a device for protecting against an overcharge condition in accordance with another exemplary embodiment of the present invention.

[0032] FIGS. 16A and 16B illustrate a device for protecting against an overcharge condition in accordance with another exemplary embodiment of the present invention.

DELTRAN EX1002
IPR2024-01219

[0033] FIGS. 17-19 illustrate exemplary cordless power tools of a cordless power tool system in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0034] With general reference to the drawings, a system of cordless power tools constructed in accordance with the teachings of exemplary embodiments of the present invention is illustrated. Exemplary cordless power tools of the system are shown to include, by way of examples, a circular power saw 10 (FIG. 17), a reciprocating saw 20 (FIG. 18) and a drill 30 (FIG. 19). The tools 10, 20 and 30 each may include a conventional DC motor (not shown) adapted to be powered by a power source having a given nominal voltage rating. In the exemplary embodiments, the tools 10, 20 and 30 may be driven by a removable power source having a nominal voltage rating of at least 18 volts. It will become evident to those skilled that the present invention is not limited to the particular types of tools shown in the drawings nor to specific voltages. In this regard, the teachings of the present invention may be applicable to virtually any type of cordless power tool and any supply voltage.

[0035] With continued reference to the drawings, the removable power source which may be embodied as a battery pack 40. In the exemplary embodiments illustrated, the battery pack may be a rechargeable battery pack 40. Battery pack 40 may include a plurality of battery cells connected in series, and/or a plurality of serially-connected strings of cells, in which the strings are in parallel with one another. For purposes of describing the exemplary embodiments of the present invention, battery pack 40 may be composed of cells having a lithium-ion cell chemistry. As the exemplary embodiments are directed to the cordless power tool environment, which requires power sources having much higher voltage ratings than conventional low voltage devices using Li-ion battery technology, (such as laptop

DELTRAN EX1002
IPR2024-01219

computers and cellular phones) the nominal voltage rating of the battery pack 40 may be at least 18V.

[0036] However, pack 40 may be composed of cells of another lithium-based chemistry, such as lithium metal or lithium polymer, or other chemistry such as nickel cadmium (NiCd), nickel metal hydride (NiMH) and lead-acid, for example, in terms of the chemistry makeup of individual cells, electrodes and electrolyte of the pack 40.

[0037] FIG. 1 illustrates a partial block diagram of a protection circuit arrangement in accordance with an exemplary embodiment of the present invention. FIG. 1 illustrates a portion of a battery circuit and in particular illustrates an individual protection device 102 for each cell 105 of a battery pack such as battery pack 40 in FIGS. 17-19. In FIG. 1, each protection device 102 may be adapted to perform a current limiting function. In an example, the protection devices 102 may be embodied as thermistor devices, where a thermistor device is part of or contained inside the cell.

[0038] A thermistor is a term used to describe a range of electronic components whose principle characteristic is that their electrical resistance changes in response to changes in their temperature, a 'thermally sensitive resistor'. Thermistors may be further classified as 'Positive Temperature Coefficient' devices (PTC devices) or 'Negative Temperature Coefficient' devices (NTC devices). PTC devices are devices whose resistance increases as their temperature increases. NTC devices are devices whose resistance decreases as their temperature increases. NTC thermistors are typically manufactured from proprietary formulations of ceramic materials based on transition metal oxides.

[0039] In FIG. 1, the protection devices 102 may be embodied as PTC devices, which may protect the string of cells from thermal overload. If any cell becomes hot, the PTC device within that cell increases in resistance to limit the current through the entire string. This method of protection of battery

DELTRAN EX1002
IPR2024-01219

cells may have a drawback in that it requires many devices (PTC's in this example) performing a current limiting function as protection device 102.

[0040] FIG. 2 illustrates a partial block diagram of a protection circuit arrangement in accordance with another exemplary embodiment of the present invention. An alternative approach to using multiple protection devices 102 is to include a dedicated protection circuit 210 for each cell that senses one or more battery pack parameter in a pack such as battery pack 40, for example. These parameters include, but are not limited to current, temperature, voltage and impedance through the pack. A protection circuit 210 may be operatively connected to a corresponding driver circuit 220. The level-shifting circuits 220 may be connected to a plurality of AND gates (shown by box 230) to link the protection circuit(s) 210 to a master device 240 which performs a current limiting or current interrupting function. If any protection circuit detects a problem it can change from an output high to an output low state. The AND gates ensure that all protection circuit outputs are high (OK) to turn master device 240 on. Additionally, it is envisioned that the reverse logic could be used with the protection devices output to be normally low and using NOR gates instead. The master device 240 may be embodied as semiconductor device such as a metal-oxide semiconductor field effect transistor (MOSFET), as shown in FIG. 2. Accordingly, if a battery pack has multiple cells 105 in series, then an exemplary configuration envisions a set of protection circuits 210 (apportioned one per cell) connected to and controlling a master device 240 that enables/disables current flow, such as a MOSFET.

[0041] As discussed above, using multiple, dedicated protection circuits 210 may require a corresponding level-shifting circuit 220 that drops the voltage changes from the highest potential cells down to normal levels to switch the master semiconductor device 240, as shown in FIG. 2 for example. If monitoring each cell is excessive, then groups of cells or the entire battery pack may be monitored with a single protection circuit 210 and a single master device 240 for limiting or interrupting current.

DELTRAN EX1002
IPR2024-01219

[0042] FIG. 3A is a block diagram illustrating components and connections between an exemplary battery pack and an exemplary battery charger in accordance with an exemplary embodiment of the present invention. FIG. 3A is merely an exemplary circuit configuration and is provided as a context for more clearly describing the various protection methods, circuits and devices in accordance with the exemplary embodiments.

[0043] Referring to FIG. 3A, battery pack 100 may include a plurality of battery cells 105 connected in series (six shown for simplicity, pack 100 could include more or less than six cells or may be composed of serial strings of cells with the serial strings in parallel with each other). For purposes of describing the exemplary embodiments of battery pack 100 may be composed of cells having a lithium-ion cell chemistry. As the exemplary embodiments are directed to the cordless power tool environment, which requires much higher voltage ratings than conventional devices using Li-ion battery technology, the nominal voltage rating of the battery pack 100 may be at least 18V.

[0044] Thus, battery pack 100 in FIG. 3A (and in FIG. 3B) may be applicable to and/or designed for cordless power tool systems comprising at least a cordless power tool, the battery pack and a charger. Pack 100 may be understood as a removable power source for high-power, power tool operations. In an example, battery pack 100 may have a nominal voltage rating of at least 18 volts and/or have a maximum power output of at least about 385 Watts. However, it should be evident to those skilled in the art that the present invention is not necessarily limited to the particular types of tools shown in FIGS. 17-19 nor to specific voltage ratings and/or power output specifications described above.

[0045] Pack 100 may further be composed of cells of another lithium-based chemistry, such as lithium metal or lithium polymer, or other chemistry such as nickel cadmium (NiCd), nickel metal hydride (NiMH) and lead-acid, for

DELTRAN EX1002
IPR2024-01219

example, in terms of the chemistry makeup of individual cells, electrodes and electrolyte of the pack 100.

[0046] In FIG. 3A, seven terminal (terminals 1-7) are shown. However, the exemplary embodiments should not be limited to this terminal configuration, as more or less terminals could be included depending on the desired information passed between, or parameters monitored by, the pack 100 or charger 150.

[0047] The pack 100 may also include a Pack ID 110 connected to an output terminal (terminal 1) for identification of the pack 100 when inserted into a charger 150. The Pack ID 110 may include the model number, version, cell configuration and the battery type (chemistry), such as lithium-ion, NiCd or NiMH, for example. The Pack ID 110 may be embodied as one or more communication codes received from output terminal 1 of the battery pack 100 by an asynchronous full duplex communication system in the pack 100, such as is described in U.S. Patent No. 5,680,027 to Hiratsuka et al. However, this is only one example, as the pack ID 110 may also be embodied by an ID resistor, LED display that displays identification data of the pack, serial data sent upon engagement and sensed by the tool/charger via terminal 2 for example, and/or a field in an frame of data sent over an air interface to the tool/charger, etc.

[0048] The pack 100 may further include one or more temperature sensors 120. Temperature sensor 120 may be embodied as NTC or PTC thermistors, Temperature sensing Integrated Circuits, or thermocouples. The temperature sensor 120 may communicate the temperature inside the battery pack 100 to intelligence in the battery pack 100 and/or to intelligence in a connected charger 150, for example, via terminal 3. As the function of such temperature sensors are known, a detailed explanation of functional operation is omitted for purposes of brevity. Power connections for charging and discharging are represented as terminals 1 and 7.

DELTRAN EX1002
IPR2024-01219

[0049] A battery electronic control unit 125 may be responsible for the protection of the cells 105 for any fault condition exposed on the terminals by the user (via charger 150, an attached tool, and/or due to user tampering). The battery electronic control unit 125 may be embodied in hardware or software as a digital microcontroller, a microprocessor or an analog circuit, a digital signal processor or by one or more digital ICs such as application specific integrated circuits (ASICs), for example.

[0050] The discharge current and charge current can be clamped or discontinued by the use of semiconductor devices 130a (discharge FET) and 130b (charge FET), under the control of battery electronic control unit 125. The battery electronic control unit 125 may be powered by an internal power supply 135 as shown, and the semiconductor devices 130a and 130b may be linked through a driver circuit 140.

[0051] Battery pack 100 may further include a current sensor 145 which senses current and provides a signal to battery electronic control unit 125. Current sensor 145 may be embodied as known components for current sensors, such as a shunt resistor, current transformer, etc. which may provide a signal representing sensed current in pack 100 to battery electronic control unit 125. Semiconductor devices 130a may include a pull down resistor 147 which acts to bypass the semiconductor device 130a when device 130a is off and the pack 100 is dormant.

[0052] Pack 100 may also include a voltage monitor circuit 115. Voltage monitor circuit 115 may be embodied by any known voltage monitor circuit, for example, and may be configured to sense individual cell voltage and/or sense total pack voltage of the string of cells 105 ('stack voltage') to provide a signal representing the individual cell or stack voltage to battery electronic control unit 125. As a variant, and instead of a single voltage monitor circuit 115 configured to sense both individual cell and total stack voltage, pack 100 could include a voltage monitor circuit as shown in FIG. 3A, comprising a first plurality of voltage monitor circuits (shown generally as 115A) for sensing

DELTRAN EX1002
IPR2024-01219

individual cell voltage and a second voltage monitor circuit 115B for sensing total stack voltage of the cells 110, for example.

[0053] Referring back to FIG. 2, for example, protection circuit 210 may include at least battery electronic control unit 125, current sensor 145, a voltage monitor circuit 115 and temperature sensor 120, and optionally may further include pack ID 110 and an internal power supply such as power supply 135. Driver circuit 140 may be analogous to driver circuit 220 in FIG. 2 and semiconductor devices 130a and 130b may singly or together represent a master device 240 having a current limiting/interrupting functionality under the control of the protection circuit 210.

[0054] Referring to FIG. 3A, during discharge, the battery electronic control unit 125 may output pulse width modulation (PWM) control signals to drive the driver circuit 140. For example, a pulsing semiconductor (pulse width modulator (PWM)) is commonly used in the electronics industry to create an average voltage that is proportional to the duty cycle. PWM is modulation in which the duration of pulses is varied in accordance with some characteristic of the modulating signal. Alternatively pulse frequency modulation could be used to create this average voltage. In either case, the semiconductor devices 130a and 130b (which may be embodied as a discharge FET and charge FET respectively) may be switched between ON and OFF states to create an average voltage that is proportional to the duty cycle at which it is switched.

[0055] During discharge, the driver circuit 140 level shifts the PWM output of battery electronic control unit 125 to drive the gate of semiconductor device 130a, cycling the semiconductor devices 130a on and off depending on sensed conditions. Since the semiconductor device 130b is reverse-biased, the device 130b passes current with only a diode drop in voltage. If the current were at 20 Amps and device 130b had a forward voltage of 0.6 Volts the power loss would be only 12 watts. If lower losses are desired, the battery electronic circuit 125 may output a state to the driver circuit 140 which

DELTRAN EX1002
IPR2024-01219

commands the semiconductor device 130b to remain on during the PWM action on semiconductor device 130a. Now, the power lost into device 130b would be its on resistance time the current squared (I^2R_{ON}). Today's MOSFETs typically have an on-resistance (R_{ON}) of 10 milliohms, so at 20 Amps the power loss would only be 4 watts. The result is a controlled discharge and lower losses through the semiconductor device.

[0056] During charge, the reverse logic can be applied. Semiconductor device 130a is reversed-biased with respect to current flow and even though it conducts in the OFF state, device 130a should remain ON for the least amount of losses. Semiconductor device 130b may control the charge current based on information from the battery electronic control 125 going through the driver circuit 140. The component arrangement that comprises driver circuit 140 is known in the art and is not described herein for reasons of brevity.

[0057] When battery pack 100 is connected to charger 150, a charger electronic control unit 155 in the charger 150 may be powered from the battery's internal power supply 135 through terminals 1 and 6. This is only an exemplary connection scheme, as other means for powering the charger electronic control unit 155 can be employed. The charger 150 could have its own supply or derive it directly from the battery voltage. The charger electronic control unit 155 may also be embodied in hardware or software as a digital microcontroller, microprocessor, analog circuit, digital signal processor, or by one or more digital ICs such as application specific integrated circuits (ASICs), for example. Battery and charger data and control information may be exchanged through serial data paths on terminals 4 and 5. The charger electronic control unit 155 may drive a power controller 160 with a set voltage and a set current to deliver the desired voltage and current from a power source 165 to the battery pack 100 via terminals 1 and 7.

[0058] FIG. 3B is a block diagram illustrating components and connections between an exemplary battery pack and an exemplary power tool in accordance with an exemplary embodiment of the present invention. FIG. 3B

DELTRAN EX1002
IPR2024-01219

is merely an exemplary circuit configuration and is provided as a context for more clearly describing the various protection methods, circuits and devices in accordance with the exemplary embodiments. The battery pack and tool configuration of FIG. 3B may be applicable to the exemplary cordless tool systems, and equivalents, in any of FIGS. 17-19. In FIG. 3B, a 'smart' power tool 170 is illustrated, it being understood that battery pack 100 may be adapted for powering a 'dumb' power tool, i.e., a power tool without an intelligent device or microelectronic component control such as a microprocessor.

[0059] Referring to FIG. 3B, power tool 170 may be powered from the internal battery power supply 135 via terminals 1 and 6. The tool 170 may include a mechanical switch 175 that pulls terminal 7 high when the semiconductor device 130a (discharge FET) is off. If semiconductor device 130a is left off while the battery pack 100 is dormant, the voltage at terminal 7 is low because of the pull down resistor 147. This resistor value should have a substantially high resistance since it acts to bypass the semiconductor device 130a. With this pull down resistor 147 in place and the semiconductor device 130a in the off state, the voltage at terminal 7 remains low until a switch 175 in tool 170 is activated. The result is that power terminal 7 immediately increases in voltage and the signal through power terminal 7 could be used to wake the battery pack 100 from a dormant mode of operation. Tool 170 may include a tool electronic control unit 180. Tool electronic control unit 180 may also be embodied in hardware or software as a digital microcontroller, microprocessor, analog circuit, digital signal processor, or by one or more digital ICs such as application specific integrated circuits (ASICs), for example.

[0060] The tool electronic control unit 180 may be programmable so as to read a trigger position of a trigger 181 and report the trigger position to the battery electronic control unit 125 via serial data paths at terminals 4 and 5. Based on the trigger position data, the battery electronic control unit 125 may

DELTRAN EX1002
IPR2024-01219

vary the PWM duty cycle through semiconductor device 130a to obtain the desired motor speed in tool motor 190. While semiconductor device 130a is off, a diode 195 in the tool 170 may re-circulate residual inductive motor current to prevent voltage spikes from occurring therein. The forward/reversing switch 185 is typical for cordless tools and will not be described here.

[0061] A dumb tool (not shown) may just have a trigger 181 configured as a potentiometer and connected to one of terminals 1, 4 or 5, and to terminal 6. The battery electronic control unit 125 may recognize the lack of serial data communications and perform an analog analysis of the voltage at terminals 4 or 5. Based on the analysis, the battery electronic control unit 125 may send PWM control signals via driver circuit 140 to cause semiconductor device 130a to switch at the desired duty cycle, so as to create an intended motor speed. Even dumber tools could exist as on/off tools. These tools require only the connection to terminals 1 and 7 for operation.

Over-charge Protection

[0062] There are two basic types of battery chargers used for recharging battery packs: trickle chargers and fast chargers. Trickle chargers are significantly less expensive than fast chargers; however a trickle charger requires approximately a 1/2 day for recharging a battery pack. A fast charger can recharge a battery pack within about an hour. An over-charge fault condition may occur because of some fault condition or system failure in either the charger or battery pack. Typically, a protection circuit in the battery pack can detect an over-charge fault condition by monitoring voltage across the battery pack. During charge, the voltage reaches a particular threshold. The charger thus considers the battery pack 'fully charged' and the charge current is terminated. If the charger was locked-on due to a component failure, it is desirable for the battery pack to be able to disable the charging current with its own semiconductor device, such as charge FET

DELTRAN EX1002
IPR2024-01219

(semiconductor device 130b) under the control of battery electronic control unit 125.

[0063] Over-charge control may be provided by use of a charge lock-on detection circuit (also known as a 'hardware watchdog circuit') between the battery pack and the charger. In general, if the charger locked-on and pulsing data (e.g., a clock provided from pack to charger via a suitable serial data path) stopped, then the hardware watchdog may automatically turn off the current flow.

[0064] A conventional hardware watchdog circuit is typically located in the charger. This circuit monitors the charge current and looks for a 10ms current off reset pulse in the charging current. In a typical charging scenario, a microprocessor in the charger (such as charger electronic control unit 155) may generate this reset pulse using the charge control line I_{CTRL}. In an abnormal situation (e.g., the charger microprocessor has locked the current solid on or the charger power supply has locked the current solid on), the hardware watchdog circuit would timeout and turn the charge current off using a charge FET. However, in the conventional arrangement, it is still possible to overcharge the battery pack if the microprocessor in the charger were to continually generate the reset pulse without ever terminating the fast charge (due to improper microprocessor behavior, for example).

[0065] FIG. 4 is a partial block diagram of connections between a battery pack and charger to illustrate over-charge protection in accordance with an exemplary embodiment of the present invention. In FIG. 4 seven terminals and six battery cells are shown for convenience, it being understood that more or less terminals and battery cells could be illustrated in the exemplary embodiment.

[0066] In FIG. 4, battery pack 100 includes at least a battery electronic control unit 125, semiconductor device 130b (such as charge control FET) and temperature sensor 120. The temperature sensor 120 may be embodied as an internal NTC thermistor, for example. The charger 150 may include at

DELTRAN EX1002
IPR2024-01219

least charger electronic control circuit 155, a charge FET 157 and a hardware watchdog circuit 158.

[0067] The battery electronic control unit 125 may receive a battery temperature value from the internal NTC thermistor and may communicate this information via serial data paths at terminals 3 and/or 4 to the charger electronic control unit 155. In the event of an extreme battery temperature due to an overcharge condition, the charge current may be terminated by the battery electronic control circuit 125 sending a PWM control signal or pulse, via driver circuit 140, to turn semiconductor device 130b off. Alternatively, this control signal may be sent via serial data paths at terminals 3 and/or 4 to charger electronic control circuit 155 to turn off the charge FET 157 in the charger 150. However, it may still be possible to overcharge the battery pack 100 in the event of a two-point failure – a shorted semiconductor device 130b (charge control FET) in the battery pack 100 and improper unit behavior in one of the battery electronic control unit 125 or charger electronic control unit 155.

[0068] The dotted arrowhead lines in FIG. 4 show a hardware watchdog circuit 158 (hereafter watchdog 158) having multiple reset inputs. In addition to monitoring the charge current reset pulse, watchdog 158 also monitors the serial communications clock path (through terminal 3) as a reset pulse. If any of these reset pulses did not occur, the watchdog would timeout and turn the charge current off. It may still be possible to overcharge the battery pack 100 in the event of a 2 point failure–a shorted charge control FET (e.g., device 130b) in the battery pack 100 and improper unit behavior in one of the battery electronic control unit 125 or charger electronic control unit 155.

[0069] In addition to monitoring the charge current reset pulse, watchdog 158 also monitors the pack temperature at temperature sensor 120 (such as an NTC thermistor) directly to sense an overcharge condition. In FIG. 4, a shorted battery charge control FET (semiconductor device 130b) and any failures in the battery electronic control unit 125 or charger electronic control

DELTRAN EX1002
IPR2024-01219

unit 155 would not affect the watchdog's 158 ability to monitor the pack temperature for sensing and terminating an overcharge condition.

[0070] In addition to monitoring the charge current reset pulse, watchdog 158 could also monitor the individual cell voltages using circuits 415A and terminal 6 to sense an over voltage condition which would indicate an overcharge condition. In FIG. 4, a shorted battery charge control FET (semiconductor device 130b) and any failures in the battery electronic control unit 125 or charger electronic control unit 155 would not affect the watchdog's 158 ability to monitor the individual cell voltages for sensing and terminating an overcharge condition.

[0071] In addition to controlling the hardware watchdog, the voltage monitor circuits 415A used for monitoring the individual cell voltages could also directly control the charge FET 130b in the battery pack 100 through the driver circuit140 and/or directly control the charge FET in the charger (157) through the AND logic (151) and terminal 6. This is shown by the dotted lines between voltage monitor circuits 415A and driver circuit 140. This control would allow circuits 415A to stop an overcharge condition due to overvoltage of the individual cells.

[0072] In addition to monitoring the charge current reset pulse, watchdog 158 could also monitor the battery stack voltage using voltage monitor circuit 415B and terminal 7 to sense an overvoltage condition which would indicate an overcharge condition. In FIG. 4, a shorted battery charge control FET (semiconductor device 130b) and any failures in the battery electronic control unit 125 or charger electronic control unit 155 would not affect the watchdog's 158 ability to monitor the battery stack voltage for sensing and terminating an overcharge condition.

[0073] In addition to controlling the hardware watchdog, voltage monitor circuit 415B used for monitoring the battery stack voltage could also directly control the charge FET in the battery (130b) (see optional dotted line 425) through the driver circuit (140) and/or directly control the charge FET in the

DELTRAN EX1002
IPR2024-01219

charger (157) through the AND logic (151) and terminal (7). This control would allow voltage monitor circuit 415B to stop an overcharge condition due to overvoltage of the entire battery stack voltage.

[0074] FIG. 5 is a partial block diagram of connections between a battery pack and charger of a cordless power tool system to illustrate over-charge protection in accordance with another exemplary embodiment of the present invention. FIG. 5 omits the voltage monitor circuits 415A and 415B for purposes of clarity, it being understood that both individual cell voltage and total stack voltage could be inputs to a hardware watchdog circuit 158' in FIG. 5, similar to as shown in FIG. 4.

[0075] FIG. 5 is a hybrid of FIG. 4 to illustrate a watchdog 158' with multiple inputs. Watchdog 158' monitors the charge reset pulse, clock reset pulse, and the NTC signal, cell voltage, and/or battery stack voltage in order to sense a charge lock-on condition. The charge current could still be shut off even with a shorted charge control FET 130b in the battery and improper unit behavior in one of the battery electronic control unit 125 or charger electronic control unit 155, and may reduce the number of terminals needed by sharing the NTC output terminal with the clock terminal. Accordingly, the exemplary hardware watchdog circuit(s) in FIGS. 4 and 5 may prevent battery overcharging by monitoring the condition of both the battery pack 100 and charger 150. Overcharge prevention remains available even in the event of a two-point failure such as a shorted battery charge FET and improper microprocessor behavior in one (or both) of the battery pack 100 and charger 150.

[0076] Determination of an over-charge fault condition can also be done by other means. If an accurate current measurement is made by a current sensor in the battery pack (such as current sensor 145) during discharge, then a coulomb measurement could be made by the battery electronic control unit 125 to put back in the amount of energy taken out. This could be used in conjunction with or without the voltage measurement that may be made by a

DELTRAN EX1002
IPR2024-01219

protection circuit 210 in the battery pack 100 to detect an over-charge fault condition.

Over-Discharge Protection

[0077] Various battery technologies can be damaged when discharged in excess of the manufacturer's recommendations. In accordance with the exemplary embodiments, the battery pack 100, such as is shown above in FIGS. 3A or 3B, may include circuitry to prevent current flow when the battery voltage drops below a given voltage threshold, hence under-voltage lockout. A protection circuit 210 in the battery pack can sense battery voltage and if the voltage drops below a given voltage level, the discharge FET (semiconductor device 130a) is turned off. Battery cells 105 would still be susceptible to charge, but would not discharge any more. The threshold may be an absolute threshold set at time of manufacture, for example, or a threshold that may vary based on a number of given factors.

[0078] FIG. 6 is a graph of voltage versus time to illustrate an automatic shutdown invoked by a protection circuit in accordance with an exemplary embodiment of the present invention. To protect against an over-discharge fault condition in a battery pack of a cordless power tool system, an exemplary protection circuit 210 (such as shown in FIG. 2) and/or the battery electronic control 125 in FIGS. 3A-5, could perform an automatic shutdown of current in pack 100 if the voltage reached a given threshold.

[0079] An improvement to the aforementioned voltage threshold may be to combine the threshold with a proportion of discharge current to compensate for the impedance of the battery pack 100. Basing the threshold on an absolute level and subtracting a portion of the instant current may provide an alternative method for under-voltage lockout.

[0080] FIG. 7 is a graph of voltage versus time to illustrate a modified threshold for over-discharge protection in accordance with an exemplary embodiment of the present invention. For the purposes of describing FIG. 7, the protection current 210 of FIG. 2 or the battery electronic control 125 could

DELTRAN EX1002
IPR2024-01219

be configured to make the following calculations and/or perform the automatic shutdown. FIG. 7 shows an example of a battery pack at 10% state-of-charge. By adding in a proportion of discharge current to compensate for the impedance of the battery pack 100, the battery pack 100 is still above a given discharge threshold of 2.7 volts.

[0081] For example, if a 10 amp pulse load is placed on the battery pack 100, the battery impedance would cause the voltage to jump below the threshold momentarily and return to its resting value when the current pulse is removed. Even though the battery pack 100 had 10% of charge left, a protection current would have interrupted current flow. However, if the low-voltage threshold was partially compensated with current as described in the previous paragraph, the threshold would be dropped during the heavy current draw and no shutdown would occur. In other words, the low-voltage threshold may be varied by subtracting a portion of the instantaneous discharge current to compensate for pack impedance so as to avoid an unwanted automatic shutdown.

[0082] Once the impedance of the pack is known, then the portion of the low-voltage threshold related to current can be calculated. Additional battery factors that may influence the low voltage threshold may include battery temperature, battery age, rate of decrease in battery voltage, etc.

Over-current Protection

[0083] FIGS. 8A and 8B illustrate exemplary devices that may be used in the battery pack for over-current protection in accordance with an exemplary embodiment of the present invention. FIGS. 8A and 8B illustrate only a portion of a battery pack circuit for reasons of brevity. However, the devices in FIGS. 8A and 8B could be part of the battery pack 100 as shown in any of FIGS. 3A-5. Another mechanism that can cause cell damage is over-current. Various electronic switching methods may have a drawback, in that electronic switches are prone to failing in a short circuit condition. When this happens, an operator overload the motor of the attached tool. For battery pack circuit

DELTRAN EX1002
IPR2024-01219

designs that include separate impedance branches, a device such as a fuse or fusible link could be used to limit the maximum current through that circuit branch.

[0084] Fuses generally are not designed to provide overload protection, as a fuse's basic function is to protect against short circuits. However, a dual-element (two-element) fuse or time delay fuse may provide secondary motor overload protection, although when blown must be replaced, as these fuses are nonrenewable. Accordingly, such a fuse could represent a secondary failure and be intended to prevent further operation, for example.

[0085] Thus, a simple fuse as shown in FIG. 8A may be designed to limit the current through the cells 105, but may also cause permanent damage once its rating is exceeded. Other devices such as Positive Temperature Coefficient (PTC) elements and re-settable fuses may be substituted for the fuse in FIG. 8A for over-current protection. As discussed above, PTC devices or elements are known as protective elements for controlling the current which flows through circuits to be protected, since their resistance value increases as they give off heat in over-current conditions. For example, PTC thermistors have been used as an over-current protection element. When an electronic circuit gets overloaded, conductive polymers of a PTC thermistor, which have PTC properties, emit heat and thermally expand to become high resistance, thereby reducing the current in the circuit to a safe, relatively small current level.

[0086] Accordingly, if a PTC device such as described above is connected in series with the battery, the total pack impedance would increase with increasing current. If substantially low impedance is needed and no commercially available single PTC device can offer the desired low impedance and/or current capability, then multiple PTC's could be connected in parallel with each other to share the current, as shown in FIG. 8B, for example.

DELTRAN EX1002
IPR2024-01219

[0087] If separate charge and discharge paths or branches are envisioned in the battery pack, then a thermal fuse such as a PTC element could be placed on each current path. This would be beneficial in that the charge path would use a low current device and the discharge path would use a high current device.

[0088] Proximity placement of a fuse nearer the terminals also may provide an added benefit of isolating the downstream branch of electrical devices from a non-isolated charger. If a battery pack 100 were to melt sufficiently to expose the cells 105 and electronics, the fuses (which would have blown) near the terminals would provide a disconnect of the exposed metal from the non-isolated charger output, hence electric isolation to possible preserve electrical components in an attached charger (or tool). Thus, positioning the fuse (or PTC element) in FIG. 8A nearer the terminal may provide additional over-current protection in pack 100.

[0089] Using current sensing measures (such as current sensor 145 of FIGS. 3A and 3B) and a semiconductor device (such as semiconductor devices 130a and 130b) to stop current flow once an over-current threshold is reached may be a desirable method of preventing cell-damage. For example, current sensor 145 may be adapted to sense pack current to generate a control signal based on sensed current exceeding a given current limit or threshold. A semiconductor device having a current limiting or current interrupting function (e.g., semiconductor devices 130a and 130b) may be directly connected to the current sensor 145. The semiconductor device may be adapted to limit or interrupt current based on the control signal received directly from the current sensor 145 instead of from battery electronic control 125 via driver 140.

[0090] Current sensing could also be coupled with an averaging algorithm if momentarily high current loads were acceptable but steady state high current was not acceptable. A suitable current limit or threshold could also be variable, and proportional, to the temperature of the cells. This may be

DELTRAN EX1002
IPR2024-01219

beneficial in that, if the cells were already hot, the maximum current pulled out would not be sufficient to overheat the internal cell chemistry.

Over-temperature protection

[0091] Some batteries may also be damaged by extreme temperatures (extreme high or low temperatures) or have reduced performance (i.e., reduced voltage and/or current output) due to extreme temperatures. This is particularly relevant to battery packs having a Li-ion cell chemistry. A battery temperature threshold may be set to shutdown the battery pack until it cools below a desired or given temperature. Likewise, a battery temperature threshold may be set to shutdown the battery pack until it rises above a desired or given temperature. These thresholds can also be based on a set limit with a partial dependence on current, voltage, age, and rate of rise or fall in temperature, for example. As discussed above, one or more temperature sensors may be used for determining the state of the battery pack temperature.

[0092] FIG. 9 illustrates a device providing over-temperature protection in accordance with the exemplary embodiments of the present invention. An over-temperature fault condition in a battery cell may cause permanent damage. Thus, a protection circuit configured to monitor absolute temperature may be useful in preventing over-temperature conditions. FIG. 9 illustrates only a portion of a battery pack circuit for reasons of brevity. However, the devices in FIG. 9 could be part of the battery pack 100 as shown in any of FIGS. 3A-5.

[0093] As shown in FIG. 9, the protection device 210 may be embodied as a thermal switch 910 that opens high current contacts 920. These contacts may be located within the circuit to stop any current flow in or out of the pack 100 until the temperature drops to an acceptable level. These devices may be typically set to trip at a pre-determined temperature and are usually found in coffee makers, for example. Once the water in a coffee maker is boiled off the heating element temperature rises above 212°F. The temperature switch

DELTRAN EX1002
IPR2024-01219

senses this and breaks the temperature controlled switch. When the pack (or a cell) temperature gets too hot, the charge and /or discharge function in pack 100 is disabled.

[0094] Alternatively, a thermally controlled release mechanism could 'pop' the battery pack 100 out of the tool 170 or charger 150 and prevent re-insertion, until the pack 100 has cooled off. This device could be similar to a "pop-up timer" aimed at a latch mechanism which restrains an ejection device within pack 100, as will be seen in further detail below. Another device for protecting against an over-temperature fault condition is the use of a thermistor. A thermistor may be utilized in the battery pack 100 to monitor temperature conditions while maintaining full electrical isolation of the thermistor from the battery cells 105.

[0095] Currently, manufacturers typically may include a thermistor in battery packs to monitor the temperature of the core pack and to terminate charge in the event of an over temperature condition. These thermistors have a connection arrangement in which one end is connected to a terminal going out to the charger 150, and the other end is referenced to ground by tying to the negative terminal lead in the battery pack.

[0096] For high power battery packs adapted for use with both existing cordless power tools, and developing lines of power tools that are manufactured for use with these high power battery packs, such as Li-ion battery packs, this above connection arrangement may be problematic, since the connection arrangement creates the potential for a charge path through the thermistor. If a small amount of current were passed through the thermistor, the battery pack could potentially be charged outside the protection controls and circuitry provided in the pack 100 and charger 150. This could potentially lead to an inadvertent overcharging of the pack 100, a potentially hazardous condition.

[0097] FIG. 10 illustrates a connection arrangement for a thermistor in accordance with an exemplary embodiment of the present invention. In FIG.

DELTRAN EX1002
IPR2024-01219

10, only the positive and negative terminals of the pack 100 are shown for clarity. FIG. 10 illustrates only a portion of a battery pack circuit for reasons of brevity. However, the thermistor in FIG. 10 could be part of the battery pack 100 as shown in any of FIGS. 3A-5. The two leads of the thermistor (Th+ and Th-) may be brought out of the pack on independent terminals 2 and 3. These terminals may interface to temperature monitoring circuitry inside of the charger 150, for example, such as temperature monitoring circuitry of the charger electronic control unit 155 (not shown in FIG. 10 for clarity). This may allow monitoring of pack 100 temperature while keeping the thermistor completely isolated from the charge path in the pack 100. By doing this, there is no charge path through the thermistor and no potential to overcharge the battery pack 100 through the thermistor.

Audible/Visual Warning Mechanisms

[0098] Before shutting down the battery power, it may be desirable that some kind of warning be provided to the operator of a cordless tool powered by the attached battery pack. Similar to a scenario when a fault condition occurs, or is in the process of occurring, in an owner's car, the owner may be given a warning light on the dashboard for a given duration of time before the engine breaks down because of the fault condition (i.e., piston damage due to a lack of oil).

[0099] Both under-voltage and temperature limitations can be used as a cut-off, i.e., the battery pack 100 ceases to output current once a threshold is reached. However, before such a fault condition occurs (such as an under-voltage or over temperature threshold) is reached, a warning mechanism in either the battery pack or tool may warn the operator that the operator is approaching an impending operating limit in the pack that may automatically shutdown battery power in the pack. The warning mechanism could be audible (with a horn or buzzer) or visible using a desired illumination scheme such as LEDs, for example.

DELTRAN EX1002
IPR2024-01219

[00100] The audible and/or visible warning mechanism may be tied into the existing circuitry in the pack 100 or tool 170. As discussed above, the battery pack 100, tool 170 or charger 150 in any of FIGS. 3A through 5 and may be controlled by intelligence in the pack, tool, charger, etc. Such intelligence as battery electronic control 125 or tool electronic control 180 could be configured to control warning mechanisms for various impending or present fault conditions. As an example, a separate audible or visual warning may be provided to alert the tool operator of an over-discharge condition in the battery pack 100, an over-current condition in the battery pack 100, and over-temperature condition in the pack 100 or in the motor 190 of the attached tool 170, and/or an under-voltage condition in the battery pack 100 due to an excessive amount of current being drawn from the battery pack 100.

[00101] As discussed above, the warning mechanism before an impending automatic battery power shutdown is reached could be embodied in many different forms. The aforementioned audible warnings such as horns, buzzers, and speaker sounds might be acceptable in some working environments, but may not be heard by the tool operator in loud environments. Visual cues such as specified illumination(s) and gauges may also be missed by the tool operator in extremely dark or substantially bright work areas.

[00102] An alternative warning mechanism to alert the tool operator may be embodied in the motor control of the tool motor. In general, an electronic circuit in one of the tool or battery pack could reduce the maximum power output capability of the battery pack and produce a "fold back" condition. The operator would both hear and feel this condition as a 'weakening' of the tool performance. The operator would be prompted to back off and avoid an impending fault condition (e.g., under-voltage, over-temperature, under-temperature condition, etc.).

[00103] An additional method for alerting the user of an impending fault condition would be to vary the motor control's pulse width modulation (PWM)

DELTRAN EX1002
IPR2024-01219

to create a "warble" effect in the speed of the motor. This mild cyclic change in motor speed is selected as such it would not adversely affect tool performance. This method provides the user with both audible and tactile feedback on the impending fault condition.

[00104] A third method for alerting the user of an impending fault condition would be to lower the PWM frequency into the audible frequency range and vary the pitch in a periodic fashion. This will present an efficient warning mechanism to get the operator's attention. At the very least, the warning mechanism gives the operator a sense of warning that they may be able to finish the current job, but may not be able to move on to another job before resting or recharging the battery pack to eliminate or overcome the impending fault condition.

[00105] Any of the above warning mechanisms, either singly or in combination with one or more of the above warning mechanisms, could potentially enhance the tool functionality or extend tool and/or battery pack life. The following details the latter warning mechanism as directed to providing the aforementioned warbling effect in the motor of the power tool based on a state of charge in the battery pack.

PWM State of Charge (SOC) Indicator

[00106] The purpose of the PWM State of Charge (SOC) Indicator is to alert the operator of an impending fault condition which could cause automatic battery power shutdown, resulting in a 'dead' battery pack. This may be accomplished by directly determining SOC information in a motor control unit that is part of the battery pack circuitry. Based on the SOC information, a motor control unit in the battery pack would vary the motor current switching frequency to produce the 'warbling effect' in the tool motor that may be heard and/or physically felt by the tool operator.

[00107] FIG. 11 is a flow diagram illustrating a method of alerting an operator of a power tool of an impending fault condition in the battery pack. Referring to FIG. 11, a motor control unit (not shown) in the battery pack may measure

DELTRAN EX1002
IPR2024-01219

various battery pack parameters to determine state of charge (SOC) information in the battery pack at a given time instant (S1110). The motor control unit may be embodied in hardware or software as a digital microcontroller or microprocessor or an analog circuit, for example, and/or by a digital IC such as a digital signal processor or an application specific integrated circuit (ASIC). Based on the SOC information, the motor control unit determines a desired motor current switching frequency (S1120) which is imparted to the tool motor to produce the warbling effect (S1130) to alert the operator.

[00108] There are a number of ways to evaluate, track and determine the SOC of the battery pack. For example, battery pack parameters measured by the motor control unit to determine the SOC information may include battery pack voltage, Coulomb count (Ah_{in} - Ah_{out}), total battery pack 100 impedance, etc. The motor control unit would then decide on a motor current switching frequency based on the SOC information.

[00109] The motor current switching frequency for the tool 170 motor could be manipulated in a number of ways to alert the user. Accordingly, adjusting the motor current switching frequency enables the motor of the tool to communicate to the tool operator. A switching frequency could be selected in the audible frequency range, so that the motor would make a noise that is perceptible by the operator. Exemplary audible frequencies could be a constant frequency tone emitted by the tool motor, a varying frequency ring tone, a complex series of multiple frequency tones to mimic a 'voice' speaking to the tool operator, for example. Additionally, the motor control unit could pulse the motor so as to make the tool physically shutter or vibrate in a way that would let the operator know that the battery packing was running out of charge, for example, or approaching a fault condition requiring attention.

[00110] Methods of pulse-width-modulating the motor to alert the operator of an impending fault condition such as a low SOC condition could also be used to communicate other fault conditions. For example, motor current switching

DELTRAN EX1002
IPR2024-01219

frequency could be adjusted to alert the tool operator based on sensed information related to an over temperature condition in the battery pack, over temperature condition in the tool motor, over-current condition in the pack and/or under-voltage condition due to an excessive amount of current being drawn from the battery pack. Current, temperature and voltage are merely exemplary measurable parameters that could be tracked for a given fault condition.

[00111] FIG. 12 is a block diagram illustrating an exemplary arrangement for determining SOC and varying motor current switching frequency in accordance with an exemplary embodiment of the present invention. FIG. 12 shows a circuit interface relationship between battery pack 100' and tool 170' somewhat similar to FIG. 3B, although only certain components are shown for reasons of clarity.

[00112] Referring to FIG. 12, IC1, R1, and Q1 contribute to protection circuitry and cell balancing functionality, as discussed above in reference to several of the other figures. IC1 could represent the battery pack electronic control unit 125, for example, in FIGS. 3A and 3B. DATA3 and DATA4 represent serial data paths to carry serial data between IC1 and IC2; IC2 in FIG. 12 may represent the motor control unit. For example, DATA3 could be dedicated to passing data and control signals between IC1 and IC2, and DATA4 for sending a clock to synchronize IC1 with IC2 or vice versa.

[00113] The element REG is a voltage regulator that supplies VCC to digital devices IC2 and IC3. In FIG. 14, IC3 may represent a tool electronic control unit 180 as described in FIG. 3B for example, with DATA1 and DATA2 representing serial data paths for communication of data and control signals between IC3 and IC2. SW1 represents the tool switch to pull current from the battery pack to power motor M1. Resistor R6 and potentiometer R7 make up a variable speed input for the tool. Each of IC1, IC2 and IC3 may be embodied in hardware or software as a digital microcontroller or

DELTRAN EX1002
IPR2024-01219

microprocessor or an analog circuit, for example, and/or by a digital IC such as a digital signal processor or an application specific integrated circuit (ASIC)

[00114] Motor control unit IC2 drives the gates of Q5 and Q6 (which may be embodied as MOSFETs) in order to regulate output voltage of the battery pack and thereby control motor current that powers the motor M1 of the tool. IC2 may measure one of more battery pack parameters to determine SOC. For example, IC2 could monitor battery pack output voltage across nodes N1 and N2, or perform Coulomb counting by monitoring current at shunt resistor R5 and keeping track of time (via suitable internal clock). Further, IC2 could also monitor pack impedance by subtracting loaded battery pack output voltage (when current is flowing) from unloaded pack voltage (recorded before current draw) and dividing the result by the current measurement taken at R5. Any of these measurable parameters could serve as a SOC measure. IC2 would then use this SOC information to determine the appropriate switching frequency, and control Q5 and Q6 to achieve that switching frequency.

Redundancy

[00115] The features described above are designed to prevent damage to the battery cells from heavy use or failing components in any part of the control system in the pack 100, charger 150 or tool 170. By adding a secondary form of redundancy, the cells may be less likely to experience cell damage. For example, in FIG. 12, the charger 150 and the tool 170 could also monitor battery temperature and current through external terminals or communications. Battery voltage may also be monitored during charge by the charger 150. It could also be checked by the tool during discharge.

[00116] FIGS. 13-16, in general, illustrate various devices for providing overcharge protection in extreme cases. In the event that an overcharge condition fails to be addressed by the above described watchdog circuit of FIGS. 4 and 5, other current sensory devices, and/or an intelligent device microprocessor in one or more of the battery pack 100 or charger 150 fails

DELTRAN EX1002
IPR2024-01219

(multi-point failures in pack or charger), FIGS. 13-16 illustrate potential secondary protection for the battery pack 100 and/or charger 150.

[00117] FIG. 13A is an isometric view of a single laminate battery cell, in which cell 1305 (analogous to cell 105 in any of FIGS. 3A-5) has a tab 1303 (also known as a connector) for connection to an adjacent serially connected cell. FIGS. 13B and 13C illustrate a device for protecting against an overcharge condition in accordance with an exemplary embodiment of the present invention.

[00118] FIGS. 13B and 13C illustrate a device which may reduce the potential for battery cells having a lithium-ion cell chemistry (or other cell chemistries) from rupturing upon a severe overcharge condition that is unattended by other protection circuitry in the pack. In general, during an overcharge event, the laminated lithium-ion battery cells 1305 may exhibit extensive swelling. If the overcharge continues, this may result in a rupture of one or more of the cells 1305. This rupture may result in fire and potentially severe damage to the battery pack 100 attached electrical device (charger 150, tool 170) and/or user of the battery pack 100.

[00119] Accordingly, a battery pack may be designed to take advantage of this swelling phenomenon. FIG. 13B a side view of a steady-state or normal condition in the battery pack, and illustrates tab welds 1306 or similar connections to serially connect the tabs 1303 of adjacent cells 1305 between positive and negative power terminals of the battery pack 100. As shown in FIG. 13C, swelling of one or more given cells 1305 in the battery pack 100 may help to prevent a severe overcharge condition from occurring. The swelling cell(s)1305 creates a tension pressure against its tab 1303, such that two tabs 1303 may separate at a tab weld 1306. In this example, the an opening 1308 is formed in the circuit, thus removing or interrupting charge current to the cells 1305. Thus, as a cell 1305 expands, it pulls the tab connector 1303 away from an adjacent tab 1303 at the tab weld 1306 to break

DELTRAN EX1002
IPR2024-01219

the electrical connection between cells 1305, interrupting current flow in the battery pack 100.

[00120] FIGS. 14A and 14B illustrate a device for protecting against an overcharge condition in accordance with another exemplary embodiment of the present invention. FIG. 14A illustrates a side view of normal or steady state conditions in pack 100 to illustrate another exemplary protection arrangement. In FIG. 14A, the cells 1305 may be serially arranged within a battery housing (shown generally as housing sidewall 1401a and housing sidewall 1401b, which may include an intermediate housing wall 1401c, for example. A plunger 1408 may be provided between the serially connected cells 1305 and the intermediate housing wall 1401c so as to protrude into a recess 1409 through the walls 1401b, 1401c. In an example, the plunger may be restrained via a counter force provided by spring 1410, so that there is a channel 1404 formed between housing sidewall 1401b and intermediate housing wall 1401c. A lead wire (here shown as a positive terminal wire or circuit trace), may extend through the channel 1404.

[00121] Referring now to FIG. 14B, showing one cell 1305 in an overcharged state. As the cell 1305 expands, the expansion force from the cell assists the plunger 1408 in overcoming the counterforce spring pressure from spring 1410. Thus, plunger 1408 travels into recess 1409 to sever lead wire 1405 as shown generally at 1415, thereby interrupting charge current to the cells 1405 of the battery pack. Note also that the swelling cell 1305 also causes the tabs 1303 to come apart as shown generally at 1308, providing further redundancy to sever or break the electrical connections internal to the battery pack. These protective features may thus prevent rupture of one or more cells in the pack 100 by interrupting the current flow.

[00122] FIGS. 15A and 15B illustrate a device for protecting against an overcharge condition in accordance with another exemplary embodiment of the present invention. FIGS. 15A and 15B illustrate a plunger designed so as to eject a battery pack from a charger.

DELTRAN EX1002
IPR2024-01219

[00123] FIG. 15A is similar to FIG. 14A, thus only differences are discussed for reasons of brevity. As shown in FIG. 15A, in steady state or normal operations, plunger 1408 is biased against a counterforce spring pressure of spring 1410, such that the plunger 1408 rests against a charger housing sidewall 1501. Charger housing sidewall 1501 abuts sidewall 1401b of pack 100. Lead wire 1405 of the pack and a charger lead wire 1505 are operatively connected at contacts 1410,1510.

[00124] Referring now to FIG. 15B, as a cell 1305 expands, plunger 1408 overcomes spring 1410 pressure which causes the plunger 1408 to self-eject the pack 100 from the charger, see gap 1508 between cell housing sidewall 1501 and pack sidewall 1401b. This action breaks contacts 1410 and 1510. Accordingly, upon a severe overcharge condition, the swelling of the pack in combination with the placement of the plunger 1408 interrupts charging current and prevents rupture of the pack by ejecting the pack from the charger. Note also that the swelling cell 1305 also causes the tabs 1303 to come apart as shown generally at 1308, providing further redundancy to sever or break the electrical connections internal to the battery pack. These protective features may thus prevent rupture of one or more cells in the pack 100 by interrupting the current flow.

[00125] FIGS. 16A and 16B illustrate a device for protecting against an overcharge condition in accordance with another exemplary embodiment of the present invention. FIGS. 16A-B are similar in some respects to FIGS. 14A-14B, thus the differences are described for purposes of brevity.

[00126] In FIG. 16A, the charger lead wire or trace 1505 is connected to pack lead wire at contacts 1405,1505. Unlike in FIG. 14A, charger lead wire 1505 abuts an inside surface a charger housing sidewall 1501. Plunger 1408 and spring 1410 are as described in FIG. 14A. Referring now to FIG. 16B, showing one cell 1305 in an overcharged state. As the cell 1305 expands, the expansion force from the cell assists the plunger 1408 in overcoming the counterforce spring pressure from spring 1410. Thus, plunger 1408 travels

DELTRAN EX1002
IPR2024-01219

into recess 1409 to sever charger lead wire 1505 as shown generally at 1615, thereby interrupting charge current to the cells 1405 of the battery pack. Note also that the swelling cell 1305 also causes the tabs 1303 to come apart as shown generally at 1308, providing further redundancy to sever or break the electrical connections internal to the battery pack. These protective features may thus prevent rupture of one or more cells in the pack 100 by interrupting the current flow.

[00127] The exemplary embodiments of the present invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as departure from the spirit and scope of the exemplary embodiments of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

DELTRAN EX1002
IPR2024-01219

What is claimed is:

1. A protection arrangement within a battery pack for protecting against a fault condition in the battery pack, the battery pack adapted to power a cordless power tool and including a plurality of battery cells, comprising:

a plurality of distinct protection devices, each cell having a corresponding protection device adapted to perform a current limiting function.

2. The arrangement of claim 1, wherein each protection device is embodied as a thermistor.

3. The arrangement of claim 1, wherein

the cells are serially connected to form a string of cells, and

each protection device is embodied as a positive temperature coefficient (PTC) that increases in resistance to limit the current through the entire string, when its corresponding cell reaches a fault condition.

4. The arrangement of claim 1, wherein the battery pack is a lithium-ion battery pack.

5. The arrangement of claim 4, wherein the lithium-ion battery pack has a nominal voltage rating of at least 18 volts.

6. A battery pack adapted to power a cordless power tool and including a plurality of serially-connected battery cells, the battery pack including a protection arrangement adapted to limit or interrupt current in the battery pack upon a fault condition that is sensed in the battery pack.

DELTRAN EX1002
IPR2024-01219

7. The battery pack of claim 6, the arrangement further comprising:

at least one protection circuit sensing a given battery parameter to determine the fault condition in one or more of the cells and to generate a control signal based on an indication of a fault condition; and

a master device having a current limiting or current interrupting function adapted to limit or interrupt current based on the control signal received from the protection circuit.

8. The battery pack of claim 6, the arrangement further comprising:

a temperature sensor for sensing pack temperature to generate a first signal;

a current sensor for sensing pack current to generate a second signal; and

a battery control circuit adapted to receive said first and second signals to determine a fault condition in the battery pack and generate a control signal.

9. The battery pack of claim 8, wherein

the battery electronic control unit sends the control signal to a semiconductor device operatively connected thereto, and

the semiconductor device has a current limiting or current interrupting function to limit or interrupt current based on the control signal.

10. The battery pack of claim 6, the arrangement further comprising:

a current sensor for sensing pack current to generate a control signal based on a sensed over-current fault condition; and

a semiconductor device having a current limiting or current interrupting function and operatively connected to the current sensor, the semiconductor device adapted to limit or interrupt current based on the control signal received from the current sensor.

DELTRAN EX1002
IPR2024-01219

11. The battery pack of claim 10, wherein the over-current fault condition exists if the sensed pack current exceeds a given threshold.

12. The battery pack of claim 11, wherein the current threshold is based on temperature of the cells.

13. The battery pack of claim 6, the arrangement further comprising:

a battery control circuit configured to monitor battery voltage, battery current and battery temperature so as to generate a control signal, and

a semiconductor device operatively controlled by the battery control circuit, the semiconductor device adapted to limit or interrupt current based on the control signal.

14. The battery pack of claim 13, the arrangement further comprising:

a temperature sensor for sensing cell temperature to output a sensed signal to the battery control circuit;

a current sensor for sensing battery current to output a sensed signal to the battery control circuit; and

a voltage monitor circuit for sensing one of individual cell voltage and total pack voltage of the pack to output a sensed signal to the battery control circuit.

15. The battery pack of claim 6, the arrangement further comprising:

at least one communication terminal for communicating information to, and sensing information from, an attached external component.

16. The battery pack of claim 6, the arrangement further comprising:

at least one protection circuit monitoring pack voltage for a potential over-discharge fault condition in the pack and adapted to perform an

DELTRAN EX1002
IPR2024-01219

automatic shutdown of current flow in the pack if the monitored voltage reaches a given voltage threshold.

17. The battery pack of claim 6, the arrangement further comprising:

at least one protection circuit monitoring pack voltage for a potential over-discharge fault condition in the pack and adapted to perform an automatic shutdown of current flow in the pack if the monitored voltage reaches a given dynamic voltage threshold,

wherein the dynamic voltage threshold is varied by subtracting a proportion of instant discharge current from an absolute threshold level to compensate for impedance of the battery pack and to avoid a spurious automatic shutdown of current flow, if monitored voltage momentarily drops below the threshold.

18. The battery pack of claim 6, the arrangement further comprising:

a single PTC device placed in series with the serially-connected cells within the battery pack as a protection against an over-current fault condition, the PTC device adapted to increase total pack impedance with increasing current in the pack.

19. The battery pack of claim 6, the arrangement further comprising:

a plurality of PTC devices placed in parallel with each other within the pack to form a parallel PTC string, the parallel PTC string placed in series with the serially-connected cells as a protection against an over-current fault condition, the parallel PTC string adapted to increase total pack impedance with increasing current in the pack.

20. The battery pack of claim 6, the arrangement further comprising:

at least one fuse arranged between the cells and a terminal of the battery pack, wherein the physical placement of the fuse is nearer in proximity

DELTRAN EX1002
IPR2024-01219

to the terminal than to the cells, thereby isolating the cells and associated electronics of the pack from a connected charger or power tool in the event of an over-current casualty in the pack.

21. The battery pack of claim 6, wherein the battery pack is a lithium-ion battery pack.

22. The battery pack of claim 21, wherein the lithium-ion battery pack has a nominal voltage rating of at least 18 volts.

23. The battery pack of claim 6, the arrangement further comprising an audible warning mechanism configured to alert the user of the battery pack of an impending or present fault condition in the battery pack.

24. The battery pack of claim 6, the arrangement further comprising a visual warning mechanism configured to alert the user of the battery pack of an impending or present fault condition in the battery pack.

25. A method of providing over-voltage protection in a battery pack removably attachable to a cordless power tool and a charger, the battery pack operatively attached to the charger charging the pack, comprising:

sensing an over-voltage fault condition in the pack; and

terminating charge current in the battery pack or charger based on the sensed fault condition.

26. The method of claim 25, wherein terminating includes generating a control signal in the pack to turn off a semiconductor device in the pack that is adapted to limit or interrupt current in a charge path of the pack.

DELTRAN EX1002
IPR2024-01219

27. The method of claim 25, wherein terminating further includes

generating a control signal in the pack, and

communicating the control signal to the charger to turn off a semiconductor device in the charger that is adapted to limit or interrupt current in a charge path of the charger to terminate current flow in the battery pack.

28. A watchdog circuit of a charger, the charger operatively attached to a battery pack for charging the battery pack, the watchdog circuit monitoring parameters in both the battery pack and the charger for one or more control signals from the battery pack or charger to terminate current flow in the battery pack.

29. The watchdog circuit of claim 28, wherein the parameters include one or more of battery pack temperature, individual cell voltages, battery stack voltage, a charge current reset pulse from the battery pack, and a clock reset pulse from the battery pack, and/or a charge current reset pulse from the charger.

30. In a charger adapted to charge a battery pack, the charger and battery pack part of a cordless power tool system, the charger comprising:

a charge current interruption circuit monitoring parameters in both the battery pack and the charger for one or more control signals from the battery pack or charger to terminate current flow in the battery pack.

31. The charge current interruption circuit of claim 30, wherein the parameters include one or more of battery pack temperature, individual cell voltages, battery stack voltage, a charge current reset pulse from the battery pack, a clock reset pulse from the battery pack, and/or a charge current reset pulse from the charger.

DELTRAN EX1002
IPR2024-01219

32. A battery pack adapted to power a cordless power tool and to be charged by a charger, the pack including a plurality of battery cells, the battery pack comprising:

a device that terminates an over-temperature condition in the pack based on pack temperature or an individual cell temperature exceeding a given temperature threshold.

33. The battery pack of claim 32, wherein the device further includes

a thermal switch, and

a plurality of high current contacts,

wherein the thermal switch opens the high current contacts when pack or cell temperature exceeds the given threshold.

34. In a battery pack operatively attachable to a charger, the battery pack adapted to power a cordless power tool, a device for providing over-temperature protection in the pack during charging, comprising:

a thermistor;

a first thermistor lead connecting the thermistor to a positive terminal shared by the pack and charger; and

a second thermistor lead connecting the thermistor to a negative terminal shared by the pack and charger.

35. The device of claim 34, wherein the positive and negative terminals connected to the first and second leads interface to temperature monitoring circuitry in the charger to enable monitoring of pack temperature while maintaining the thermistor isolated from the charge path in the pack.

DELTRAN EX1002
IPR2024-01219

36. A battery pack, the pack operatively attached to a cordless power tool for powering a motor of the power tool, the battery pack comprising:

a motor control unit for determining at least one measurable parameter in the battery pack that would indicate a fault condition; and

a pair of transistors in communication with the motor control circuit, the motor control circuit controlling the pair of transistors to provide one of audible or tactile feedback to the user of the tool.

37. In a cordless power tool system including a battery pack removably attached to a power tool, a method of providing an audible warning in the motor of the power tool to alert an operator of the tool of an impending fault condition in the pack or tool, comprising:

determining at least one measurable parameter in one of the battery pack or tool, and

providing one of audible or tactile feedback to the user of the tool based on the at least one determined measurable parameter.

38. The method of claim 37, wherein providing includes adjusting motor current switching frequency based on the at least one determined parameter to produce an audible tone in the motor of the tool that warns the tool operator of the impending fault condition.

39. The method of claim 37, wherein providing includes adjusting a desired PWM duty cycle of at least one semiconductor device in the battery pack to produce a warble effect in the motor speed that warns the tool operator of the impending fault condition.

40. The method of claim 39, wherein adjusting further includes reducing the PWM duty cycle to produce a weakening of the tool as felt by the tool user to warn the user of an impending fault condition.

DELTRAN EX1002
IPR2024-01219

41. A battery pack having over-charge protection, comprising:

a housing,

a plurality of serially-connected cells therein, and

a current interrupt mechanism to interrupt current in the cells that is triggered upon swelling of at least one cell during an over-charge event.

42. The battery pack of claim 41, wherein

the cells are serially connected between power terminals of the pack and interconnected to each other via tab connectors, the tab connectors of adjacent cells connected to each other.

43. The battery pack of claim 42, wherein the current interrupt mechanism is embodied as at least one tab connector of a swelling cell being pull apart from at least one tab connector of an adjacent cell to interrupt current.

44. The battery pack of claim 41, wherein the current interrupt mechanism comprises:

a plunger, and

a spring, the plunger restrained between the serially-connected cells and a sidewall of the battery housing under a counterforce provided by the spring, the plunger including a portion that extends partially into a recess between formed an intermediate wall and an outer sidewall of the battery pack housing, the recess including a lead wire from the pack electrically connecting the cells of the pack to a charger,

wherein swelling of the at least one cell assists the plunger to overcome spring pressure to sever the lead wire in the recess to interrupt current.

45. The battery pack of claim 44, wherein the cells are serially connected between power terminals of the pack and interconnected to each other via tab

DELTRAN EX1002
IPR2024-01219

connectors, the tab connectors of adjacent cells connected to each other, and the current interrupt mechanism further includes at least one tab connector of the at least one swelling cell pulling apart from at least one tab connector of an adjacent cell to interrupt current.

46. The battery pack of claim 41, wherein the current interrupt mechanism comprises:

a plunger, and

a spring, the plunger restrained between the serially-connected cells and a sidewall of the battery housing under a counterforce provided by the spring, the plunger including a portion that extends partially into a recess, the recess extending through a sidewall of the battery pack housing and a sidewall of a charger housing,

wherein a charger lead wire electrically connecting the charger to a corresponding lead wire of the battery pack extends longitudinally along a face of the charger housing sidewall and over the recess, and

wherein swelling of the at least one cell assists the plunger to overcome spring pressure to sever the charger lead wire extending over the recess to interrupt current.

47. The battery pack of claim 46, wherein the cells are serially connected between power terminals of the pack and interconnected to each other via tab connectors, the tab connectors of adjacent cells connected to each other, and the current interrupt mechanism further includes at least one tab connector of the at least one swelling cell pulling apart from at least one tab connector of an adjacent cell to interrupt current.

DELTRAN EX1002
IPR2024-01219

48. The battery pack of claim 41, wherein the current interrupt mechanism comprises:

a plunger, and

a spring, the plunger restrained between the serially-connected cells and a sidewall of the battery housing under a counterforce provided by the spring, the plunger including a portion that extends partially into a recess between formed a sidewall of the battery pack housing and a housing of the charger,

wherein a lead wire from the cells is electrically connected to a corresponding lead wire of the charger at a contact interface, and

wherein swelling of the at least one cell assists the plunger to overcome spring pressure to eject the pack housing from the charger housing, causing a break in the contact interface to interrupt current.

49. The battery pack of claim 48, wherein the cells are serially connected between power terminals of the pack and interconnected to each other via tab connectors, the tab connectors of adjacent cells connected to each other, and the current interrupt mechanism further includes at least one tab connector of the at least one swelling cell pulling apart from at least one tab connector of an adjacent cell to interrupt current.

DELTRAN EX1002
IPR2024-01219

WO 2005/038952

FIG. 1

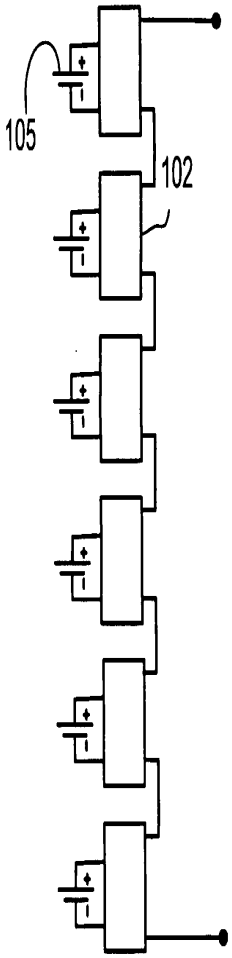
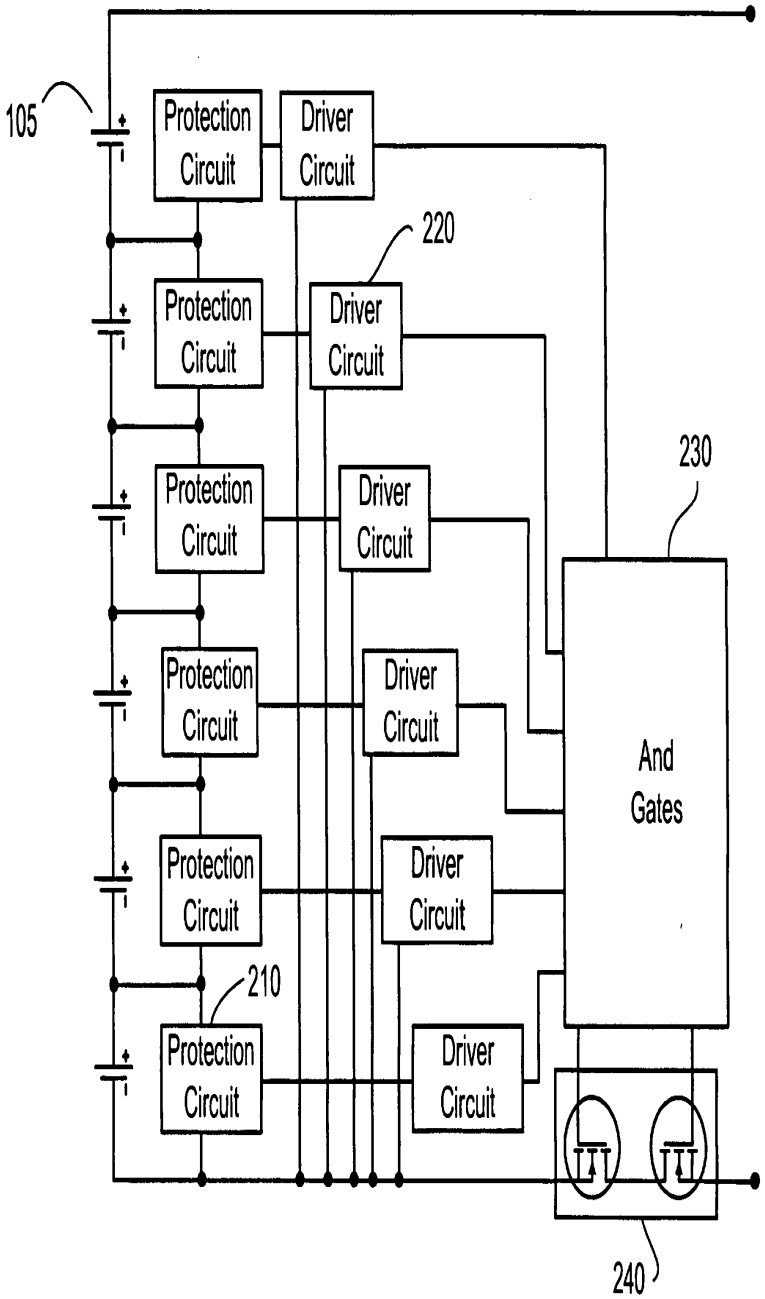


FIG. 2



1/20

PCT/US2004/032945

FIG. 3A

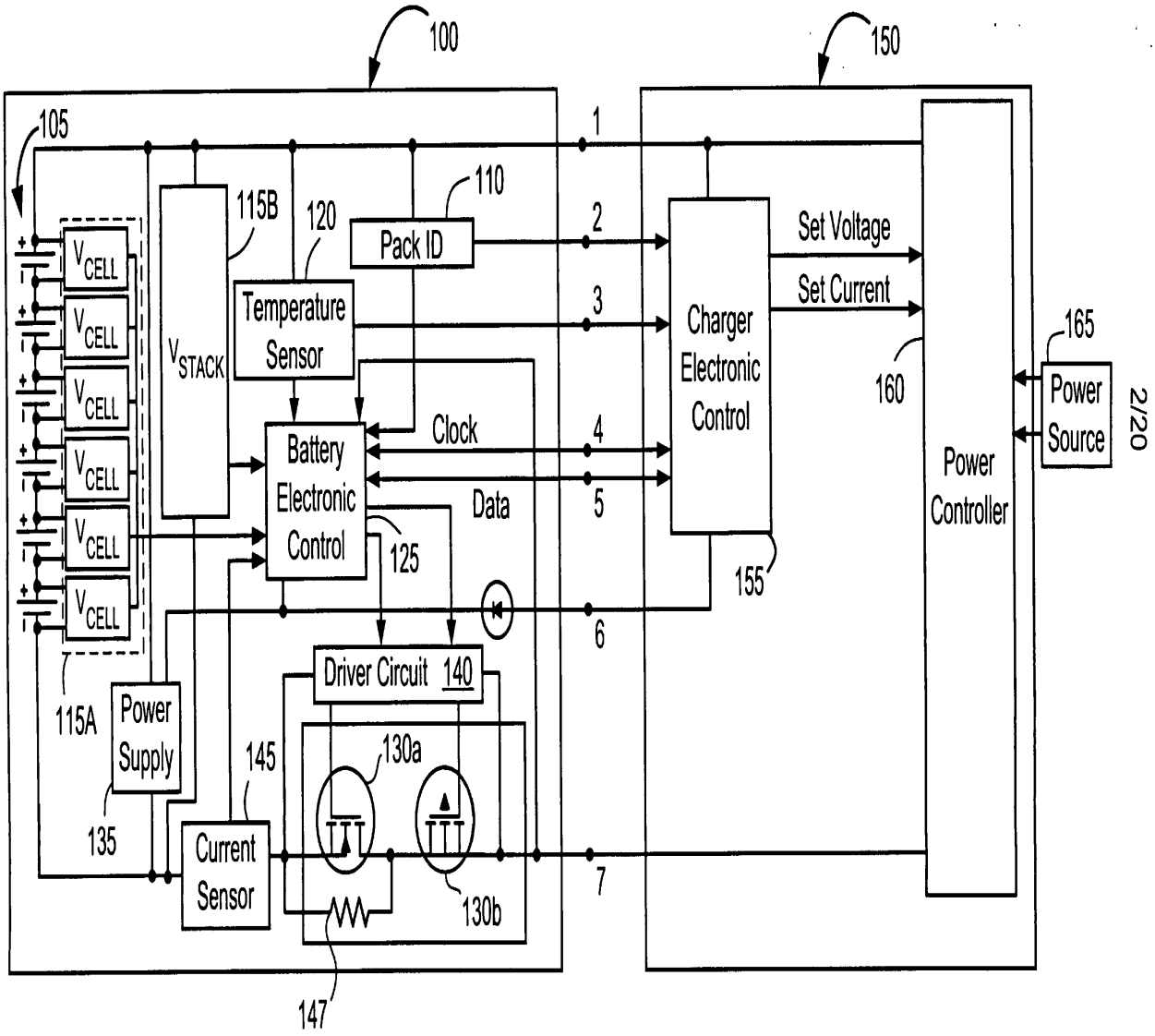

100
150
105
1
110
115B
120
2
Pack ID
Set Voltage
Set Current
3
Temperature Sensor
Charger Electronic Control
165
160
Power Source
V_{CELL}
V_{STACK}
Clock
4
Battery Electronic Control
Data
5
Power Controller
125
155
6
Driver Circuit 140
115A
Power Supply
145
130a
135
Current Sensor
7
130b
147

FIG. 3B

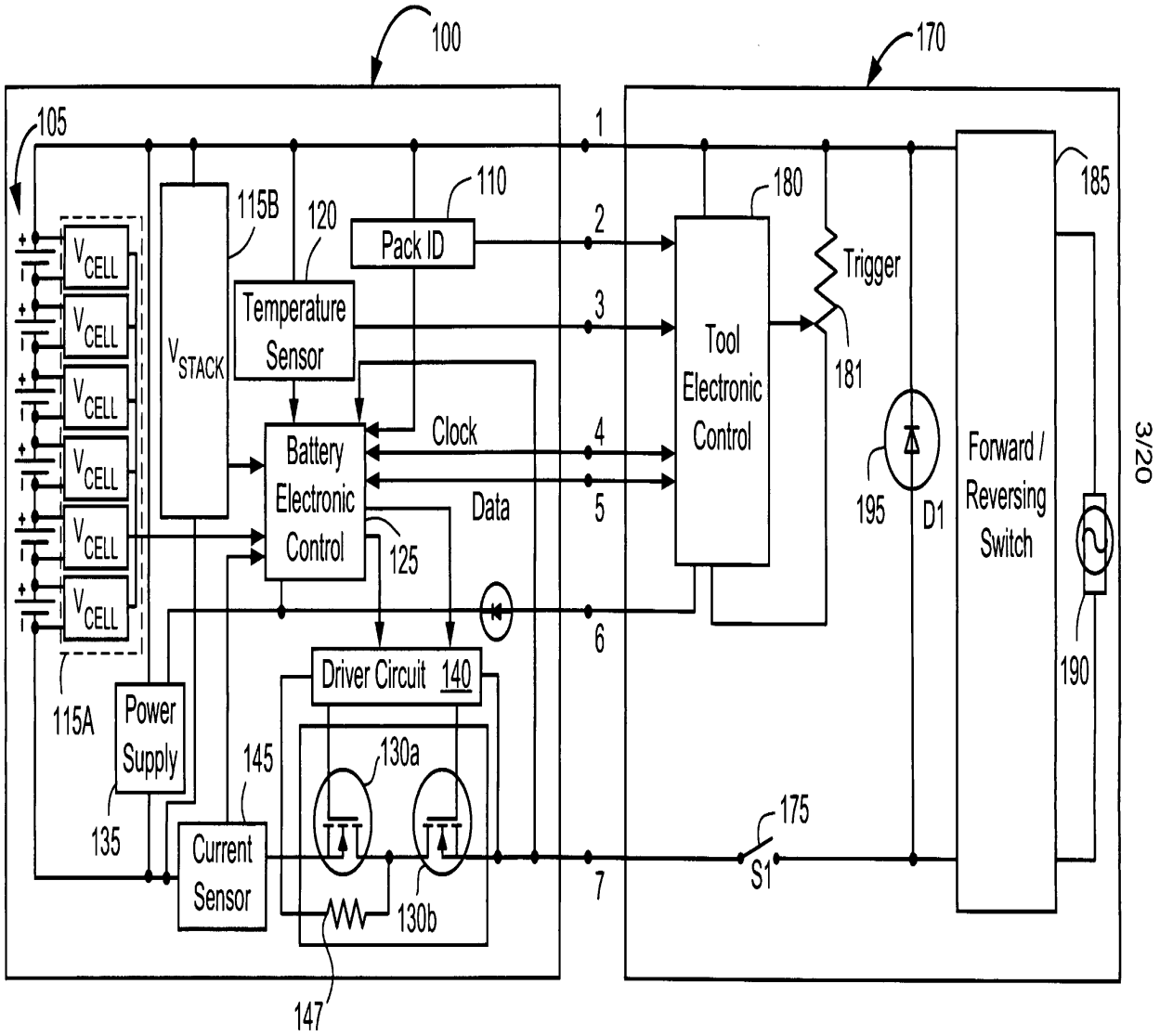

100
170
105
1
2
3
4
5
6
7
110
180
185
115B
120
Pack ID
Trigger
Temperature Sensor
Tool Electronic Control
181
V_{CELL}
V_{STACK}
Clock
Data
Battery Electronic Control
125
195
D1
Forward / Reversing Switch
190
115A
Power Supply
Driver Circuit 140
130a
145
135
Current Sensor
130b
175
S1
147

FIG. 4

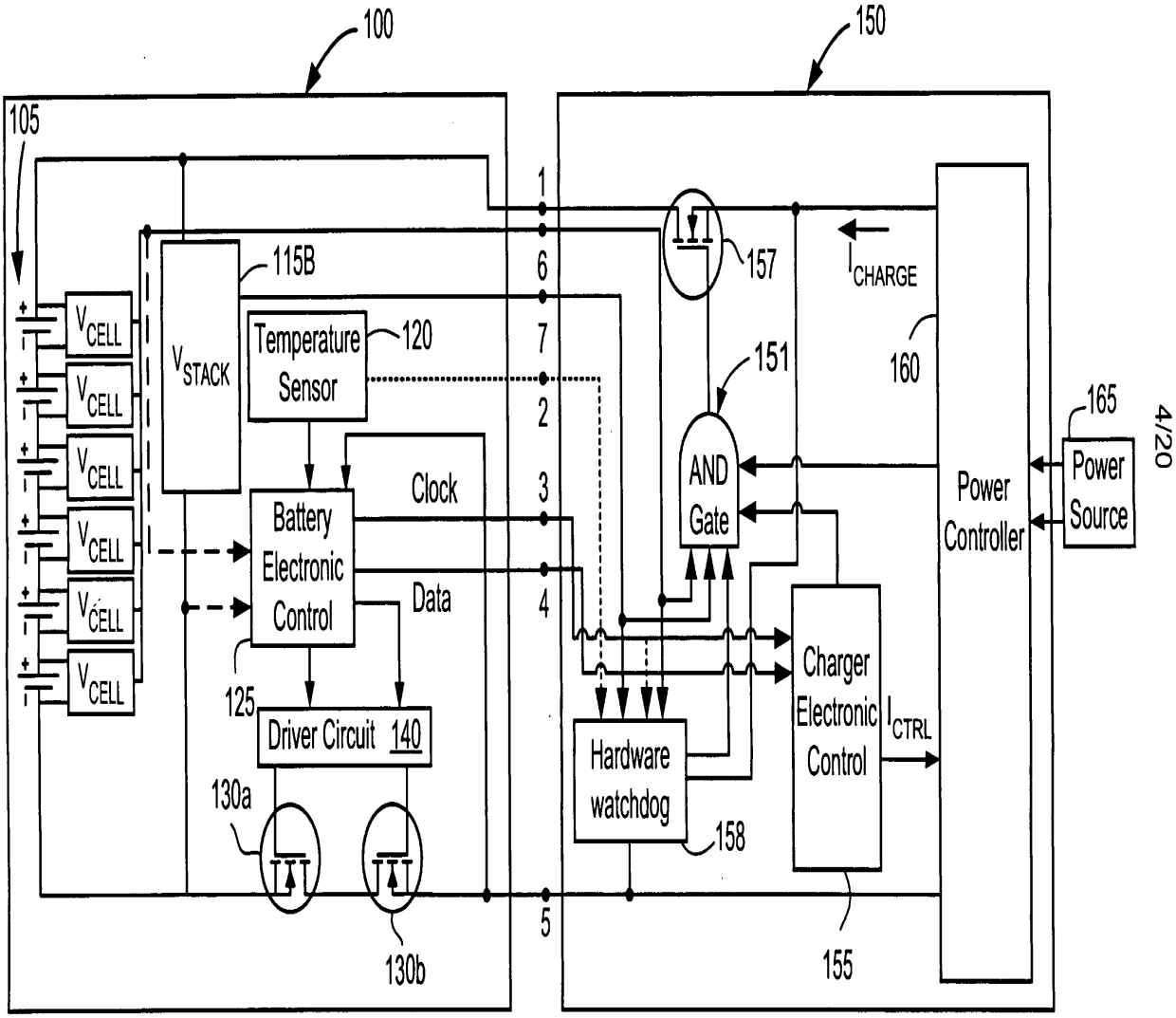

100
150
105
1
6
7
2
3
4
5
115B
157
I_{CHARGE}
160
151
165
Power Source
Power Controller
AND Gate
V_{CELL}
V_{STACK}
Temperature Sensor
120
Clock
Data
Battery Electronic Control
125
Driver Circuit 140
130a
130b
Hardware watchdog
158
Charger Electronic Control
I_{CTRL}
155

FIG. 5

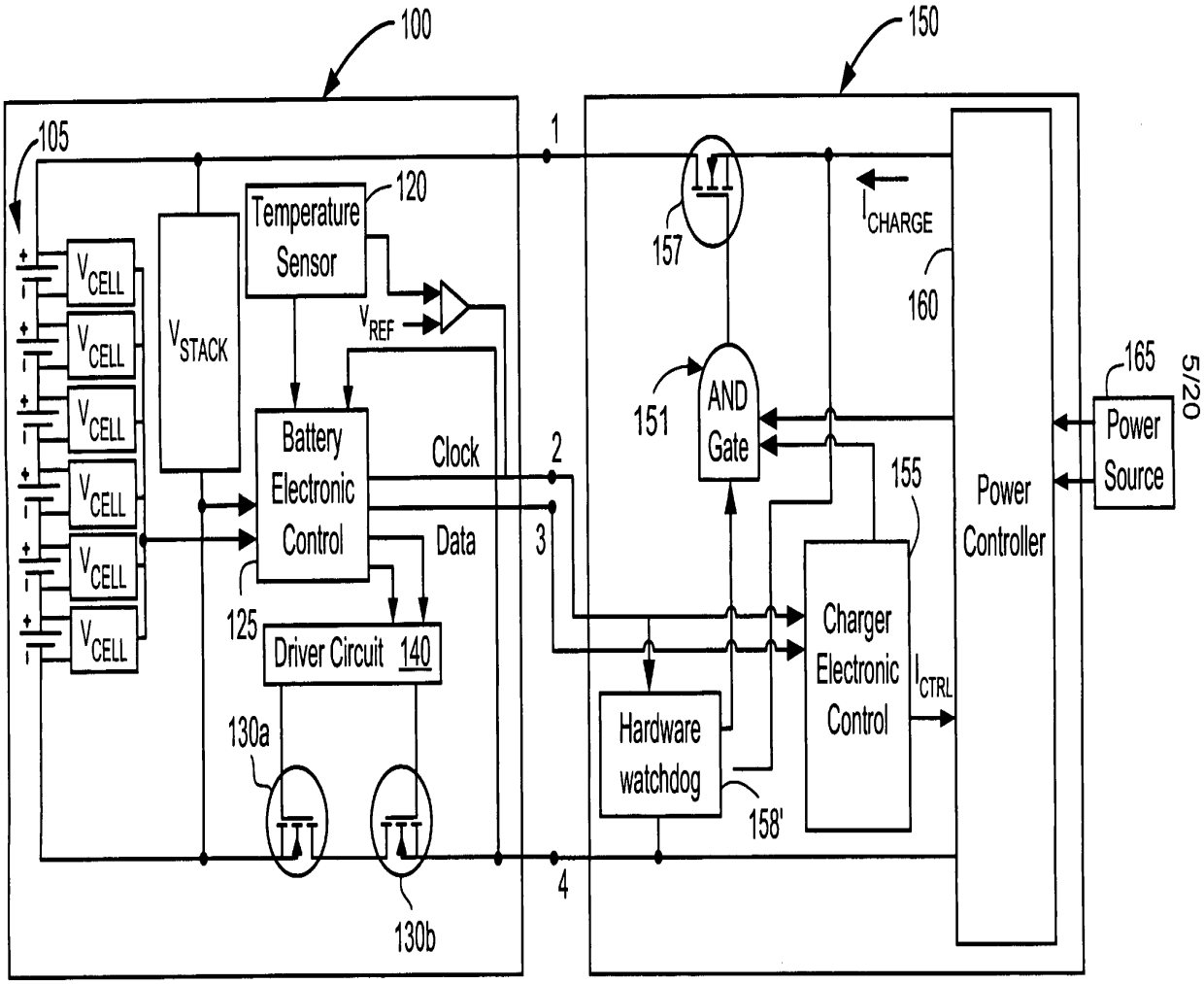

100
150
105
1
120
Temperature Sensor
V_{CELL}
V_{STACK}
V_{REF}
Battery Electronic Control
Clock
Data
2
3
125
Driver Circuit 140
130a
130b
4
157
I_{CHARGE}
160
165
Power Source
151
AND Gate
155
Power Controller
Charger Electronic Control
I_{CTRL}
Hardware watchdog
158'

FIG. 6

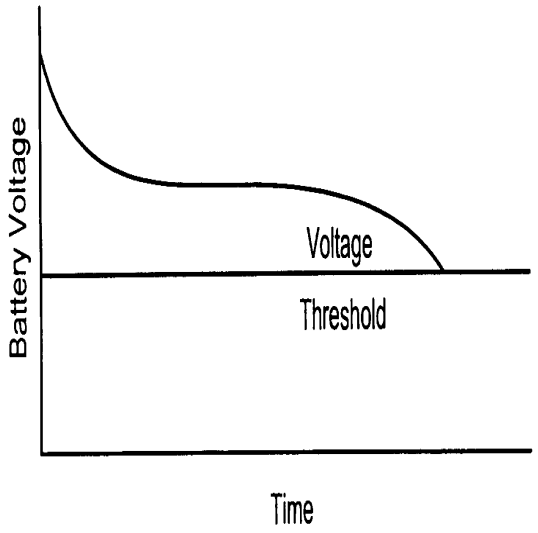


FIG. 7

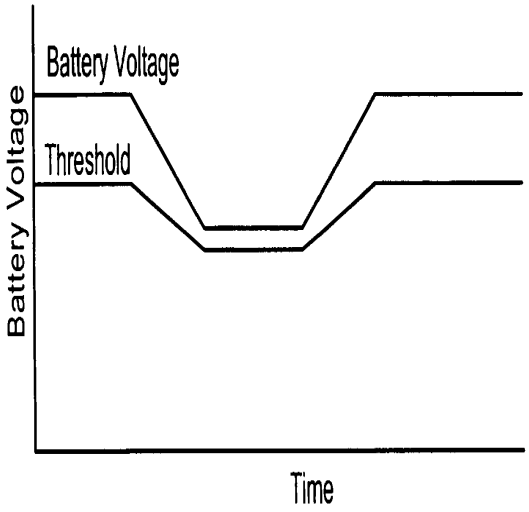


FIG. 8A

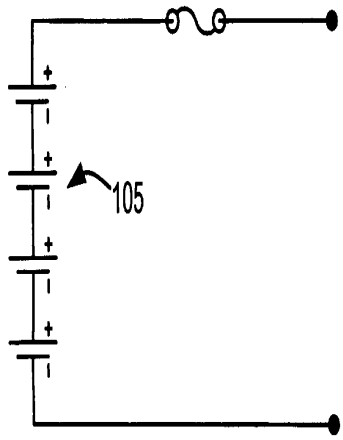


FIG. 8B

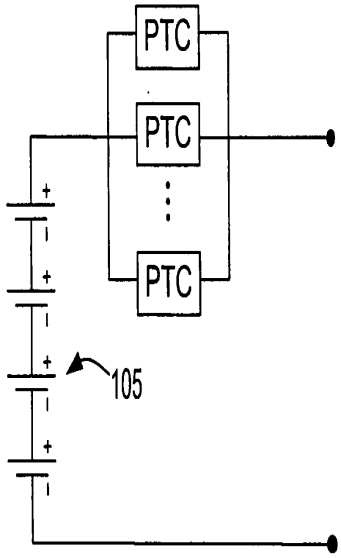


FIG. 9

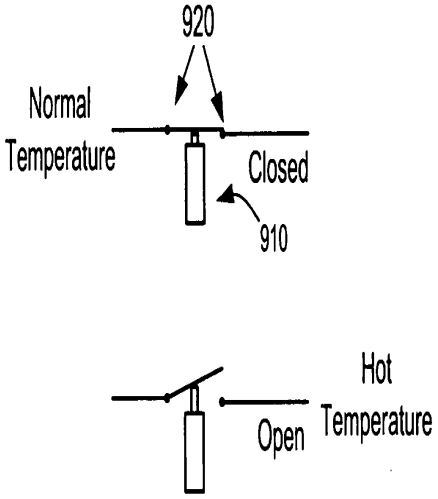

920
Normal
Temperature
Closed
910
Hot
Temperature
Open

FIG. 10

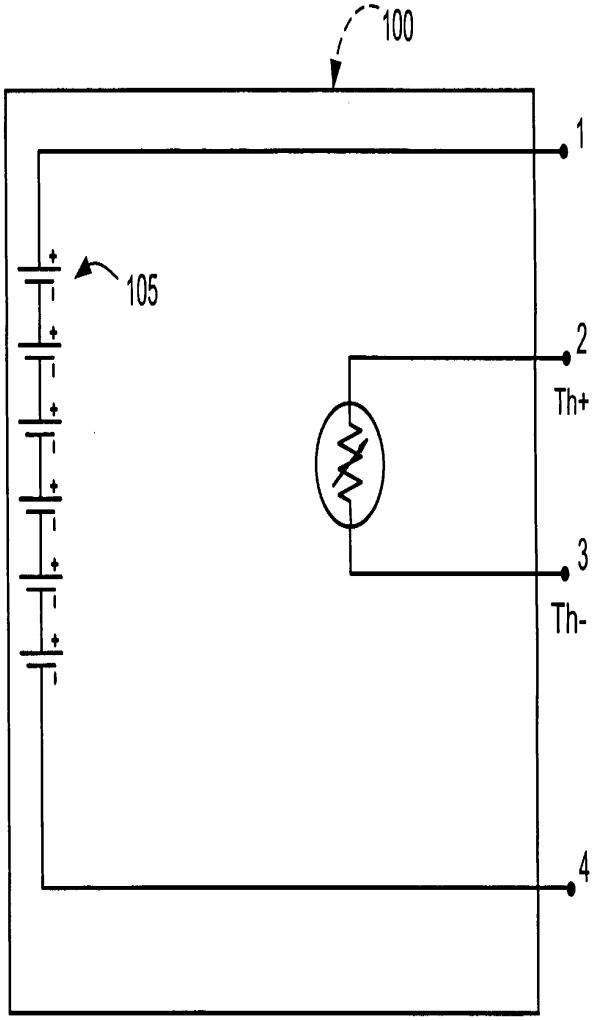

100
1
105
2
Th+
3
Th-
4

FIG. 11

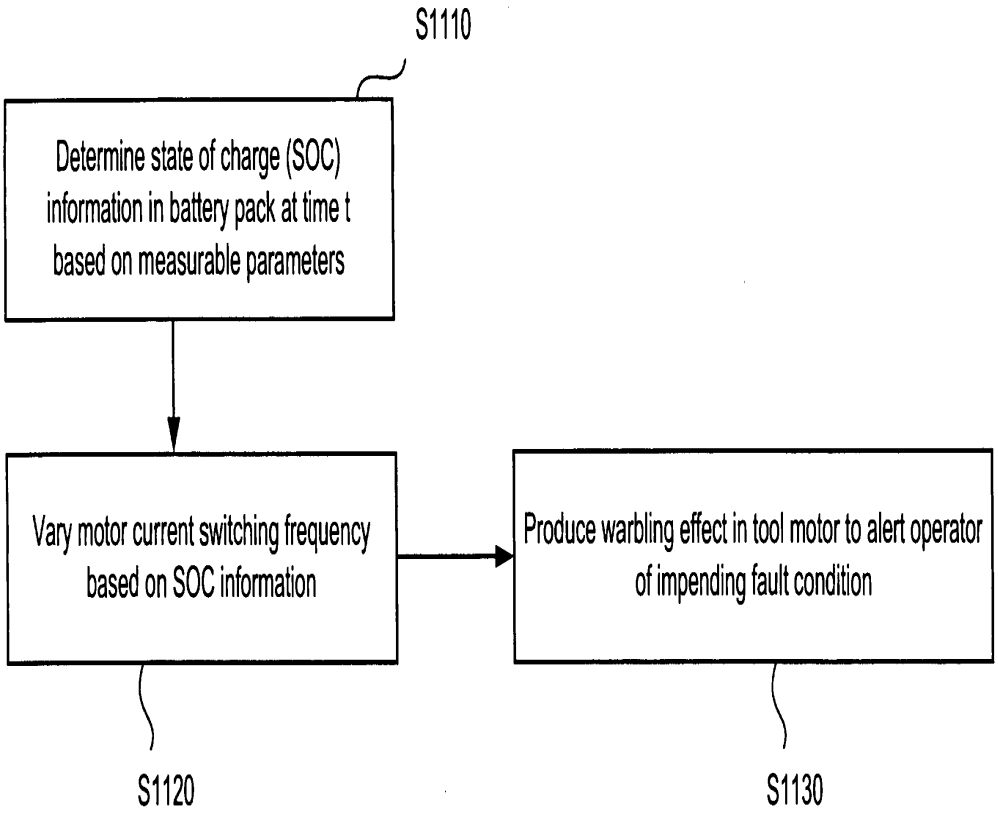

S1110
Determine state of charge (SOC) information in battery pack at time t based on measurable parameters
Vary motor current switching frequency based on SOC information
Produce warbling effect in tool motor to alert operator of impending fault condition
S1120
S1130

FIG. 12

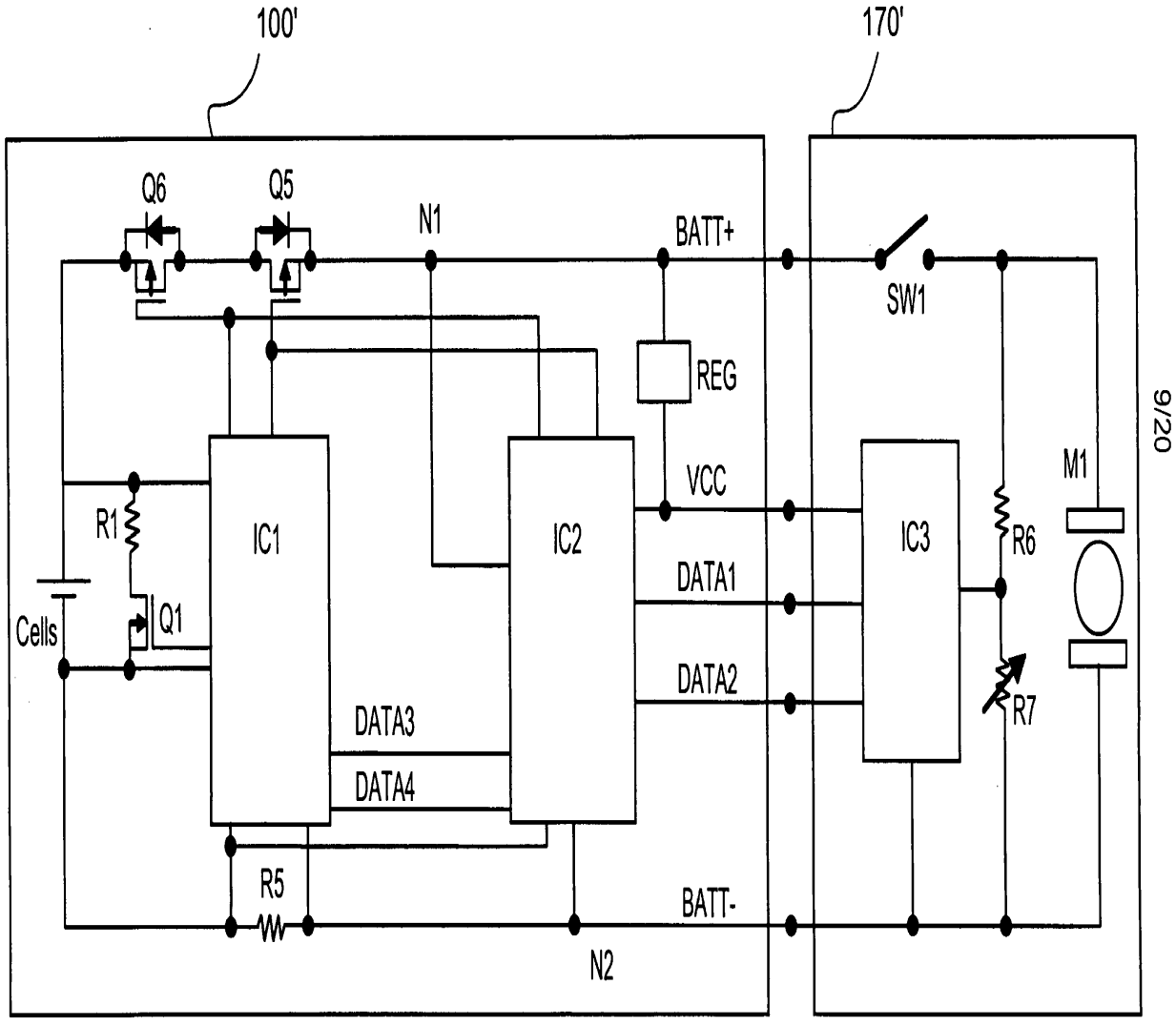

100'
170'
Q6
Q5
N1
BATT+
SW1
REG
VCC
IC1
IC2
IC3
R1
Q1
Cells
DATA1
DATA2
DATA3
DATA4
R6
M1
R7
R5
BATT-
N2

FIG. 13A

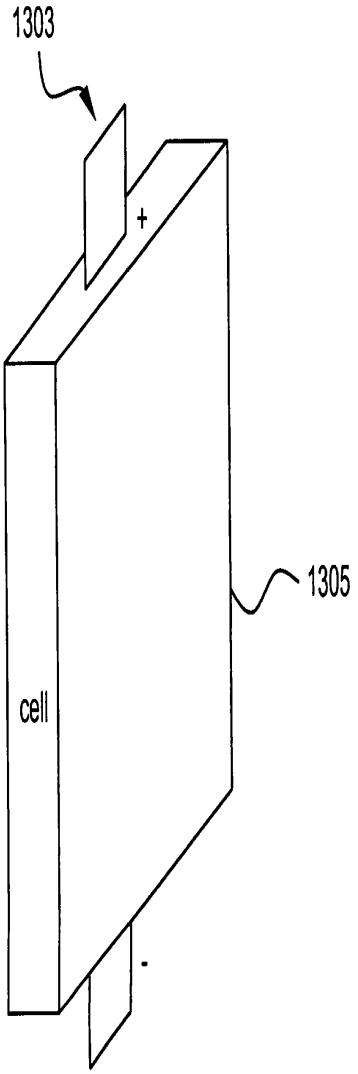


FIG. 13B

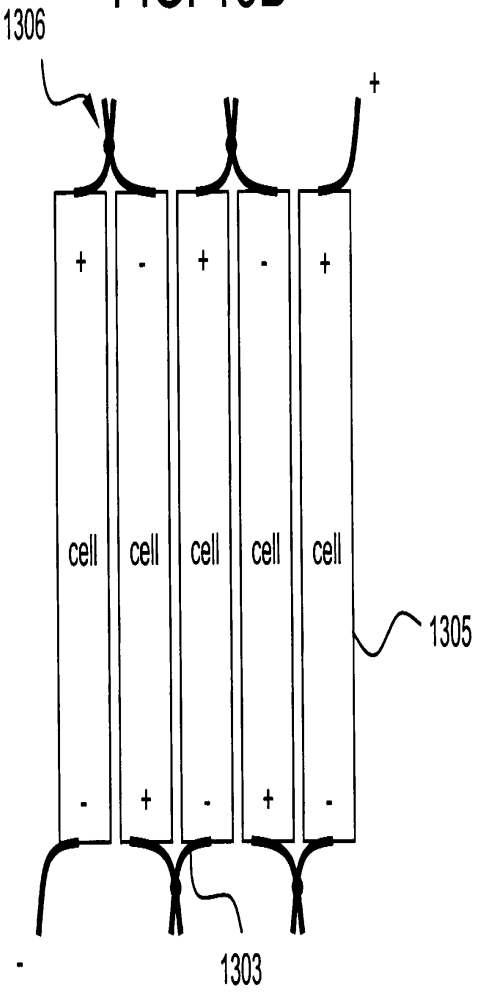


FIG. 13C

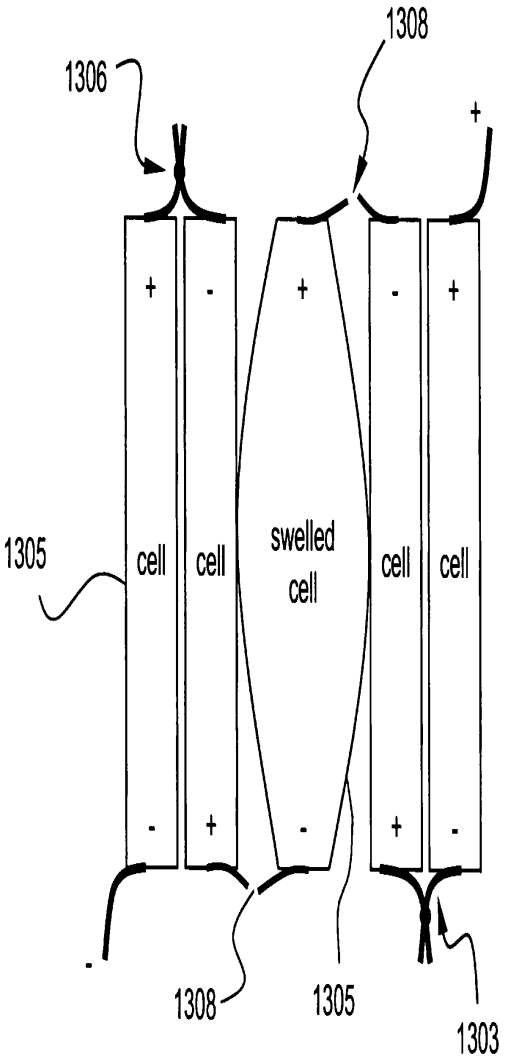

1308
1306
+
+
-
+
-
+
cell
cell
swelled
cell
cell
cell
1305
-
+
-
+
-
1308
1305
1303

FIG. 14A

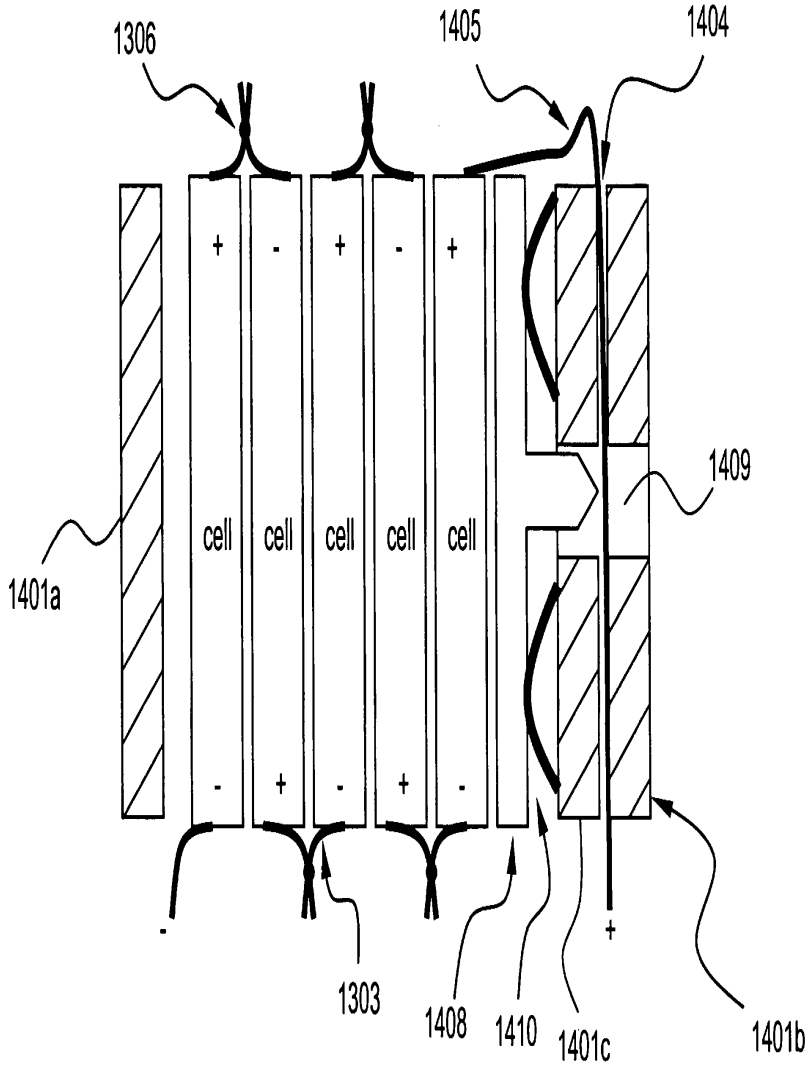

1306
1405
1404
1409
1401a
cell
cell
cell
cell
cell
1303
1408
1410
1401c
1401b

FIG. 14B

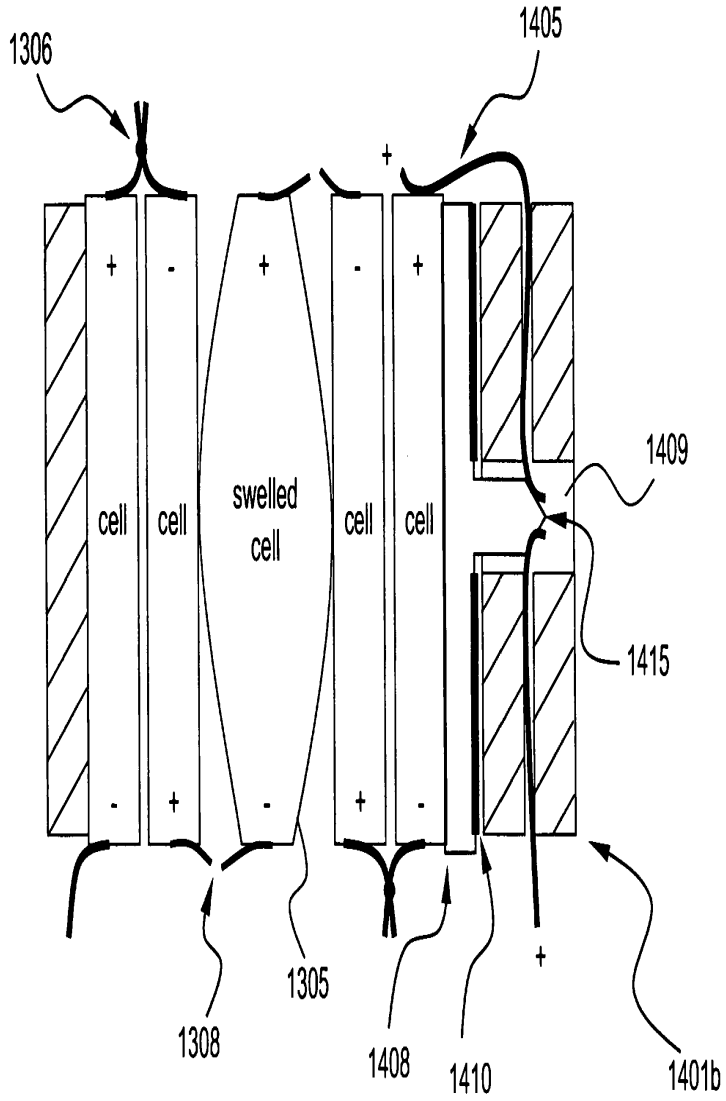

1306
1405
+
+
-
+
-
+
cell
cell
swelled
cell
cell
cell
1409
1415
-
+
-
+
-
+
1308
1305
1408
1410
1401b

FIG. 15A

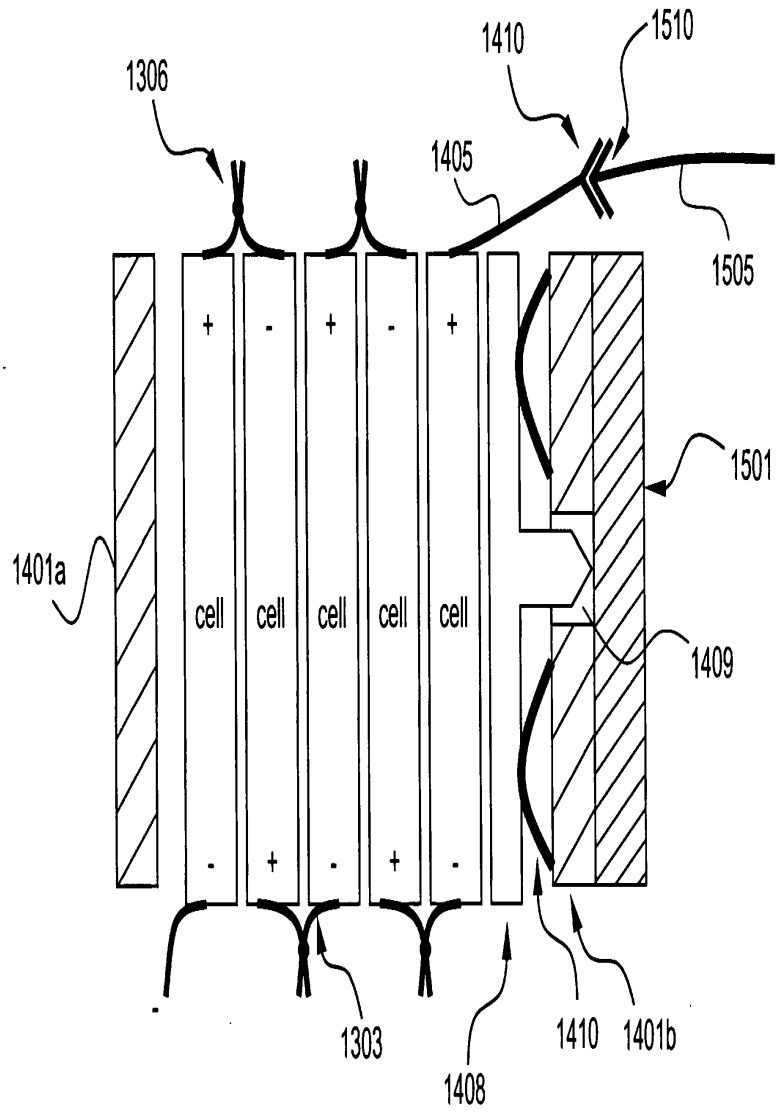

1306
1410
1510
1405
1505
1501
1409
1401a
cell
cell
cell
cell
cell
1303
1408
1410
1401b

FIG. 15B

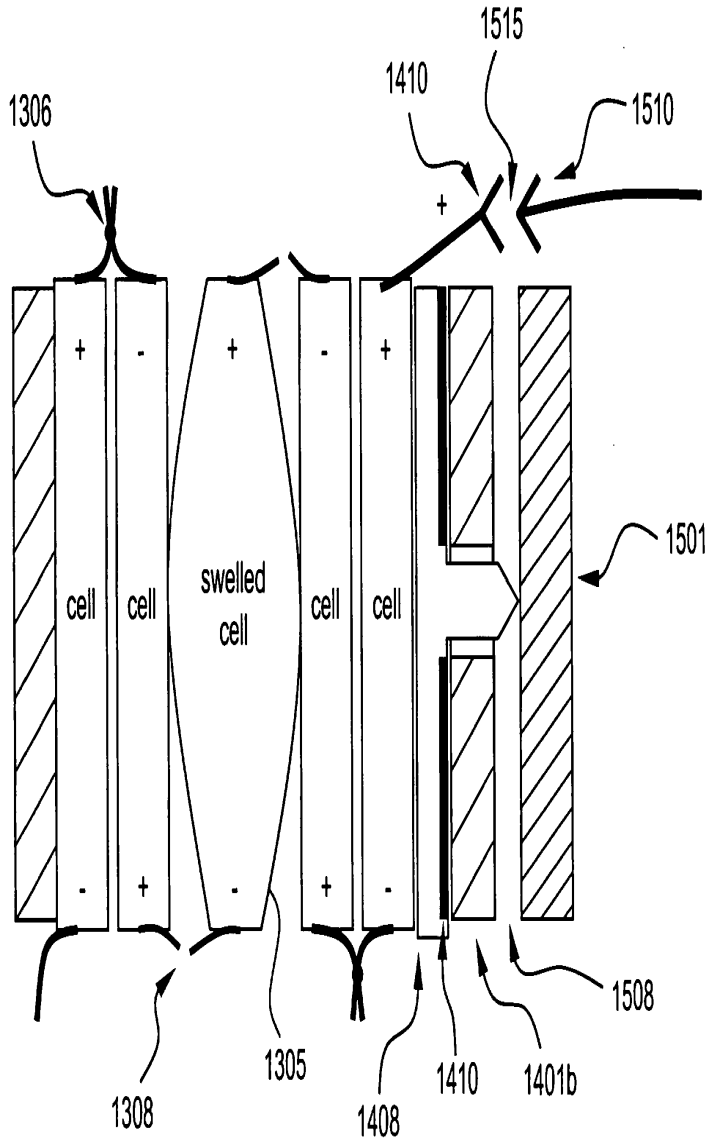

1515
1410
1510
1306
+
+
-
+
-
+
cell
cell
swelled cell
cell
cell
1501
-
+
-
+
-
1508
1308
1305
1408
1410
1401b

FIG. 16A

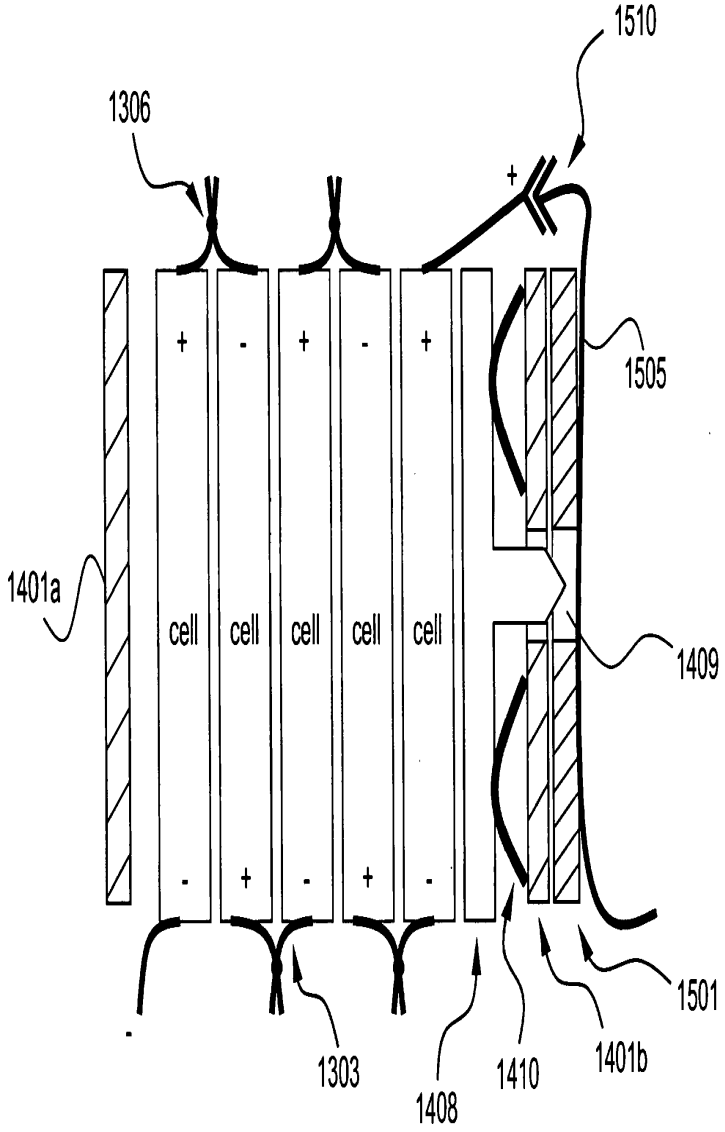

1510
1306
+
+
-
+
-
+
1505
1401a
cell
cell
cell
cell
cell
1409
-
+
-
+
-
1501
-
1303
1408
1410
1401b

FIG. 16B

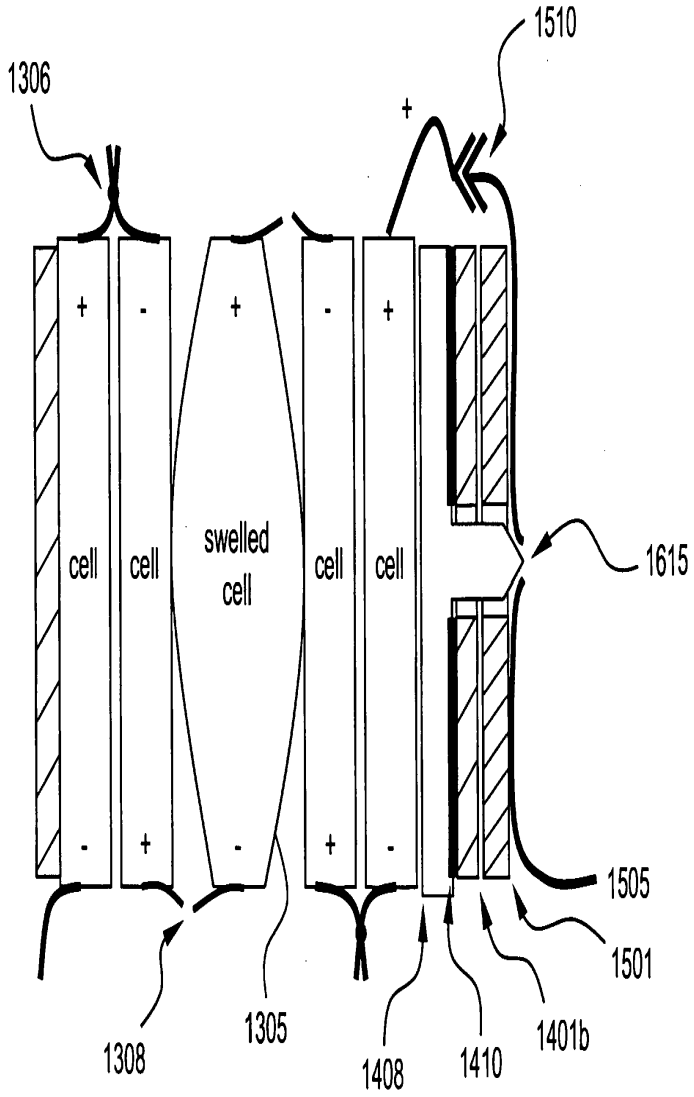

1510
1306
+
+
-
+
-
+
cell
cell
swelled cell
cell
cell
1615
-
+
-
+
-
1505
1501
1308
1305
1408
1410
1401b

FIG. 17

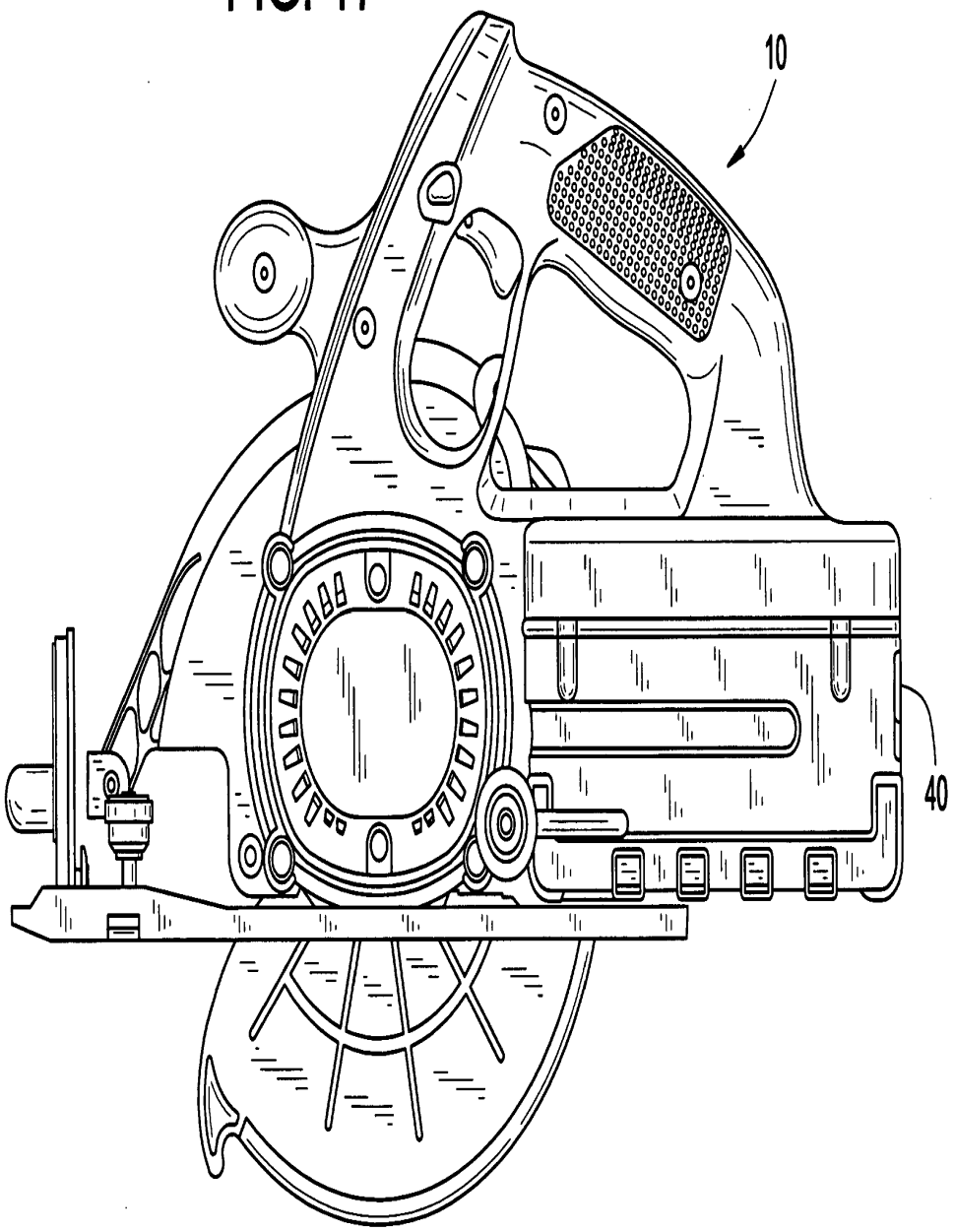


FIG. 18

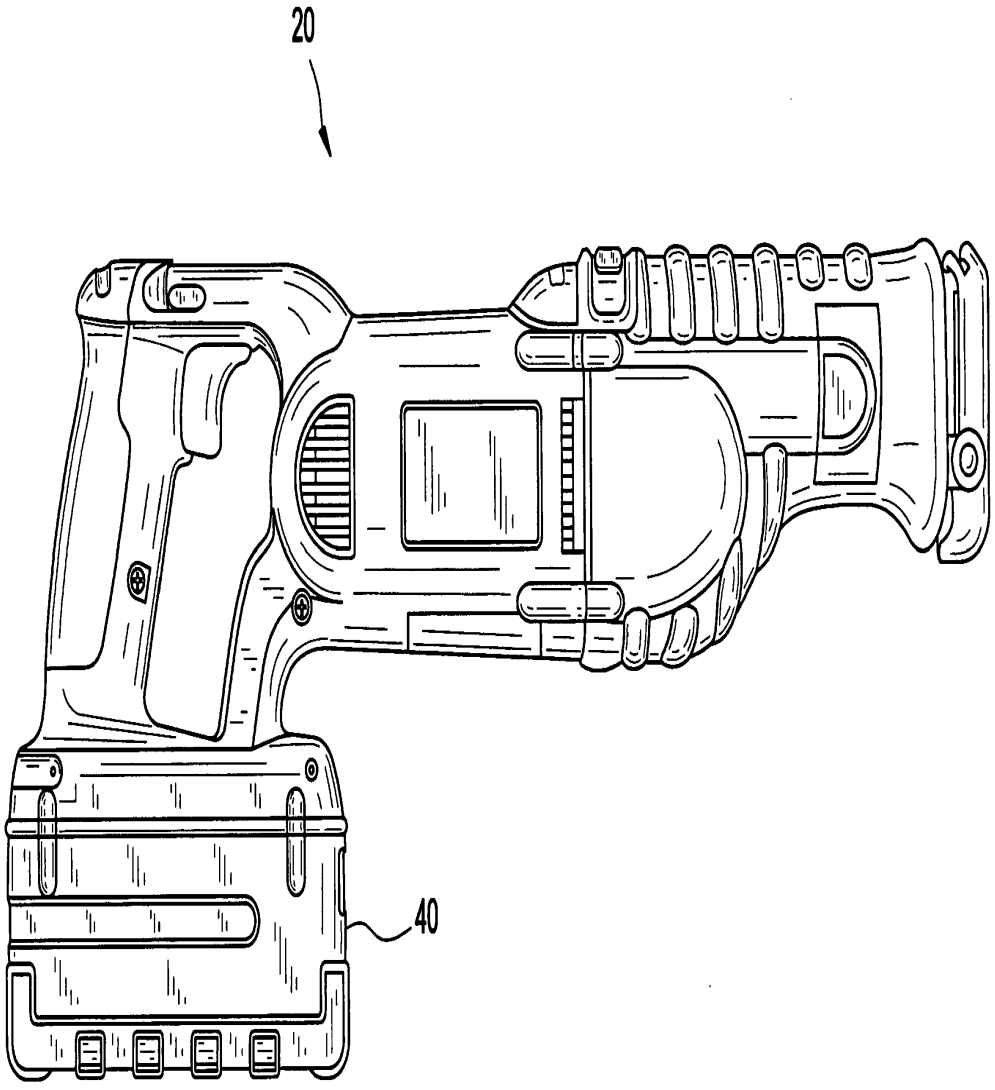
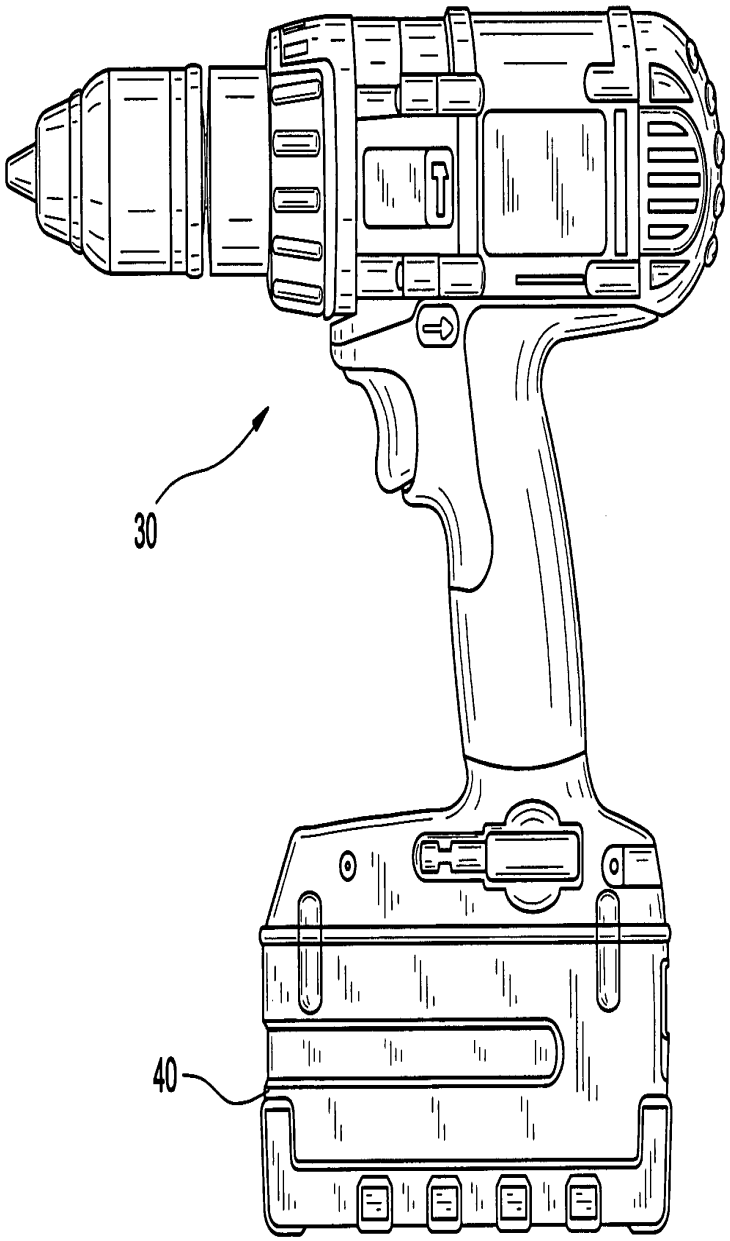


FIG. 19



UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Clark S. Cheney
Administrative Law Judge

In the Matter of: **CERTAIN PORTABLE BATTERY JUMP STARTERS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1256**

RESPONSE OF BEST BUY CO., INC. TO THE FIRST AMENDED COMPLAINT AND THE NOTICE OF INVESTIGATION

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Robert A. Hall
Jiwei Zhang
MEI & MARK LLP
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Washington, DC 20035
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Timothy Wang
Hao Ni
Neal Massand
Stevenson Moore V
NI, WANG & MASSAND, PLLC
8140 Walnut Hill Ln., Ste. 500
Dallas, TX 75231
Tel: (972) 331-4600
Fax: (972) 314-0900

Counsel for Respondent Best Buy Co., Inc.

Respondent Best Buy Co., Inc. ("Respondent" or "Best Buy") respectfully submits the following Response to Complainant The NOCO Company's ("Complainant" or "NOCO") Amended Complaint Under Section 337 of the Tariff Act of 1930, as amended, and the Commission's Notice of Investigation. The headings set forth below repeat the headings in the Complaint and are not intended to be construed as an admission of any fact relating thereto.

RESPONSE TO THE NOTICE OF INVESTIGATION

Responding to the March 17, 2021, Notice of Investigation ("Notice") filed in the above-titled investigation, Best Buy admits such an investigation exists, and that Best Buy is a named respondent therein. However, Best Buy otherwise denies the existence of the predicates and requirements for liability under such investigation, and therefore denies the allegations in the Notice, to the extent such allegations exist.

RESPONSE TO THE AMENDED COMPLAINT

I. INTRODUCTION

1. Responding to paragraph 1, Best Buy admits that NOCO purports to bring an action pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("Section 337"). Best Buy denies the existence of the predicates and requirements of such action with respect to Best Buy. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

2. Responding to paragraph 2, Best Buy admits that NOCO listed the Proposed Respondents in Section II.B in the Complaint. Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy. Best Buy lacks

DELTRAN EX1002
IPR2024-01219

sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

3. Responding to paragraph 3, Best Buy admits that NOCO alleges the Accused Products infringe one or more of the Asserted Claims of United States Patent Nos. 9,007,015 and 10,604,024 (collectively, the "Asserted Patents"), and Exhibits 1-2 to the Complaint purport to be copies of the Asserted Patents. Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

4. Responding to paragraph 4, Best Buy admits that NOCO alleges certain of Respondents' Accused Products also infringe one or more of U.S. Trademark Reg. Nos. 4,811,656 and 4,811,749 (collectively, the "Asserted Trademarks"), and Exhibits 3-4 to the Complaint purport to be copies of the Asserted Trademarks. Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

5. Responding to paragraph 5, Best Buy admits that NOCO asserts the Accused Products infringe at least the claims in Table 1 of one or more Asserted Patents in violation of Section 337(a)(1)(B)(i), either literally or under the doctrine of equivalents. Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy

DELTRAN EX1002
IPR2024-01219

lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

6. Responding to paragraph 6, Best Buy admits that NOCO provides a description of the category of the Accused Products. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

7. Responding to paragraph 7, Best Buy denies a domestic industry exists or is well established.

8. Responding to paragraph 8, Best Buy admits that NOCO seeks a general exclusion order pursuant to Section 337(d)(2), cease and desist orders pursuant to Section 337(f), and a bond pursuant to Section 337(j). Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy also denies a general exclusion order or cease and desist orders are required. Best Buy further denies that any bond is required. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

9. Responding to paragraph 9, Best Buy admits that NOCO seeks limited exclusion orders alternatively. Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

II. THE PARTIES

A. Complainant NOCO

DELTRAN EX1002
IPR2024-01219

10. Responding to paragraph 10, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

11. Responding to paragraph 11, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

12. Responding to paragraph 12, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

13. Responding to paragraph 13, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

14. Responding to paragraph 14, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

B. The Proposed Respondents

15. Responding to paragraph 15, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

1. Carku Respondents

a) Advance Auto Parts, Inc.

16. Responding to paragraph 16, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

17. Responding to paragraph 17, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Antigravity Batteries LLC

DELTRAN EX1002
IPR2024-01219

18. Responding to paragraph 18, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

19. Responding to paragraph 19, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Aukey Technology Co., Ltd.

20. Responding to paragraph 20, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

21. Responding to paragraph 21, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

d) Autogen Technology Co., Ltd.

22. Responding to paragraph 22, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

23. Responding to paragraph 23, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation

e) Gooloo Technologies LLC

24. Responding to paragraph 24, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

25. Responding to paragraph 25, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

f) Guangzhou Unique Electronics Co., Ltd.

DELTRAN EX1002
IPR2024-01219

26. Responding to paragraph 26, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

27. Responding to paragraph 27, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

g) Horizon Tool, Inc.

28. Responding to paragraph 28, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

29. Responding to paragraph 29, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

h) Huizhou Grepro E-Commerce

30. Responding to paragraph 30, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

31. Responding to paragraph 31, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

i) Medcursor, Inc.

32. Responding to paragraph 32, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

33. Responding to paragraph 33, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

j) Nekteck, Inc.

DELTRAN EX1002
IPR2024-01219

34. Responding to paragraph 34, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

35. Responding to paragraph 35, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

k) PowerMax Battery (U.S.A.), Inc.

36. Responding to paragraph 36, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

37. Responding to paragraph 37, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

l) Prime Global Products, Inc.

38. Responding to paragraph 38, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

39. Responding to paragraph 39, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

m) Shenzhen Carku Technology Co., Ltd.

40. Responding to paragraph 40, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

41. Responding to paragraph 41, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

n) Shenzhen Moock Technology Co., Ltd.

DELTRAN EX1002
IPR2024-01219

42. Responding to paragraph 42, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

43. Responding to paragraph 43, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

o) Shenzhen Take Tools Co., Ltd.

44. Responding to paragraph 44, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

45. Responding to paragraph 45, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

p) Sictec Instruments Co., Ltd.

46. Responding to paragraph 46, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

47. Responding to paragraph 47, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

q) Walmart Inc.

48. Responding to paragraph 48, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

49. Responding to paragraph 49, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

r) 70mai Co., Ltd.

DELTRAN EX1002
IPR2024-01219

50. Responding to paragraph 50, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

51. Responding to paragraph 51, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Boltpower Respondents

a) Anker Technology (UK) Ltd.

52. Responding to paragraph 52, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

53. Responding to paragraph 53, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Arteck Electronic Co., Ltd.

54. Responding to paragraph 54, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

55. Responding to paragraph 55, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Best Parts, Inc.

56. Responding to paragraph 56, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

57. Responding to paragraph 57, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

d) Circus Link, Inc.

DELTRAN EX1002
IPR2024-01219

58. Responding to paragraph 58, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

59. Responding to paragraph 59, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

e) Deltran USA, LLC

60. Responding to paragraph 40, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

61. Responding to paragraph 61, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

f) FlyLink Tech Technologies Co., Ltd.

62. Responding to paragraph 62, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

63. Responding to paragraph 63, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

g) Fconegy Co., Ltd.

64. Responding to paragraph 64, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

65. Responding to paragraph 65, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

h) Guangdong Boltpower Energy Co., Ltd.

66. Responding to paragraph 66, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

67. Responding to paragraph 67, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

i) Guangzhou Autolion Electric Technology Co., Ltd.

68. Responding to paragraph 68, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

69. Responding to paragraph 69, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

j) Integrated Supply Network, LLC

70. Responding to paragraph 70, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

71. Responding to paragraph 71, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

k) K-Tool International

72. Responding to paragraph 72, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

73. Responding to paragraph 73, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

l) Lowe's Companies, Inc.

DELTRAN EX1002
IPR2024-01219

74. Responding to paragraph 74, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

75. Responding to paragraph 75, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

m) Matco Tools Corporation.

76. Responding to paragraph 76, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

77. Responding to paragraph 77, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

n) MonoPrice, Inc.

78. Responding to paragraph 78, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

79. Responding to paragraph 79, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

o) National Automotive Parts Association, LLC

80. Responding to paragraph 80, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

81. Responding to paragraph 81, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

p) O'Reilly Automotive, Inc.

DELTRAN EX1002
IPR2024-01219

82. Responding to paragraph 82, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

83. Responding to paragraph 83, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

q) Pep Boys.

84. Responding to paragraph 84, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

85. Responding to paragraph 85, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

r) Schumacher Power Technology Ltd.

86. Responding to paragraph 86, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

87. Responding to paragraph 87, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

s) Shenzhen Chic Electrics Co., Ltd.

88. Responding to paragraph 88, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

89. Responding to paragraph 89, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

t) Shenzhen Dingjiang Technology Co., Ltd. LLLC

DELTRAN EX1002
IPR2024-01219

90. Responding to paragraph 90, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

91. Responding to paragraph 91, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

u) Shenzhen Lianfatong Technology Co., Ltd.

92. Responding to paragraph 92, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

93. Responding to paragraph 93, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

v) Shenzhen Li Feng Maoyiyouxiangongsi

94. Responding to paragraph 94, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

95. Responding to paragraph 95, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

w) Shenzhen Mediatek Tong Technology Co., Ltd.

96. Responding to paragraph 96, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

97. Responding to paragraph 97, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

x) Shenzhen Topdon Technology Co., Ltd.

DELTRAN EX1002
IPR2024-01219

98. Responding to paragraph 98, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

99. Responding to paragraph 99, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

y) Shenzhen Valuelink E-Commerce Co., Ltd.

100. Responding to paragraph 100, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

101. Responding to paragraph 101, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

z) Smart Well Enterprise Limited.

102. Responding to paragraph 102, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

103. Responding to paragraph 103, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

aa) Tii Trading Inc.

104. Responding to paragraph 104, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

105. Responding to paragraph 105, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

bb) Zhejiang Qingyou Electronic Commerce Co., Ltd.

DELTRAN EX1002
IPR2024-01219

106. Responding to paragraph 106, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

107. Responding to paragraph 107, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

3. Smartech Respondents

a) Smartech Products, Inc.

108. Responding to paragraph 108, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

109. Responding to paragraph 109, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

4. Weego Respondents

a) Shenzhen Jieruijia Technology Co., Ltd.

110. Responding to paragraph 110, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

111. Responding to paragraph 111, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Paris Corporation

112. Responding to paragraph 112, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

113. Responding to paragraph 113, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

5. WinPlus Respondents

a) Shenzhen Winplus Technology Co., Ltd.

114. Responding to paragraph 114, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

115. Responding to paragraph 115, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Winplus North America, Inc.

116. Responding to paragraph 116, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

117. Responding to paragraph 117, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

6. Great Neck Respondents

a) AutoZone, Inc.

118. Responding to paragraph 118, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

119. Responding to paragraph 119, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Great Neck Global, Inc. & Great Neck Saw Manufacturers, Inc.

120. Responding to paragraph 120, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

121. Responding to paragraph 121, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

122. Responding to paragraph 122, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

7. ThiEye Respondents

a) Dongguan Hangchebao Energy Technology Co., Ltd.

123. Responding to paragraph 123, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

124. Responding to paragraph 124, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) ThiEye Technologies Co., Ltd.

125. Responding to paragraph 125, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

126. Responding to paragraph 126, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

8. Energen/ Performance Tool Respondents

a) Best Buy Co., Inc.

127. Responding to paragraph 127, Best Buy admits that it is organized and existing under the laws of the United States but its principal place of business is located at 7601 Penn Avenue South, Richfield, Minnesota 55423. Best Buy denies the remaining allegations in this paragraph.

DELTRAN EX1002
IPR2024-01219

128. Responding to paragraph 128, Best Buy admits that it sells jump starter products. Best Buy denies the remaining allegations in this paragraph.

b) Chao Fung Trading Co. Ltd.

129. Responding to paragraph 129, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

130. Responding to paragraph 130, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Energen, Inc.

131. Responding to paragraph 131, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

132. Responding to paragraph 132, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

d) Wilmar Corporation

133. Responding to paragraph 133, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

134. Responding to paragraph 134, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

III. THE PRODUCTS AT ISSUE

135. Responding to paragraph 135, Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to

DELTRAN EX1002
IPR2024-01219

admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

136. Responding to paragraph 136, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

137. Responding to paragraph 137, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

138. Responding to paragraph 138, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

A. Complainant's Jump Starters

139. Responding to paragraph 139, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

140. Responding to paragraph 140, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

141. Responding to paragraph 141, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

142. Responding to paragraph 142, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

B. Respondents' Jump Starters

143. Responding to paragraph 143, Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to

DELTRAN EX1002
IPR2024-01219

admit or deny the allegations of this paragraph that are addressed to other Respondents and on that basis denies those allegations.

144. Responding to paragraph 144, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

145. Responding to paragraph 145, Best Buy admits that it sells jump starter products in its stores and on www.bestbuy.com. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

IV. THE ASSERTED PATENTS

146. Responding to paragraph 146, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

147. Responding to paragraph 147, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

A. U.S. Patent No. 9,007,015

1. Identification of the Patent and Ownership

148. Responding to paragraph 148, Best Buy admits that Exhibit 1 purports to be a certified copy of the '015 Patent. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

149. Responding to paragraph 149, Best Buy admits that Appendices A1 and A2 purport to be a certified copy of the prosecution history for the '015 Patent. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

DELTRAN EX1002
IPR2024-01219

150. Responding to paragraph 150, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Non-Technical Description of the Patent

151. Responding to paragraph 151, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

152. Responding to paragraph 152, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

3. Foreign Counterparts of the Patent

153. Responding to paragraph 153, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

154. Responding to paragraph 154, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

4. Licensees to the Patent

155. Responding to paragraph 155, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

B. U.S. Patent No. 10,604,024

1. Identification of the Patent and Ownership

156. Responding to paragraph 156, Best Buy admits that Exhibit 2 purports to be a certified copy of the '024 Patent. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

DELTRAN EX1002
IPR2024-01219

157. Responding to paragraph 157, Best Buy admits that Appendices. B1 and B2 purports to be a certified copy of the prosecution history for the '024 Patent. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

158. Responding to paragraph 158, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Non-Technical Description of the Patent

159. Responding to paragraph 159, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

160. Responding to paragraph 160, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

3. Foreign Counterparts of the Patent

161. Responding to paragraph 161, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

4. Licensees to the Patent

162. Responding to paragraph 162, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

V. THE ASSERTED TRADEMARKS

A. U.S. Trademark Reg. No. 4,811,656

163. Responding to paragraph 163, Best Buy admits that Exhibit 3 purports to be a copy of the Certificate of Registration for the ULTRASAFE mark for U.S. Trademark Reg. No.

DELTRAN EX1002
IPR2024-01219

4,811,656. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

164. Responding to paragraph 164, Appendix C purports to be a certified copy of the prosecution history of the ULTRASAFE trademark for U.S. Trademark Reg. No. 4,811,656. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

B. U.S. Trademark Reg. No. 4,811,749

165. Responding to paragraph 165, Exhibit 4 purports to be a copy of the Certificate of Registration for the SAFELY JUMP START A DEAD BATTERY IN SECONDS mark for U.S. Trademark Reg. No. 4,811,749. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

166. Responding to paragraph 166, Appendix D purports to be a certified copy of the prosecution history of the SAFELY JUMP START A DEAD BATTERY IN SECONDS trademark for U.S. Trademark Reg. No. 4,811,749. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

VI. THE ASSERTED PATENTS

A. Infringement of the Asserted Patents

167. Responding to paragraph 167, Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to

DELTRAN EX1002
IPR2024-01219

admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

168. Responding to paragraph 168, Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

169. Responding to paragraph 169, Best Buy denies the existence of the predicates and requirements of a violation of Section 337 with respect to Best Buy and, in particular, denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

3. Claim Chart 01- Carku Accused Products

a) Carku Design

170. Responding to paragraph 170, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

171. Responding to paragraph 171, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

172. Responding to paragraph 172, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

DELTRAN EX1002
IPR2024-01219

173. Responding to paragraph 173, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

174. Responding to paragraph 174, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Claim Chart 02- Boltpower Accused Products

a) Boltpower Design

175. Responding to paragraph 175, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

176. Responding to paragraph 176, Best Buy denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations

177. Responding to paragraph 177, Best Buy admits Exhibit 112 purports to be a claim chart. Best Buy denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

c) Infringement of the '024 Patent

178. Responding to paragraph 178, Best Buy denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

DELTRAN EX1002
IPR2024-01219

179. Responding to paragraph 179, Best Buy admits Exhibit 112 purports to be a claim chart. Best Buy denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

3. Claim Chart 03- Smartech Accused Products

a) Smartech Design

180. Responding to paragraph 180, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

181. Responding to paragraph 181, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

182. Responding to paragraph 182, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

183. Responding to paragraph 183, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

184. Responding to paragraph 184, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

4. Claim Chart 04- Weego Accused Products

a) Weego Design

DELTRAN EX1002
IPR2024-01219

185. Responding to paragraph 185, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

186. Responding to paragraph 186, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

187. Responding to paragraph 187, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

188. Responding to paragraph 188, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

189. Responding to paragraph 189, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

5. Claim Chart 05- Winplus Accused Products

a) Winplus Design

190. Responding to paragraph 190, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

191. Responding to paragraph 191, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

192. Responding to paragraph 192, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

c) Infringement of the '024 Patent

193. Responding to paragraph 193, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

194. Responding to paragraph 194, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

6. Claim Chart 06- Great Neck Accused Products

a) Great Neck Design

195. Responding to paragraph 195, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

196. Responding to paragraph 196, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

197. Responding to paragraph 197, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

7. Claim Chart 07- ThiEye Accused Products

a) ThiEye Design

198. Responding to paragraph 198, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

199. Responding to paragraph 199, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

200. Responding to paragraph 200, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

201. Responding to paragraph 201, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

202. Responding to paragraph 202, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

8. Claim Chart 08- Energen/Performance Tool Accused Products

a) Energen/Performance Tool Design

203. Responding to paragraph 203, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

204. Responding to paragraph 204, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

205. Responding to paragraph 205, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

206. Responding to paragraph 206, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

207. Responding to paragraph 207, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

9. Claim Chart 09- HALO Accused Products

a) HALO Design

208. Responding to paragraph 208, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

209. Responding to paragraph 209, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

210. Responding to paragraph 210, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

211. Responding to paragraph 211, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

212. Responding to paragraph 212, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

10. Claim Chart 10- Clore Accused Products

a) Clore Design

213. Responding to paragraph 213, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

b) Infringement of the '015 Patent

214. Responding to paragraph 214, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

215. Responding to paragraph 215, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

c) Infringement of the '024 Patent

216. Responding to paragraph 216, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

217. Responding to paragraph 217, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

B. Infringement of the Asserted Trademarks

218. Responding to paragraph 218, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

219. Responding to paragraph 219, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

220. Responding to paragraph 220, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

221. Responding to paragraph 221, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

222. Responding to paragraph 222, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Audew

223. Responding to paragraph 223, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

Autown

224. Responding to paragraph 224, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Beatit

225. Responding to paragraph 225, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Imazing

226. Responding to paragraph 226, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Jumtop

227. Responding to paragraph 227, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Nexpow

228. Responding to paragraph 228, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Sanrock

229. Responding to paragraph 229, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

Topdon

230. Responding to paragraph 230, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

Trekpow

231. Responding to paragraph 231, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

VII. SPECIFIC INSTANCES OF IMPORTATION AND SALE

232. Responding to paragraph 232, Best Buy admits that it sells jump starter products in the U.S. Best Buy denies that any Best Buy product infringes the Asserted Patents. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

A. Carku Brands

1. AllStart

233. Responding to paragraph 233, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

234. Responding to paragraph 234, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

235. Responding to paragraph 235, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

236. Responding to paragraph 236, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Antigravity Batteries

237. Responding to paragraph 237, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

238. Responding to paragraph 238, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

239. Responding to paragraph 239, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

240. Responding to paragraph 240, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

3. Audew

241. Responding to paragraph 241, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

242. Responding to paragraph 242, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

243. Responding to paragraph 243, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

244. Responding to paragraph 244, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

4. Autogen

245. Responding to paragraph 245, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

246. Responding to paragraph 246, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

247. Responding to paragraph 247, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

248. Responding to paragraph 248, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

5. Freeman

249. Responding to paragraph 249, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

250. Responding to paragraph 250, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

251. Responding to paragraph 251, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

252. Responding to paragraph 252, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

6. Gooloo

253. Responding to paragraph 253, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

254. Responding to paragraph 254, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

255. Responding to paragraph 255, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

256. Responding to paragraph 256, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

7. Grepro

257. Responding to paragraph 257, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

258. Responding to paragraph 258, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

259. Responding to paragraph 259, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

260. Responding to paragraph 260, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

8. iClever

261. Responding to paragraph 261, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

262. Responding to paragraph 262, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

263. Responding to paragraph 263, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

9. M Moock

264. Responding to paragraph 264, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

265. Responding to paragraph 265, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

266. Responding to paragraph 266, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

267. Responding to paragraph 267, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

10. Nekteck

268. Responding to paragraph 268, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

269. Responding to paragraph 269, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

270. Responding to paragraph 270, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

271. Responding to paragraph 271, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

11. PowerMax

272. Responding to paragraph 272, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

273. Responding to paragraph 273, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

274. Responding to paragraph 274, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

275. Responding to paragraph 275, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

12. Tacklife

276. Responding to paragraph 276, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

277. Responding to paragraph 277, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

278. Responding to paragraph 278, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

279. Responding to paragraph 279, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

13. Xiaomi

280. Responding to paragraph 280, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

281. Responding to paragraph 281, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

282. Responding to paragraph 282, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

283. Responding to paragraph 283, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

B. Boltpower Brands

1. Ampeak

284. Responding to paragraph 284, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

285. Responding to paragraph 285, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

286. Responding to paragraph 286, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

287. Responding to paragraph 287, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Arteck

288. Responding to paragraph 288, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

289. Responding to paragraph 289, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

290. Responding to paragraph 290, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

291. Responding to paragraph 291, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

3. Autown

292. Responding to paragraph 292, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

293. Responding to paragraph 293, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

294. Responding to paragraph 294, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

295. Responding to paragraph 295, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

4. Battery Tender

296. Responding to paragraph 296, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

297. Responding to paragraph 297, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

298. Responding to paragraph 298, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

299. Responding to paragraph 299, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

5. Beatit

300. Responding to paragraph 300, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

301. Responding to paragraph 301, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

302. Responding to paragraph 302, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

303. Responding to paragraph 303, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

6. Boltpower

304. Responding to paragraph 304, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

305. Responding to paragraph 305, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

306. Responding to paragraph 306, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

307. Responding to paragraph 307, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

7. DB Power/Valuelink

308. Responding to paragraph 308, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

309. Responding to paragraph 309, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

310. Responding to paragraph 310, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

311. Responding to paragraph 311, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

8. DieHard

312. Responding to paragraph 312, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

313. Responding to paragraph 313, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

314. Responding to paragraph 314, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

315. Responding to paragraph 315, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

9. Duralast

316. Responding to paragraph 316, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

317. Responding to paragraph 317, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

318. Responding to paragraph 318, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

319. Responding to paragraph 319, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

10. EverStart

320. Responding to paragraph 320, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

321. Responding to paragraph 321, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

322. Responding to paragraph 322, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

323. Responding to paragraph 323, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

11. Fconegy

324. Responding to paragraph 324, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

325. Responding to paragraph 325, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

326. Responding to paragraph 326, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

327. Responding to paragraph 327, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

12. Flylinktech

DELTRAN EX1002
IPR2024-01219

328. Responding to paragraph 328, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

329. Responding to paragraph 329, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

330. Responding to paragraph 330, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

331. Responding to paragraph 331, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

13. Imazing

332. Responding to paragraph 332, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

333. Responding to paragraph 333, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

334. Responding to paragraph 334, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

335. Responding to paragraph 335, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

14. Jumtop

336. Responding to paragraph 336, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

337. Responding to paragraph 337, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

338. Responding to paragraph 338, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

339. Responding to paragraph 339, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

15. KTI (K-Tool International)

340. Responding to paragraph 340, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

341. Responding to paragraph 341, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

342. Responding to paragraph 342, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

343. Responding to paragraph 343, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

16. Lemsir

344. Responding to paragraph 344, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

345. Responding to paragraph 345, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

346. Responding to paragraph 346, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

347. Responding to paragraph 347, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

17. Loftek

348. Responding to paragraph 348, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

349. Responding to paragraph 349, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

350. Responding to paragraph 350, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

351. Responding to paragraph 351, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

18. Matco Tools

352. Responding to paragraph 352, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

353. Responding to paragraph 353, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

354. Responding to paragraph 354, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

355. Responding to paragraph 355, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

19. Nexpow

356. Responding to paragraph 356, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

357. Responding to paragraph 357, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

358. Responding to paragraph 358, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

359. Responding to paragraph 359, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

20. PowerCache

360. Responding to paragraph 360, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

361. Responding to paragraph 361, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

362. Responding to paragraph 362, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

363. Responding to paragraph 363, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

21. Roav

DELTRAN EX1002
IPR2024-01219

364. Responding to paragraph 364, Best Buy admits that it sells Roav jump starter products within the U.S. and that the packaging of the Roav Accused Products indicates that the products are "Made in China." Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

365. Responding to paragraph 365, Best Buy denies that it purchased Roav jump starter products from Anker Technology (UK). Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

366. Responding to paragraph 366, Best Buy admits that it sells Roav jump starter products on www.bestbuy.com. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

367. Responding to paragraph 367, Best Buy admits that the packaging of the Roav Accused Products indicates that the products are "Made in China."

22. Sanrock

368. Responding to paragraph 368, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

369. Responding to paragraph 369, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

370. Responding to paragraph 370, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

371. Responding to paragraph 371, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

23. Schumacher

DELTRAN EX1002
IPR2024-01219

372. Responding to paragraph 372, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

373. Responding to paragraph 373, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

374. Responding to paragraph 374, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

375. Responding to paragraph 375, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

24. Tooliom

376. Responding to paragraph 376, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

377. Responding to paragraph 377, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

378. Responding to paragraph 378, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

379. Responding to paragraph 379, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

25. Topdon

380. Responding to paragraph 380, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

381. Responding to paragraph 381, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

382. Responding to paragraph 382, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

383. Responding to paragraph 383, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

26. Topvision

384. Responding to paragraph 384, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

385. Responding to paragraph 385, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

386. Responding to paragraph 386, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

387. Responding to paragraph 387, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

27. Trekpow

388. Responding to paragraph 388, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

389. Responding to paragraph 389, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

390. Responding to paragraph 390, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

391. Responding to paragraph 391, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

28. Vavofo

392. Responding to paragraph 392, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

393. Responding to paragraph 393, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

394. Responding to paragraph 394, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

395. Responding to paragraph 395, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

29. Vekkia

396. Responding to paragraph 396, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

397. Responding to paragraph 397, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

398. Responding to paragraph 398, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

399. Responding to paragraph 399, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

30. Yaber

400. Responding to paragraph 400, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

401. Responding to paragraph 401, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

402. Responding to paragraph 402, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

403. Responding to paragraph 403, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

C. Smartech Brands

1. Smartech

404. Responding to paragraph 404, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

405. Responding to paragraph 405, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

406. Responding to paragraph 406, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

407. Responding to paragraph 407, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

D. Weego Brands

1. Weego

408. Responding to paragraph 408, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

409. Responding to paragraph 409, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

410. Responding to paragraph 410, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

411. Responding to paragraph 411, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

E. Winplus Brands

1. Type S

412. Responding to paragraph 412, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

413. Responding to paragraph 413, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

414. Responding to paragraph 414, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

415. Responding to paragraph 415, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Winplus

DELTRAN EX1002
IPR2024-01219

416. Responding to paragraph 416, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

417. Responding to paragraph 417, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

418. Responding to paragraph 418, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

419. Responding to paragraph 419, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

F. Great Neck Brands

1. OEM Tools

420. Responding to paragraph 420, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

421. Responding to paragraph 421, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

422. Responding to paragraph 422, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

423. Responding to paragraph 423, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

G. ThiEye Brands

1. Buture

DELTRAN EX1002
IPR2024-01219

424. Responding to paragraph 424, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

425. Responding to paragraph 425, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

426. Responding to paragraph 426, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

427. Responding to paragraph 427, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Fnnemge

428. Responding to paragraph 428, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

429. Responding to paragraph 429, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

430. Responding to paragraph 430, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

431. Responding to paragraph 431, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

3. Utrai

432. Responding to paragraph 432, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

433. Responding to paragraph 433, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

434. Responding to paragraph 434, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

435. Responding to paragraph 435, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

H. Energen & Performance Tool Brands

1. Energen

436. Responding to paragraph 436, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

437. Responding to paragraph 437, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

438. Responding to paragraph 438, Best Buy denies that the Energen Accused Products were sold by Best Buy. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

439. Responding to paragraph 439, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

2. Performance Tool

440. Responding to paragraph 440, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

441. Responding to paragraph 441, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

442. Responding to paragraph 442, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

443. Responding to paragraph 443, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

I. Halo Brands

1. HALO

444. Responding to paragraph 444, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

445. Responding to paragraph 445, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

446. Responding to paragraph 446, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

447. Responding to paragraph 447, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

J. Clore Brands

1. Jump-N-Carry

448. Responding to paragraph 448, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

449. Responding to paragraph 449, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

450. Responding to paragraph 450, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

451. Responding to paragraph 451, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

VIII. HARMONIZED TARIFF SCHEDULE ITEM NUMBERS

452. Responding to paragraph 452, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

IX. DOMESTIC INDUSTRY

453. Responding to paragraph 453, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

A. Technical Prong

454. Responding to paragraph 454, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

455. Responding to paragraph 455, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

456. Responding to paragraph 456, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

B. Economic Prong

DELTRAN EX1002
IPR2024-01219

457. Responding to paragraph 457, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

458. Responding to paragraph 458, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

459. Responding to paragraph 459, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

460. Responding to paragraph 460, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

461. Responding to paragraph 461, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

462. Responding to paragraph 462, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

X. RELATED LITIGATION

463. Responding to paragraph 463, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

464. Responding to paragraph 464, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

465. Responding to paragraph 465, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

466. Responding to paragraph 466, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

DELTRAN EX1002
IPR2024-01219

XI. GEO

467. Responding to paragraph 467, Best Buy denies that a general exclusion order is required. Best Buy lacks sufficient information to admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

468. Responding to paragraph 468, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

469. Responding to paragraph 469, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

470. Responding to paragraph 470, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

471. Responding to paragraph 471, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

472. Responding to paragraph 472, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

473. Responding to paragraph 473, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

474. Responding to paragraph 474, Best Buy lacks sufficient information to admit or deny the allegations in this paragraph, and on that basis denies each and every allegation.

XII. REQUESTED RELIEF

475. Responding to paragraph 475, Best Buy denies it has infringed or will continue to infringe the Asserted Patents or Asserted Trademarks. Best Buy lacks sufficient information to

DELTRAN EX1002
IPR2024-01219

admit or deny the remaining allegations in this paragraph, and on that basis denies those allegations.

476. Responding to paragraph 476, Best Buy states:

a) Responding to paragraph a), Best Buy's response is that the Complaint is unfounded, and the relief requested by NOCO should be denied in its entirety.

b) Responding to paragraph b), Best Buy's response is that the Complaint is unfounded, and the relief requested by NOCO should be denied in its entirety.

c) Responding to paragraph c), Best Buy's response is that the Complaint is unfounded, and the relief requested by NOCO should be denied in its entirety.

d) Responding to paragraph d), Best Buy's response is that the Complaint is unfounded, and the relief requested by NOCO should be denied in its entirety.

e) Responding to paragraph e), Best Buy's response is that the Complaint is unfounded, and the relief requested by NOCO should be denied in its entirety.

f) Responding to paragraph f), Best Buy's response is that the Complaint is unfounded, and the relief requested by NOCO should be denied in its entirety.

RESPONDENT'S DEFENSES

Respondent sets forth below certain defenses to the allegations in the Complaint, based on the information available to Respondent at this time. Respondent notes that discovery in this investigation is at a very early stage, and Respondent's analysis of its defenses is continuing. Moreover, the parties have not yet exchanged claim constructions, and the Commission has not construed the claims of the asserted patents. Accordingly, Respondent reserves the right to assert additional defenses as this investigation proceeds. Moreover, Respondent, by identifying the

DELTRAN EX1002
IPR2024-01219

following defenses, does not admit that they have the burden of proof with respect to any of those defenses.

FIRST DEFENSE
(No Unfair Act/Unfair Competition)

1. Best Buy has not committed an unfair act and has not engaged in any unfair competition.

SECOND DEFENSE
(Non-Infringement)

2. Best Buy does not directly infringe, indirectly infringe, contribute to infringement, or induce infringement of any valid and enforceable claim of the Asserted Patents, either literally or under the doctrine of equivalents.

3. For non-limiting examples, Best Buy's products do not perform at least the following claim elements of the independent claims:

U.S. Patent No. 9,007,015

Claim 1	a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs
Claim 1	a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port.
Claim 1	a power switch connected between said internal power supply and said output port; and

DELTRAN EX1002
IPR2024-01219

Claim 1	a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch, such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs

U.S. Patent No. 10,604,024

Claim 1	a vehicle battery isolation sensor connected in circuit with the positive and negative polarity vehicle battery terminal connectors, the vehicle battery isolation sensor configured to detect a presence of the vehicle battery when connected between the positive and negative polarity vehicle battery terminal connectors
Claim 1	a reverse polarity sensor connected in circuit with the positive and negative polarity vehicle battery terminal connectors, the reverse polarity sensor configured to detect a polarity of the vehicle battery connected between the positive and negative polarity vehicle battery terminal connectors and to provide an output signal indicating that the positive and negative polarity terminals of the vehicle battery are properly connected to the positive and negative polarity vehicle battery connectors;
Claim 1	a microcontroller configured to receive

	input signals from the vehicle isolation sensor and the reverse polarity sensor, the microcontroller is configured to provide an activating output signal to turn on the power switch to cause the power supply to be connected to the positive and negative polarity vehicle battery connectors in response to the microcontroller receiving input signals simultaneously from the sensors indicating both the presence and connection of the vehicle battery to the positive and negative polarity vehicle battery connectors and proper polarity connection of the positive and negative polarity terminals of the vehicle battery with the positive and negative polarity battery terminal connectors, and the microcontroller is configured to provide a deactivating output signal to turn off the power switch to cause the power supply to be disconnected from the positive and negative polarity vehicle battery connectors in response to the microcontroller receiving input signals from the sensors indicating the absence of the vehicle battery connected to the positive and negative polarity vehicle battery connectors and/or improper polarity connection of the positive and negative polarity terminals of the vehicle battery to the positive and negative polarity vehicle battery connectors.
Claim 29	a vehicle battery isolation sensor connected in circuit with the positive and negative polarity vehicle battery terminal connectors, the vehicle battery isolation sensor configured to detect a presence of the vehicle battery when connected between the positive and negative polarity vehicle battery terminal connectors
Claim 29	a reverse polarity sensor connected in circuit with the positive and negative polarity vehicle battery terminal connectors, the reverse polarity sensor configured to detect a polarity of the vehicle battery connected between the

DELTRAN EX1002
IPR2024-01219

	positive and negative polarity vehicle battery terminal connectors and to provide an output signal indicating that the positive and negative polarity terminals of the vehicle battery are properly connected to the positive and negative polarity vehicle battery connectors.
Claim 29	a microcontroller configured to receive input signals from the vehicle isolation sensor and the reverse polarity sensor, the microcontroller configured to control operation of the power switch, wherein the microcontroller is configured to turn on the power switch when receiving input signals from the vehicle isolation sensor and reverse polarity sensor indicating both the presence and connection of the vehicle battery to the positive and negative polarity vehicle battery connectors and proper polarity connection of the positive and negative polarity terminals of the vehicle battery with the positive and negative polarity battery terminal connectors, and wherein the microcontroller is configured to turn off the power switch when receiving input signals from the sensors indicating the absence of the vehicle battery connected to the positive and negative polarity vehicle battery connectors and/or improper polarity connection of the positive and negative polarity terminals of the vehicle battery to the positive and negative polarity vehicle battery connectors.
Claim 30	a vehicle battery isolation sensor connected in circuit with the positive and negative polarity vehicle battery terminal connectors, the vehicle battery isolation sensor configured to detect a presence of the vehicle battery when connected between the positive and negative polarity vehicle battery terminal connectors.
Claim 30	a reverse polarity sensor connected in circuit with the positive and negative polarity vehicle battery terminal connectors, the reverse polarity sensor

DELTRAN EX1002
IPR2024-01219

	configured to detect a polarity of the vehicle battery connected between the positive and negative polarity vehicle battery terminal connectors and to provide an output signal indicating that the positive and negative polarity terminals of the vehicle battery are properly connected to the positive and negative polarity vehicle battery connectors.
Claim 30	a microcontroller configured to receive input signals from the vehicle isolation sensor and the reverse polarity sensor, the microcontroller is configured to turn on the power switch to cause the power supply to be connected to the positive and negative polarity vehicle battery connectors in response to the microcontroller receiving input signals simultaneously from the sensors indicating both the presence and connection of the vehicle battery to the positive and negative polarity vehicle battery connectors and proper polarity connection of the positive and negative polarity terminals of the vehicle battery with the positive and negative polarity battery terminal connectors, and the microcontroller is configured to turn off the power switch to prevent the power supply from being connected to the positive and negative polarity vehicle battery connectors in response to the microcontroller not receiving the input signals simultaneously from the sensors indicating both the presence and connection of the vehicle battery to the positive and negative polarity vehicle battery connectors and proper polarity connection of the positive and negative polarity terminals of the vehicle battery with the positive and negative polarity battery terminal connectors.

DELTRAN EX1002
IPR2024-01219

4. No dependent claim can be infringed if the independent claim from which it depends is not infringed. Since no independent claim of the Asserted Patents is infringed, no dependent claim is infringed either. This includes at least asserted claims 4, 11, 14, 18, 19, and 21 of the '015 patent and claims 4, 5, 6, 16, 19, 23, 24, and 26 of the '024 patent.

THIRD DEFENSE
(Invalidity)

5. The asserted claims of the Asserted Patents are invalid under 35 U.S.C. §§ 101, 102, 103, 112, 115, 116, and/or 256. Best Buy's investigation of the prior art and potential defenses in this Investigation is continuing.

6. For example, all of the asserted claims are invalid under 35 U.S.C. §102 and/or §103 in view of at least any reference listed on the face of the patents, any reference cited or referred to in the prosecution histories of the patents at issue, foreign counterparts to those patents, and related U.S. and foreign patents, the Notice of Prior Art filed in this investigation, any prior art referenced in any submission in any prior litigation and/or *Inter Partes* review proceeding against either Asserted Patent, and/or the following prior art, either individually or in combination, and any prior art related to the following prior art:

U.S. Patent No. 9,954,391 to Lei;

U.S. Patent No. 9,525,297 to Wang;

U.S. Patent No. 9,506,446 to Xinfang;

U.S. Patent No. 8,172,603 to Richardet;

U.S. Patent No. 8,076,900 to Brown;

U.S. Patent No. 7,345,450 to Krieger et. al;

U.S. Patent No. 7,095,339 to Peng et al;

U.S. Patent No. 6,426,606 to Purkey;

U.S. Patent No. 6,424,158 to Klang;

DELTRAN EX1002
IPR2024-01219

U.S. Patent No. 5,793,185 to Prelec et al;

U.S. Patent No. 5,650,974 to Yoshimura;

U.S. Patent No. 5,496,658 to Hein et al;

U.S. Patent No. 5,319,298 to Wanzong et al;

U.S. Patent No. 3,267,452 to Wolf ;

U.S. Patent No. 3,085,187 to Godshalk;

U.S. Patent No. 3,105,183 to Hysler et al;

U.S. Patent Application Publication No. 2013/0314041 to Proebstle;

U.S. Patent Application Publication No. 2013/0241488 to Dao;

U.S. Patent Application Publication No. 2013/0154543 to Richardson et al;

U.S. Patent Application Publication No. 2012/0091944 to Rogers

U.S. Patent Application Publication No. 2009/0174362 to Richardson et al;

U.S. Patent Application Publication No. 2007/0285049 to Krieger et al;

U.S. Patent Application Publication No. 2005/0252573 to Montani;

U.S. Patent Application Publication No. 2005/0110467 to Thomason;

U.S. Patent Application Publication No. 2005/0040788 to Tseng;

U.S. Patent Application Publication No. 2004/0130298 to Krieger et al;

Chinese Patent No. 202696190 to Zhang;

WO Publication No. 2013-137873 to Dao;

WO Publication No. 2010/129723 to Baxter et al;

Japanese Patent No. 2013137873A to Hirose et. al.;

USB Battery Charging Specification Version 1.2;

E-flite EC Connector Assembly Instructions 2008;

Datasheet for LM7805 Voltage Regulator from Fairchild Semiconductor;

Carku Product Brochure for the Epower-20 jump starter product;

DELTRAN EX1002
IPR2024-01219

Carku Product Brochure for the Epower-21 jump starter product;

MC78XX/LM78XX/MC78XXA 3-Terminal 1A Positive Voltage Regulator from Fairchild Semiconductor Corporation 2001.

7. Best Buy also incorporates by reference all prior art in any other Respondents' response to the Complaint and/or discovery responses.

8. Best Buy is continuing to seek further prior art and reserves the right to refine its positions regarding invalidity according to the appropriate dates on the procedural schedule of this Investigation, once issued.

FOURTH DEFENSE
(Lack of Written Description)

9. The Asserted Claims of the Asserted Patents are invalid under 35 U.S.C. § 112 (a) because the Asserted Patents fails to contain a sufficient written description of the alleged inventions set forth in the claims.

FIFTH DEFENSE
(Lack of Enablement)

10. The asserted claims of the Asserted Patents are invalid under 35 U.S.C. § 112 (a) because the Asserted Patents fails to disclose the manner and process of making and using the alleged inventions set forth in the claims, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same.

SIXTH DEFENSE
(Indefiniteness)

11. The asserted claims of the Asserted Patents are invalid under the second paragraph of 35 U.S.C. § 112 (b) for failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention.

SEVENTH DEFENSE

DELTRAN EX1002
IPR2024-01219

(Prosecution History Estoppel and/or Disclaimer)

12. On information and belief, NOCO's claims are barred in whole or in part by the doctrine of estoppel, including equitable estoppel and prosecution history estoppel. For example, NOCO disclaimed during prosecution of the Asserted Patents, and/or while defending against IPR proceedings, products that use only one sensor circuit and send one signal to the MCU in favor of claiming two sensors/two signals design,

EIGHTH DEFENSE
(Inequitable conduct / Unclean hands)

13. On information and belief, the NOCO is barred from asserting the Asserted Patents by the doctrine of unclean hands. For example, NOCO has alleged infringement by competitors' products and/or design-around products that NOCO knows or should know use features that NOCO disclaimed during prosecution of the Asserted Patents and/or while defending against IPR proceedings. Specifically, products that use only one sensor circuit and send one signal to the MCU, while NOCO distinguished their invention from prior art by claiming the two sensors/two signals design during prosecution,

NINTH DEFENSE
(Lack of a Domestic Industry)

14. On information and belief, NOCO has not adequately alleged and cannot prove the existence of a domestic industry as required under 19 U.S.C. § 1337(a)(2)-(3), in connection with the Asserted Patents. Specifically, Complainant fails to demonstrate that they have made significant investments in plant and equipment, significant employment of labor and capital, and/or substantial investments in exploitation of the Asserted Patents.

DELTRAN EX1002
IPR2024-01219

TENTH DEFENSE
(Inventorship)

15. On information and belief, the Asserted Patents are invalid under 35 U.S.C. § 115 (a) for failure to name the actual inventors and/or to name proper co-inventors.

ELEVENTH AFFIRMATIVE DEFENSE
(Incorporation and Reservation)

16. Respondent hereby adopts and incorporates by reference any other defenses raised by any of the other respondents in this investigation and reserves the right to assert additional defenses as they are discovered throughout the course of this Investigation.

REQUEST FOR RELIEF

All allegations in the Complaint which are not specifically admitted as set forth above are hereby denied.

WHEREFORE, with respect to the relief requested by Complainant, Best Buy responds that the Complaint is unfounded, and the relief requested by Complainant should be denied in its entirety. Specifically, Best Buy requests that the Commission:

A. Deny all relief requested in the Complaint;

B. Find that Best Buy has not violated Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337;

C. Find that the Accused Products do not infringe the Asserted Patents;

D. Find that the Asserted Patents are invalid for failing to comply with the requirements of patentability as set forth in at least 35 U.S.C. §§ 101, 102, 103, 112, 115, 116 and/or 256;

E. Find the domestic industry requirement is not shown for the Asserted Patents;

DELTRAN EX1002
IPR2024-01219

F. Dismiss the present Complaint and terminate the Investigation;

G. Award such other and further relief as the Commission deems just and proper.

STATEMENT PURSUANT TO 19 C.F.R. § 210.13(b)

Best Buy provides certain information, as a retailer, in the concurrently-submitted Confidential Exhibit A, attached, as required by 19 C.F.R. § 210.13(b). Best Buy specifically denies that any of the information or supplied data refers or relates to any allegations of unfair acts under Section 337 or otherwise, and Best Buy denies that any of its products infringe the Asserted Patents or otherwise constitute a violation of Section 337.

Dated: April 13, 2021

Respectfully submitted,

/s/ P. Andrew Riley

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Counsel for Respondent Best Buy Co., Inc.

DELTRAN EX1002
IPR2024-01219

DocuSign Envelope ID: 5D565CD0-CF1C-407E-96F2-08D5F894F281

VERIFICATION

I, Cheryl L. Hauch, am authorized to make this verification on behalf of Best Buy Co., Inc., and hereby verify that I have read "RESPONSE OF BEST BUY CO., INC. TO THE FIRST AMENDED COMPLAINT AND THE NOTICE OF INVESTIGATION." Although I do not have personal knowledge of all the facts contained therein, I hereby declare under penalty of perjury that they are true to the best of my knowledge, information and belief.

Dated: 4/13/2021 | 11:02 CDT

Signature: DocuSigned by: Cheryl L. Hauch E83949B2DD2B413...

Cheryl L. Hauch
Senior Corporate Counsel

CERTIFICATE OF SERVICE

I, Jiwei Zhang, hereby certify that on April 13, 2021, a copy of the foregoing document was filed and served as indicated:

The Honorable Lisa R. Barton Secretary to the Commission U. S. International Trade Commission 500 E Street, S.W., Room 112 Washington, D.C. 20436	☐ Via Hand Delivery (2 copies) ☐ Via U.S. Mail ☐ Via Overnight Mail ☐ Via Electronic Mail ☒ Via Electronic Docket Filing
The Honorable Clark S. Cheney Administrative Law Judge U.S. International Trade Commission 500 E Street, S.W. Washington, D.C. 20436 Cheney337@usitc.gov	☐ Via Hand Delivery (2 copies) ☐ Via U.S. Mail ☐ Via Overnight Mail ☒ Via Electronic Mail
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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

Technology Co., Ltd., 70mai Co., Ltd., Antigravity Batteries LLC, Gooloo Technologies LLC, Horizon Tool, Inc., Great Neck Saw Manufacturers, Inc., Matco Tools Corporation, Nekteck, Inc., Paris Corporation, and PowerMax Battery (U.S.A.), Inc.	
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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

/s/ Jiwei Zhang
Jiwei Zhang

DELTRAN EX1002
IPR2024-01219

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In the Matter of **CERTAIN PORTABLE BATTERY JUMP STARTERS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1256**

RESPONSE OF WINPLUS NORTH AMERICA, INC. TO AMENDED COMPLAINT AND THE COMMISSION'S NOTICE OF INVESTIGATION

Dated: April 19, 2021

Respectfully submitted,

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DELTRAN EX1002
IPR2024-01219

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Counsel for Respondent Winplus North America, Inc.

DELTRAN EX1002
IPR2024-01219

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Clark S. Cheney
Administrative Law Judge

In the Matter of **CERTAIN PORTABLE BATTERY JUMP STARTERS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1256**

RESPONSE OF WINPLUS NORTH AMERICA, INC. TO AMENDED COMPLAINT AND THE COMMISSION'S NOTICE OF INVESTIGATION

Pursuant to the United States International Trade Commission's (the "ITC") Rules, 19 C.F.R. Part 210, Respondent Winplus North America, Inc. (Winplus), hereby responds to the Amended Complaint Under Section 227 of the Tariff Act of 1930 (the "Amended Complaint"), filed by The NOCO Company ("NOCO" or the "Complainant"), and the Notice of Investigation (the "Notice") issued by the ITC. Winplus denies that it has engaged in unfair competition or violated Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("Section 337"), by importing, selling for importation, or selling within the United States after importation certain portable battery jump starters and components thereof, that infringe, directly, literally or under the doctrine of equivalents, any valid and enforceable claim of U.S. Patent Nos. 9,007,015 ("the '015 Patent") and 10,604,024 (" the '024 Patent") (collectively, the "Asserted Patents"). Winplus further denies that the Asserted Patents are valid and enforceable.

Winplus reserves the right to amend or supplement its response based on additional facts or developments that become available or that arise during discovery in this investigation.

DELTRAN EX1002
IPR2024-01219

RESPONSE TO AMENDED COMPLAINT[1]

Winplus files its response to the specific allegations of the Amended Complaint filed by NOCO admitting only those facts expressly admitted below and denying all others averred in the Amended Complaint, and states as follows:

I. INTRODUCTION[2]

1. Winplus admits that NOCO has filed a complaint requesting that the Commission institute an investigation pursuant to Section 337, but Winplus denies any allegation that it acted unlawfully, that it infringes any of the claims of the Asserted Patents, and further denies any allegation in Paragraph 1 of the Complaint directed at Winplus. Winplus denies that the Asserted Patents are valid or enforceable. Paragraph 1 of the Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 1 of the Complaint and, therefore, denies them.

2. Winplus admits that Paragraph 2 of the Amended Complaint references proposed respondents identified in Section 2.B of the Amended Complaint. Winplus North America, Inc. admits that it has imported the following Winplus Accused Products: model numbers AC55929-6/1, AC55929-60, and AC55717-1 identified in exhibits 115 and 159 to the Amended Complaint

[1] NOCO submitted six supplements to its Amended Complaint on February 4, 5, 8, 22, 23, and March 4, 2021. NOCO's supplements included withdrawn allegations, additional allegations, and multiple additional exhibits (including claim charts) that were not submitted with the original Complaint or Amended Complaint. To the extent any allegations set forth in NOCO's supplements and/or additional exhibits are not specifically addressed in the paragraphs herein, such allegations are denied.

[2] Winplus's reproduction of any headings set forth in the Complaint is solely for the purpose of convenience and is not, and should not be construed as, an admission by Winplus that any allegations or other statements in such headings, whether explicit or implied, are true, correct, or admitted by Winplus.

DELTRAN EX1002
IPR2024-01219

into the United States and sold those products after importation. Winplus denies the allegations with regard to the remaining Winplus Accused Products, which were imported by related entities. Winplus North America, Inc. denies that it currently imports Accused Products or sells such products in the United States after importation. Winplus denies any allegation that it acted unlawfully, that any of the Winplus Accused Products infringe the Asserted Patents, and further denies any other allegations in Paragraph 2 of the Amended Complaint directed at Winplus. Paragraph 2 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 2 of the Amended Complaint and, therefore, denies them.

3. Winplus denies the allegations in Paragraph 3 of the Amended Complaint as they pertain to Winplus. Winplus admits that documents purporting to be the Asserted Patents are attached as Exhibits 1 and 2 to the Amended Complaint. Paragraph 3 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 3 of the Amended Complaint and, therefore, denies them.

4. Winplus admits that documents purporting to be the Asserted Trademarks are attached as Exhibits 3 and 4 to the Complaint. NOCO has not alleged that Winplus infringes the Asserted Trademarks. Paragraph 4 of the Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 4 of the Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

5. Winplus admits that NOCO is alleging that the Accused Products infringe the Asserted Claims of the Asserted Patents. Winplus denies the allegations in Paragraph 5 of the Complaint as they pertain to Winplus. Winplus denies that its Accused Products infringe one or more of the Asserted Patents. Paragraph 5 of the Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 5 of the Complaint and, therefore, denies them.

6. Winplus admits that Paragraph 6 of the Amended Complaint describes the category of Accused Products as portable, battery-powered devices that are used to jump-start batteries such as those in automobiles, trucks, and other vehicles, and related components, namely battery cables and clamps. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 5 of the Complaint and, therefore, denies them.

7. Winplus denies that a domestic industry exists and is well established in the United States for each of the Asserted Patents and Asserted Trademarks

8. Winplus admits that NOCO is seeking a general exclusion order, cease and desist orders, and a bond. Winplus denies the allegations contained in Paragraph 8 of the Amended Complaint as they pertain to Winplus. Winplus further denies that NOCO is entitled to any relief whatsoever from the Commission, including a general exclusion order or a cease and desist order. Winplus further denies that NOCO is entitled to a bond during the 60-day Presidential review period.

9. Winplus admits that NOCO requests that limited exclusion orders be entered in the event the Commission finds that a general exclusion order is not appropriate. Winplus denies the

DELTRAN EX1002
IPR2024-01219

allegations in Paragraph 9 of the Complaint as they pertain to Winplus. Winplus further denies that NOCO is entitled to any relief whatsoever from the Commission as it relates to Winplus, including a limited exclusion order. Paragraph 9 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 9 of the Amended Complaint and, therefore, denies them.

II. THE PARTIES

A. Complainant

10. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 10 of the Amended Complaint and, therefore, denies them.

11. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 11 of the Amended Complaint and, therefore, denies them.

12. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 12 of the Amended Complaint and, therefore, denies them.

13. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 13 of the Amended Complaint and, therefore, denies them.

14. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 14 of the Amended Complaint and, therefore, denies them.

B. Respondents

15. Winplus admits that NOCO's Amended Complaint groups the Proposed Respondents by the entity that NOCO believe to be the manufacturer of a particular design and the entities that NOCO believes to be related to the importation of that design. Winplus denies that

DELTRAN EX1002
IPR2024-01219

Section VI of the Amended Complaint and the Confidential Declaration of Anne Hurst contain information regarding any "unfair acts" purportedly committed by Winplus. Winplus expressly denies that it has committed any unfair acts in violation of Section 337, and expressly denies that its products infringe any claims of the Asserted Patents. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 15 of the Amended Complaint and, therefore, denies them.

1. Carku Respondents

a) Advance Auto Parts, Inc.

16. Paragraph 16 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 16 of the Amended Complaint and, therefore, denies them.

17. Paragraph 17 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 17 of the Amended Complaint and, therefore, denies them.

b) Antigravity Batteries LLC

18. Paragraph 18 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 18 of the Amended Complaint and, therefore, denies them.

19. Paragraph 19 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 19 of the Amended Complaint and, therefore, denies them.

c) Aukey Technology Co., Ltd.

20. Paragraph 20 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 20 of the Amended Complaint and, therefore, denies them.

21. Paragraph 21 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 21 of the Amended Complaint and, therefore, denies them.

d) Autogen Technology Co., Ltd.

22. Paragraph 22 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 22 of the Amended Complaint and, therefore, denies them.

23. Paragraph 23 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 23 of the Amended Complaint and, therefore, denies them.

e) Gooloo Technologies LLC

24. Paragraph 24 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 24 of the Amended Complaint and, therefore, denies them.

25. Paragraph 25 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 25 of the Amended Complaint and, therefore, denies them.

f) Guangzhou Unique Electronics Co., Ltd.

26. Paragraph 26 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 26 of the Amended Complaint and, therefore, denies them.

27. Paragraph 27 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 27 of the Amended Complaint and, therefore, denies them.

g) Horizon Tool, Inc.

28. Paragraph 28 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 28 of the Amended Complaint and, therefore, denies them.

29. Paragraph 29 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 29 of the Amended Complaint and, therefore, denies them.

h) Huizhou Grepro E-Commerce

30. Paragraph 30 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 30 of the Amended Complaint and, therefore, denies them.

31. Paragraph 31 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 31 of the Amended Complaint and, therefore, denies them.

i) Medcursor, Inc.

32. Paragraph 32 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 32 of the Amended Complaint and, therefore, denies them.

33. Paragraph 33 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 33 of the Amended Complaint and, therefore, denies them.

j) Nekteck, Inc.

34. Paragraph 34 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 34 of the Amended Complaint and, therefore, denies them.

35. Paragraph 35 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 35 of the Amended Complaint and, therefore, denies them.

k) PowerMax Battery (U.S.A.), Inc.

36. Paragraph 36 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 36 of the Amended Complaint and, therefore, denies them.

37. Paragraph 37 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 37 of the Amended Complaint and, therefore, denies them.

l) Prime Global Products, Inc.

38. Paragraph 38 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 38 of the Amended Complaint and, therefore, denies them.

39. Paragraph 39 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 39 of the Amended Complaint and, therefore, denies them.

m) Shenzhen Carku Technology Co., Ltd.

40. Paragraph 40 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 40 of the Amended Complaint and, therefore, denies them.

41. Paragraph 41 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 41 of the Amended Complaint and, therefore, denies them.

n) Shenzhen Moock Technology Co., Ltd.

42. Paragraph 42 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 42 of the Amended Complaint and, therefore, denies them.

43. Paragraph 43 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 43 of the Amended Complaint and, therefore, denies them.

o) Shenzhen Take Tools Co., Ltd.

44. Paragraph 44 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 44 of the Amended Complaint and, therefore, denies them.

45. Paragraph 45 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 45 of the Amended Complaint and, therefore, denies them.

p) Sictec Instruments Co., Ltd.

46. Paragraph 46 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 46 of the Amended Complaint and, therefore, denies them.

47. Paragraph 47 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 47 of the Amended Complaint and, therefore, denies them.

q) Walmart Inc.

48. Paragraph 48 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 48 of the Amended Complaint and, therefore, denies them.

49. Paragraph 49 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 49 of the Amended Complaint and, therefore, denies them.

r) 70mai Co., Ltd.

50. Paragraph 50 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 50 of the Amended Complaint and, therefore, denies them.

51. Paragraph 51 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 51 of the Amended Complaint and, therefore, denies them.

2. Boltpower Respondents

a) Anker Technology (UK) Ltd.

52. Paragraph 52 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 52 of the Amended Complaint and, therefore, denies them.

53. Paragraph 53 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 53 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

b) Artek Electronic Co., Ltd.

54. Paragraph 54 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 54 of the Amended Complaint and, therefore, denies them.

55. Paragraph 55 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 55 of the Amended Complaint and, therefore, denies them.

c) Best Parts, Inc.

56. Paragraph 56 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 56 of the Amended Complaint and, therefore, denies them.

57. Paragraph 57 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 57 of the Amended Complaint and, therefore, denies them.

d) Circus Link, Inc.

58. Paragraph 58 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 58 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

59. Paragraph 59 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 59 of the Amended Complaint and, therefore, denies them.

e) Deltran USA, LLC

60. Paragraph 60 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 60 of the Amended Complaint and, therefore, denies them.

61. Paragraph 61 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 61 of the Amended Complaint and, therefore, denies them.

f) FlyLink Tech Technologies Co., Ltd.

62. Paragraph 62 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 62 of the Amended Complaint and, therefore, denies them.

63. Paragraph 63 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 63 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

g) Fconegy Co., Ltd.

64. Paragraph 64 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 64 of the Amended Complaint and, therefore, denies them.

65. Paragraph 65 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 66 of the Amended Complaint and, therefore, denies them.

h) Guangdong Boltpower Energy Co., Ltd.

66. Paragraph 66 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 66 of the Amended Complaint and, therefore, denies them.

67. Paragraph 67 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 67 of the Amended Complaint and, therefore, denies them.

i) Guangzhou Autolion Electric Technology Co., Ltd.

68. Paragraph 68 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 68 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

69. Paragraph 69 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 69 of the Amended Complaint and, therefore, denies them.

j) Integrated Supply Network, LLC

70. Paragraph 70 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 70 of the Amended Complaint and, therefore, denies them.

71. Paragraph 71 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 71 of the Amended Complaint and, therefore, denies them.

k) K-Tool International

72. Paragraph 72 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 72 of the Amended Complaint and, therefore, denies them.

73. Paragraph 73 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 73 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

l) Lowe's Companies, Inc.

74. Paragraph 74 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 74 of the Amended Complaint and, therefore, denies them.

75. Paragraph 75 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 75 of the Amended Complaint and, therefore, denies them.

m) Matco Tools Corporation

76. Paragraph 76 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 76 of the Amended Complaint and, therefore, denies them.

77. Paragraph 77 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 77 of the Amended Complaint and, therefore, denies them.

n) MonoPrice, Inc.

78. Paragraph 78 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 78 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

79. Paragraph 79 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 79 of the Amended Complaint and, therefore, denies them.

o) National Automotive Parts Association, LLC

80. Paragraph 80 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 80 of the Amended Complaint and, therefore, denies them.

81. Paragraph 81 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 81 of the Amended Complaint and, therefore, denies them.

p) O'Reilly Automotive, Inc.

82. Paragraph 82 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 82 of the Amended Complaint and, therefore, denies them.

83. Paragraph 83 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 83 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

q) Pep Boys

84. Paragraph 84 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 84 of the Amended Complaint and, therefore, denies them.

85. Paragraph 85 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 85 of the Amended Complaint and, therefore, denies them.

r) Schumacher Power Technology Ltd.

86. Paragraph 86 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 86 of the Amended Complaint and, therefore, denies them.

87. Paragraph 87 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 87 of the Amended Complaint and, therefore, denies them.

Schumacher Electric Corp.[3]

87a. Paragraph 87a of the Sixth Supplement to the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the

[3] NOCO added paragraphs 87a) and 87b) to its Amended Complaint via its Sixth Supplement to the Amended Complaint dated March 4, 2021.

DELTRAN EX1002
IPR2024-01219

extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 87a of the Sixth Supplement to the Amended Complaint and, therefore, denies them.

87b. Paragraph 87b of the Sixth Supplement to the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 87b of the Sixth Supplement to the Amended Complaint and, therefore, denies them.

s) Shenzhen Chic Electrics Co., Ltd.

88. Paragraph 88 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 88 of the Amended Complaint and, therefore, denies them.

89. Paragraph 89 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 89 of the Amended Complaint and, therefore, denies them.

t) Shenzhen Dingjiang Technology Co., Ltd. LLC

90. Paragraph 90 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 90 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

91. Paragraph 91 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 91 of the Amended Complaint and, therefore, denies them.

u) Shenzhen Lianfatong Technology Co., Ltd.

92. Paragraph 92 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 92 of the Amended Complaint and, therefore, denies them.

93. Paragraph 93 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 93 of the Amended Complaint and, therefore, denies them.

v) Shenzhen Li Feng Maoyiyouxiangongsi

94. Paragraph 94 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 94 of the Amended Complaint and, therefore, denies them.

95. Paragraph 95 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 95 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

w) Shenzhen Mediatek Tong Technology Co., Ltd.

96. Paragraph 96 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 96 of the Amended Complaint and, therefore, denies them.

97. Paragraph 97 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 97 of the Amended Complaint and, therefore, denies them.

x) Shenzhen Topdon Technology Co., Ltd.

98. Paragraph 98 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 98 of the Amended Complaint and, therefore, denies them.

99. Paragraph 99 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 99 of the Amended Complaint and, therefore, denies them.

y) Shenzhen Valuelink E-Commerce Co., Ltd.

100. Paragraph 100 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 100 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

101. Paragraph 101 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 101 of the Amended Complaint and, therefore, denies them.

z) Smart Well Enterprise Limited

102. Paragraph 102 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 102 of the Amended Complaint and, therefore, denies them.

103. Paragraph 103 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 103 of the Amended Complaint and, therefore, denies them.

aa) Tii Trading Inc.

104. Paragraph 104 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 104 of the Amended Complaint and, therefore, denies them.

105. Paragraph 105 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 105 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

bb) Zhejiang Qingyou Electronic Commerce co., Ltd.

106. Paragraph 106 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 106 of the Amended Complaint and, therefore, denies them.

107. Paragraph 107 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 107 of the Amended Complaint and, therefore, denies them.

3. Smartech Respondents

a) Smartech Products, Inc.

108. Paragraph 108 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 108 of the Amended Complaint and, therefore, denies them.

109. Paragraph 109 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 109 of the Amended Complaint and, therefore, denies them.

4. Weego Respondents

a) Shenzhen Jieruijia Technology Co., Ltd.

110. Paragraph 110 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 110 of the Amended Complaint and, therefore, denies them.

111. Paragraph 111 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 111 of the Amended Complaint and, therefore, denies them.

b) Paris Corporation

112. Paragraph 112 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 112 of the Amended Complaint and, therefore, denies them.

113. Paragraph 113 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 113 of the Amended Complaint and, therefore, denies them.

5. WinPlus Respondents

a) Shenzhen Winplus Technology Co., Ltd.

114. Paragraph 114 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. Winplus denies that it has any relationship to Shenzhen Winplus Technology Co., Ltd. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 114 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

115. Paragraph 115 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 115 of the Amended Complaint and, therefore, denies them.

b) Winplus North America, Inc.

116. Winplus admits that Winplus North America, Inc. is a company organized and existing under the laws of the United States, having its principal place of business located at 2975 Red Hill Avenue, Suite 100, Costa Mesa, California 92626.

117. Winplus North America, Inc. admits that it has imported and/or sold within the United States after importation, inter alia, jump starters. Winplus North America, Inc. denies that it currently imports and/or sells within the United States after importation, inter alia, jump starters. Winplus denies that the Winplus Accused Products infringe one or more claims of the Asserted Patents. Winplus denies the characterizations pertaining to the products purportedly identified in Paragraph 117 of the Amended Complaint.

6. Great Neck Respondents

a) AutoZone, Inc.

118. Paragraph 118 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 118 of the Amended Complaint and, therefore, denies them.

119. Paragraph 119 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 119 of the Amended Complaint and, therefore, denies them.

b) Great Neck Global, Inc. & Great Neck Saw Manufacturers, Inc.

120. Paragraph 120 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 120 of the Amended Complaint and, therefore, denies them.

121. Paragraph 121 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 121 of the Amended Complaint and, therefore, denies them.

122. Paragraph 122 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 122 of the Amended Complaint and, therefore, denies them.

7. ThiEye Respondents

a) Dongguan Hangchebao Energy Technology Co., Ltd.

123. Paragraph 123 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 123 of the Amended Complaint and, therefore, denies them.

124. Paragraph 124 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 124 of the Amended Complaint and, therefore, denies them.

b) ThiEye Technologies Co., Ltd.

125. Paragraph 125 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 125 of the Amended Complaint and, therefore, denies them.

126. Paragraph 126 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 126 of the Amended Complaint and, therefore, denies them.

8. Energen/Performance Tool Respondents

a) Best Buy Co., Inc.

127. Paragraph 127 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 127 of the Amended Complaint and, therefore, denies them.

128. Paragraph 128 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 128 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

b) Chao Fung Trading Co., Ltd.

129. Paragraph 129 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 129 of the Amended Complaint and, therefore, denies them.

130. Paragraph 130 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 130 of the Amended Complaint and, therefore, denies them.

c) Energen, Inc.

131. Paragraph 131 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 131 of the Amended Complaint and, therefore, denies them.

132. Paragraph 132 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 132 of the Amended Complaint and, therefore, denies them.

d) Wilmar Corporation

133. Paragraph 133 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 133 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

134. Paragraph 134 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134 of the Amended Complaint and, therefore, denies them.

9. Halo Respondents[4]

a) Halo2Cloud LLC

134a. Paragraph 134a of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134a of the Amended Complaint and, therefore, denies them.

134b. Paragraph 134b of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 133 of the Amended Complaint and, therefore, denies them.

b) QVC, Inc.

134c. Paragraph 134c of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134c of the Amended Complaint and, therefore, denies them.

[4] NOCO added paragraphs 134a) – 134h) to its Amended Complaint via its Sixth Supplement to the Amended Complaint dated March 4, 2021.

DELTRAN EX1002
IPR2024-01219

134d. Paragraph 134d of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134d of the Amended Complaint and, therefore, denies them.

c) Zagg Co. Rrd Gst

134e. Paragraph 134e of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134e of the Amended Complaint and, therefore, denies them.

134f. Paragraph 134f of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134f of the Amended Complaint and, therefore, denies them.

10. Jump-n-Carry Respondents

Clore Automotive, LLC

134g. Paragraph 134g of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134g of the Amended Complaint and, therefore, denies them.

134h. Paragraph 134h of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required,

DELTRAN EX1002
IPR2024-01219

Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 134h of the Amended Complaint and, therefore, denies them.

III. THE PRODUCTS AT ISSUE

135. Winplus admits that the Amended Complaint identifies the products at issue as portable battery jump starter packs that allow users to jump start cars, boats, motorcycles, and more without connecting to a vehicle. Winplus denies that any Winplus Accused Products include safety features claimed by the Asserted Patents. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 135 of the Amended Complaint and, therefore, denies them.

136. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 136 of the Amended Complaint and, therefore, denies them.

137. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 137 of the Amended Complaint and, therefore, denies them.

138. Winplus lacks sufficient knowledge or information to admit or deny the the allegations contained in Paragraph 138 of the Amended Complaint and, therefore, denies them.

A. Complainant's Jump Starters

139. Winplus admits that Paragraph 139 of the Amended Complaint contains a photograph labeled NOCO Boost® ProTM (GB150) 3,000A Jump Starter. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 139 of the Amended Complaint and, therefore, denies them.

140. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 140 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

141. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 141 of the Amended Complaint and, therefore, denies them.

142. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 142 of the Amended Complaint and, therefore, denies them.

B. Respondents' Jump Starters

143. Winplus North America, Inc. admits that it has imported into the United States portable battery jump starters manufactured in China. Winplus North America, Inc. denies that it is currently importing portable battery jump starters. Winplus denies that its products infringe the Asserted Patents. Paragraph 143 of the Amended Complaint contains allegations directed to entities other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 143 of the Amended Complaint and, therefore, denies them.

144. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 144 of the Amended Complaint and, therefore, denies them.

145. Winplus admits that the Winplus Accused Products are sold through brick-and-mortar retail locations and/or websites of these retailers in the United States and via online marketplaces such as Amazon.com. Paragraph 145 of the Complaint contains allegations directed to entities other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 145 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

IV. THE ASSERTED PATENTS

146. Winplus admits that the Asserted Patents purport to generally relate to portable battery jump starters. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 146 of the Complaint and, therefore, denies them.

147. Winplus admits that in certain paragraphs of the Amended Complaint below, NOCO purports to discuss the identification, ownership, non-technical description, foreign counterparts and licensees for each Asserted Patent. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 147 of the Amended Complaint and, therefore, denies them.

A. U.S. Patent No. 9,007,015

1. Identification of the Patent and Ownership

148. Winplus admits that the '015 Patent is titled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection" and that Exhibit 1 purports to be a certified copy of the '015 Patent, that it names Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill as inventors, and that it purports on its face to have issued on April 14, 2015 from an application filed on July 8, 2014, which purports to be a continuation of an application filed on July 3, 2014. The remainder of the allegations in Paragraph 148 of the Amended Complaint are legal conclusions to which no response is required. To the extent a response is required, Winplus denies them.

149. Winplus admits that Appendix A1 and A2 purport to be a certified copy of the prosecution history for the '015 Patent and the references cited therein. Winplus denies that Appendix A1 and A2 contain complete and accurate copies of the entirety of the prosecution

DELTRAN EX1002
IPR2024-01219

history of the '015 patent. For example, it appears that at least the complete record of the IPRs that have been filed against claims of the '015 patent are not included in their entirety in Appendix A1 or A2. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 149 of the Amended Complaint and, therefore, denies them.

150. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 150 of the Amended Complaint and, therefore, denies them.

2. Non-Technical Description of the Patent

151. The disclosure of the '015 patent speaks for itself. Winplus denies that the '015 patent discloses any improvements or anything that is novel. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 151 of the Complaint and, therefore, denies them.

152. Winplus admits that the '015 Patent, on its face, has 23 claims, 1 of which is an independent claim.

3. Foreign Counterparts of the Patent

153. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 153 of the Amended Complaint and, therefore, denies them.

154. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 154 of the Amended Complaint and, therefore, denies them.

4. Licensee to the Patent

155. Winplus admits that Confidential Exhibit 5C purports to identify all licensees to the '015 Patent. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 155 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

B. U.S. Patent No. 10,604,024

1. Identification of the Patent and Ownership

156. Winplus admits that the '024 Patent is titled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection." Winplus admits that Exhibit 2 purports to be a certified copy of the '024 Patent and appears to have been issued on March 31, 2020 naming Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill as the inventors. Winplus admits that on its face, the '024 Patent purports to have issued from an application filed on August 31, 2017, which purports to be a continuation of an application filed on February 11, 2015 and which purports to claim priority to an application filed on July 3, 2014. The remaining allegations contained in Paragraph 156 of the Amended Complaint are legal conclusions to which no response is required. To the extent a response is required, Winplus denies them.

157. Winplus admits that Appendix B1 and B2 purport to be a certified copy of the prosecution history for the '024 Patent and the references cited therein. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 149 of the Amended Complaint and, therefore, denies them.

158. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 158 of the Complaint and, therefore, denies them.

2. Non-Technical Description of the Patent

159. The disclosure of the '024 Patent speaks for itself. Winplus denies that the '024 Patent discloses any improvement or inventive features. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 159 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

160. Winplus admits that the '015 Patent, on its face, has 30 claims, 3 of which are independent claims.

3. Foreign Counterparts of the Patent

161. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 161 of the Amended Complaint and, therefore, denies them.

4. Licensee to the Patent

162. Winplus admits that Confidential Exhibit 5C purports to identify all licensees to the '024 Patent. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 155 of the Amended Complaint and, therefore, denies them.

V. THE ASSERTED TRADEMARKS

A. U.S. Trademark Reg. No. 4,811,656

163. Winplus admits that Exhibit 3 purports to be a copy of the Certificate of Registration for the Registered Trademark. NOCO has not accused Winplus of infringing the Asserted Trademarks. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 163 of the Amended Complaint and, therefore, denies them.

164. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 164 of the Amended Complaint and, therefore, denies them.

B. U.S. Trademark Reg. No. 4,811,749

165. Winplus admits that Exhibit 4 purports to be a copy of the Certificate of Registration for the Registered Trademark. NOCO has not accused Winplus of infringing the Asserted Trademarks. Winplus lacks sufficient knowledge or information to admit or deny the

DELTRAN EX1002
IPR2024-01219

remaining allegations contained in Paragraph 165 of the Amended Complaint and, therefore, denies them.

166. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 164 of the Amended Complaint and, therefore, denies them.

VI. UNFAIR ACTS OF THE PROPOSED RESPONDENTS

A. Infringement of the Asserted Patents

167. Winplus denies the allegations contained in Paragraph 167 of the Amended Complaint as they pertain to Winplus. Paragraph 167 of the Complaint contains allegations directed to entities other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 167 of the Amended Complaint and, therefore, denies them.

168. Winplus denies the allegations contained in Paragraph 168 of the Amended Complaint as they pertain to Winplus. Paragraph 168 of the Amended Complaint contains allegations directed to entities other than Winplus, to which no response is required. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 168 of the Amended Complaint and, therefore, denies them.

169. Winplus admits that NOCO has categorized the various accused products in this Investigation into ten separate groups, as set forth in its ten separate claims charts (Claim Chart 01 through Claim Chart 10). Winplus denies that any of the Winplus Accused Products infringe any claims of the Asserted Patents. Winplus notes that Exhibit 9 to the Complaint appears to have been withdrawn. To the extent a response is required to the remaining allegations in this paragraph,

DELTRAN EX1002
IPR2024-01219

Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 169 of the Amended Complaint and, therefore, denies them.

1. Claim Chart 01 – Carku Accused Products

a) Carku Design

170. Paragraph 170 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 170 of the Amended Complaint and, therefore, denies them.

b) Infringement of the '015 Patent

171. Paragraph 171 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 171 of the Amended Complaint and, therefore, denies them.

172. Paragraph 172 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 172 of the Amended Complaint and, therefore, denies them.

c) Infringement of the '024 Patent

173. Paragraph 173 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 173 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

174. Paragraph 174 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 174 of the Amended Complaint and, therefore, denies them.

2. Claim Chart 02 – Boltpower Accused Products

a) Boltpower Design

175. Paragraph 175 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 175 of the Amended Complaint and, therefore, denies them.

b) Infringement of the '015 Patent

176. Paragraph 176 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 176 of the Amended Complaint and, therefore, denies them.

177. Paragraph 177 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 177 of the Amended Complaint and, therefore, denies them.

c) Infringement of the '024 Patent

178. Paragraph 178 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 178 of the Amended Complaint and, therefore, denies them.

179. Paragraph 179 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 179 of the Amended Complaint and, therefore, denies them.

3. Claim Chart 03 – Smartech Accused Products

a) Smartech Design

180. Paragraph 180 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 180 of the Amended Complaint and, therefore, denies them.

b) Infringement of the '015 Patent

181. Paragraph 181 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 181 of the Amended Complaint and, therefore, denies them.

182. Paragraph 182 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 182 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

c) Infringement of the '024 Patent

183. Paragraph 183 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 183 of the Amended Complaint and, therefore, denies them.

184. Paragraph 184 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 184 of the Amended Complaint and, therefore, denies them.

4. Claim Chart 04 – Weego Accused Products

a) Weego Design

185. Paragraph 185 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 185 of the Amended Complaint and, therefore, denies them.

b) Infringement of the '015 Patent

186. Paragraph 186 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 186 of the Amended Complaint and, therefore, denies them.

187. Paragraph 187 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 187 of the Amended Complaint and, therefore, denies them.

c) Infringement of the '024Patent

188. Paragraph 188 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 188 of the Amended Complaint and, therefore, denies them.

189. Paragraph 189 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 189 of the Amended Complaint and, therefore, denies them.

5. Claim Chart 05 – Winplus Accused Products

a) Winplus Design

190. Winplus admits that Model AC55717-1 is sold under the Winplus brand. Winplus admits that models AC56388-BLK, AC56789-AM, and AC56794-1 are sold under the Type S brand. Winplus denies that model number AC530171-1 is sold under the Winplus brand. Model AC530171-1 is sold under the Type S brand. Winplus denies that it currently sells models AC55929-60 and AC55929-6/1. Winplus denies the remaining characterization of those jump starters in Paragraph 190 and Claim Chart 05. Winplus denies the remaining allegations contained in Paragraph 190 of the Amended Complaint. Winplus is not affiliated with Shenzhen Winplus. Winplus denies that the products listed in Claim Chart 05 infringe any claim of the Asserted

DELTRAN EX1002
IPR2024-01219

Patents. By way of further response, to the extent the claim chart set forth in Exhibit 159[5] is intended to supplement Exhibit 115, Winplus denies the allegations and characterizations set forth in that claim chart. Winplus denies that the product listed in Exhibit 115 infringes any claim of the Asserted Patents.

b) Infringement of the '015 Patent

191. Winplus denies the allegations contained in Paragraph 191 of the Amended Complaint.

192. Winplus admits that Exhibit 115 purports to compare the claims of the '015 Patent to a certain product. Winplus further admits that Exhibit 115 purports to contain a photograph of a Type S jump starter labeled AC56388-BLK. Winplus denies that it currently offers the remaining Accused Products in Exhibit 115. Winplus denies the characterizations pertaining to the products purportedly identified in Paragraph 192 of the Amended Complaint. Winplus denies that the chart is sufficient to demonstrate that the asserted claims of the '015 Patent are infringed. Winplus North America, Inc. admits that it has imported the following Winplus Accused Products: model numbers AC55929-6/1, AC55929-60, and AC55717-1 identified in exhibits 115 and 159 to the Amended Complaint into the United States and sold those products after importation. Winplus denies the allegations with regard to the remaining Winplus Accused Products, which were imported by related entities. Winplus North America, Inc. denies that it currently imports Accused Products or sells such products in the United States after importation. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 192 of the Amended Complaint and, therefore, denies them. By way of further response, to the extent

[5] NOCO submitted Exhibit 159 with its Fourth Supplement to the Amended Complaint dated February 22, 2021.

DELTRAN EX1002
IPR2024-01219

the claim chart set forth in Exhibit 159 is intended to supplement Exhibit 115, Winplus denies the allegations and characterizations set forth in that claim chart. Winplus denies that the products listed in Exhibits 115 or 159 infringe any claim of the Asserted Patents.

c) Infringement of the '024 Patent

193. Winplus denies the allegations contained in Paragraph 193 of the Amended Complaint.

194. Winplus admits that Exhibit 115 purports to compare the claims of the '024 Patent to a Type S jump starter. Winplus further admits that Exhibit 115 purports to contain a photograph of the product labeled AC56388-BLK. Winplus denies the characterizations pertaining to the products purportedly identified in Paragraph 194 of the Amended Complaint. Winplus denies that the chart is sufficient to demonstrate that the asserted claims of the '015 Patent are infringed. Winplus North America, Inc. admits that it has imported the following Winplus Accused Products: model numbers AC55929-6/1, AC55929-60, and AC55717-1 identified in exhibits 115 and 159 to the Amended Complaint into the United States and sold those products after importation. Winplus denies the allegations with regard to the remaining Winplus Accused Products, which were imported by related entities. Winplus North America, Inc. denies that it currently imports Accused Products or sells such products in the United States after importation. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 194 of the Amended Complaint and, therefore, denies them. By way of further response, to the extent the claim chart set forth in Exhibit 159 is intended to supplement Exhibit 115, Winplus denies the allegations and characterizations set forth in that claim chart. Winplus denies that the products listed in Exhibits 115 or 159 infringe any claim of the Asserted Patents.

DELTRAN EX1002
IPR2024-01219

6. Claim Chart 06 – Great Neck Accused Products

a) Great Neck Design

195. Paragraph 195 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 195 of the Amended Complaint and, therefore, denies them.

b) Infringement of the ’015 Patent

196. Paragraph 196 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 196 of the Amended Complaint and, therefore, denies them.

197. Paragraph 197 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 197 of the Amended Complaint and, therefore, denies them.

7. Claim Chart 07 – ThiEye Accused Products

a) ThiEye Design

198. Paragraph 198 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 198 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

b) Infringement of the '015 Patent

199. Paragraph 199 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 199 of the Amended Complaint and, therefore, denies them.

200. Paragraph 200 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 200 of the Amended Complaint and, therefore, denies them.

c) Infringement of the '024 Patent

201. Paragraph 201 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 201 of the Amended Complaint and, therefore, denies them.

202. Paragraph 202 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 202 of the Amended Complaint and, therefore, denies them.

8. Claim Chart 08 – Energen/Performance Tool Accused Products

a) Energen/Performance Tool Design

203. Paragraph 203 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 203 of the Amended Complaint and, therefore, denies them.

b) Infringement of the ’015 Patent

204. Paragraph 204 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 204 of the Amended Complaint and, therefore, denies them.

205. Paragraph 204 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 204 of the Amended Complaint and, therefore, denies them.

c) Infringement of the ’024 Patent

206. Paragraph 206 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 206 of the Amended Complaint and, therefore, denies them.

207. Paragraph 207 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 207 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

9. Claim Chart 09 – HALO Accused Products

a) HALO Design

208. Paragraph 208 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 208 of the Amended Complaint and, therefore, denies them.

b) Infringement of the '015 Patent

209. Paragraph 209 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 209 of the Amended Complaint and, therefore, denies them.

210. Paragraph 210 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 210 of the Amended Complaint and, therefore, denies them.

c) Infringement of the '024 Patent

211. Paragraph 211 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 211 of the Amended Complaint and, therefore, denies them.

212. Paragraph 212 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 212 of the Amended Complaint and, therefore, denies them.

10. Claim Chart 10 – Clore Accused Products

a) Clore Design

213. Paragraph 213 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 213 of the Amended Complaint and, therefore, denies them.

b) Infringement of the '015 Patent

214. Paragraph 214 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 214 of the Amended Complaint and, therefore, denies them.

215. Paragraph 215 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 215 of the Amended Complaint and, therefore, denies them.

c) Infringement of the '024 Patent

216. Paragraph 216 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 216 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

217. Paragraph 217 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 217 of the Amended Complaint and, therefore, denies them.

B. Infringement of the Asserted Trademarks

218. Paragraph 218 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. NOCO has not accused Winplus of infringing the Asserted Trademarks, To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 218 of the Amended Complaint and, therefore, denies them.

219. Paragraph 219 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. NOCO has not accused Winplus of infringing the Asserted Trademarks To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 219 of the Amended Complaint and, therefore, denies them.

220. Paragraph 220 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. NOCO has not accused Winplus of infringing the Asserted Trademarks To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 220 of the Amended Complaint and, therefore, denies them.

221. Paragraph 221 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. NOCO has not accused Winplus of infringing the Asserted Trademarks To the extent a response is required, Winplus lacks sufficient

DELTRAN EX1002
IPR2024-01219

knowledge or information to admit or deny the allegations contained in Paragraph 221 of the Amended Complaint and, therefore, denies them.

222. Paragraph 222 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. NOCO has not accused Winplus of infringing the Asserted Trademarks To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 222 of the Amended Complaint and, therefore, denies them.

Audew

223. Paragraph 223 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 223 of the Amended Complaint and, therefore, denies them.

Autown

224. Paragraph 224 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 224 of the Amended Complaint and, therefore, denies them.

Beatit

225. Paragraph 225 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 225 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

Imazing

226. Paragraph 226 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 226 of the Amended Complaint and, therefore, denies them.

Jumptop

227. Paragraph 227 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 227 of the Amended Complaint and, therefore, denies them.

Nexpow

228. Paragraph 228 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 228 of the Amended Complaint and, therefore, denies them.

Sanrock

229. Paragraph 229 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 229 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

Topdon

230. Paragraph 230 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 230 of the Amended Complaint and, therefore, denies them.

Trekpow

231. Paragraph 231 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 231 of the Amended Complaint and, therefore, denies them.

VII. SPECIFIC INSTANCES OF IMPORTATION AND SALE

232. Winplus North America, Inc. admits that it has imported the following Winplus Accused Products: model numbers AC55929-6/1, AC55929-60, and AC55717-1 identified in exhibits 115 and 159 to the Amended Complaint into the United States and sold those products after importation. Winplus denies the allegations with regard to the remaining Winplus Accused Products, which were imported by related entities. Winplus North America, Inc. denies that it currently imports Accused Products or sells such products in the United States after importation. Winplus denies that any Winplus Accused Product infringes any claim of the Asserted Patents. To the extent a further response is required, Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 232 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

A. Carku Brands

1. AllStart

233. Paragraph 233 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 233 of the Amended Complaint and, therefore, denies them.

234. Paragraph 234 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 234 of the Amended Complaint and, therefore, denies them.

235. Paragraph 235 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 235 of the Amended Complaint and, therefore, denies them.

236. Paragraph 236 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 236 of the Amended Complaint and, therefore, denies them.

2. Antigravity Batteries

237. Paragraph 237 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 237 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

238. Paragraph 238 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 238 of the Amended Complaint and, therefore, denies them.

239. Paragraph 239 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 239 of the Amended Complaint and, therefore, denies them.

240. Paragraph 240 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 240 of the Amended Complaint and, therefore, denies them.

3. Audew

241. Paragraph 241 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 241 of the Amended Complaint and, therefore, denies them.

242. Paragraph 242 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 242 of the Amended Complaint and, therefore, denies them.

243. Paragraph 243 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 243 of the Amended Complaint and, therefore, denies them.

244. Paragraph 244 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 244 of the Amended Complaint and, therefore, denies them.

4. Autogen

245. Paragraph 245 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 245 of the Amended Complaint and, therefore, denies them.

246. Paragraph 246 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 246 of the Amended Complaint and, therefore, denies them.

247. Paragraph 247 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 247 of the Amended Complaint and, therefore, denies them.

248. Paragraph 248 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 248 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

5. Freeman

249. Paragraph 249 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 249 of the Amended Complaint and, therefore, denies them.

250. Paragraph 250 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 250 of the Amended Complaint and, therefore, denies them.

251. Paragraph 251 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 251 of the Amended Complaint and, therefore, denies them.

252. Paragraph 252 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 252 of the Amended Complaint and, therefore, denies them.

6. Gooloo

253. Paragraph 253 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 253 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

254. Paragraph 254 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 254 of the Amended Complaint and, therefore, denies them.

255. Paragraph 255 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 255 of the Amended Complaint and, therefore, denies them.

256. Paragraph 256 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 256 of the Amended Complaint and, therefore, denies them.

7. Grepro

257. Paragraph 257 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 257 of the Amended Complaint and, therefore, denies them.

258. Paragraph 258 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 258 of the Amended Complaint and, therefore, denies them.

259. Paragraph 259 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 259 of the Amended Complaint and, therefore, denies them.

8. iClever

260. Paragraph 260 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 260 of the Amended Complaint and, therefore, denies them.

261. Paragraph 261 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 261 of the Amended Complaint and, therefore, denies them.

262. Paragraph 262 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 262 of the Amended Complaint and, therefore, denies them.

263. Paragraph 263 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 263 of the Amended Complaint and, therefore, denies them.

9. M Moock

264. Paragraph 264 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 264 of the Amended Complaint and, therefore, denies them.

265. Paragraph 265 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 265 of the Amended Complaint and, therefore, denies them.

266. Paragraph 266 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 266 of the Amended Complaint and, therefore, denies them.

267. Paragraph 267 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 267 of the Amended Complaint and, therefore, denies them.

10. Nekteck

268. Paragraph 268 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 268 of the Amended Complaint and, therefore, denies them.

269. Paragraph 269 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 269 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

270. Paragraph 270 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 270 of the Amended Complaint and, therefore, denies them.

271. Paragraph 271 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 271 of the Amended Complaint and, therefore, denies them.

11. PowerMax

272. Paragraph 272 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 272 of the Amended Complaint and, therefore, denies them.

273. Paragraph 273 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 273 of the Amended Complaint and, therefore, denies them.

274. Paragraph 274 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 274 of the Amended Complaint and, therefore, denies them.

275. Paragraph 275 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 275 of the Amended Complaint and, therefore, denies them.

12. Tacklife

276. Paragraph 276 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 276 of the Amended Complaint and, therefore, denies them.

277. Paragraph 277 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 277 of the Amended Complaint and, therefore, denies them.

278. Paragraph 278 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 278 of the Amended Complaint and, therefore, denies them.

279. Paragraph 279 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 279 of the Amended Complaint and, therefore, denies them.

13. Xiaomi

280. Paragraph 280 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 280 of the Amended Complaint and, therefore, denies them.

281. Paragraph 281 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 281 of the Amended Complaint and, therefore, denies them.

282. Paragraph 282 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 282 of the Amended Complaint and, therefore, denies them.

283. Paragraph 283 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 283 of the Amended Complaint and, therefore, denies them.

B. Boltpower Brands

1. Ampeak

284. Paragraph 284 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 284 of the Amended Complaint and, therefore, denies them.

285. Paragraph 285 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 285 of the Amended Complaint and, therefore, denies them.

286. Paragraph 286 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 286 of the Amended Complaint and, therefore, denies them.

287. Paragraph 287 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 287 of the Amended Complaint and, therefore, denies them.

2. Arteck

288. Paragraph 288 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 288 of the Amended Complaint and, therefore, denies them.

289. Paragraph 289 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 289 of the Amended Complaint and, therefore, denies them.

290. Paragraph 290 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 290 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

291. Paragraph 291 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 291 of the Amended Complaint and, therefore, denies them.

3. Autown

292. Paragraph 292 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 292 of the Amended Complaint and, therefore, denies them.

293. Paragraph 293 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 293 of the Amended Complaint and, therefore, denies them.

294. Paragraph 294 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 294 of the Amended Complaint and, therefore, denies them.

295. Paragraph 295 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 295 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

4. Battery Tender

296. Paragraph 296 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 296 of the Amended Complaint and, therefore, denies them.

297. Paragraph 297 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 297 of the Amended Complaint and, therefore, denies them.

298. Paragraph 298 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 298 of the Amended Complaint and, therefore, denies them.

299. Paragraph 299 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 299 of the Amended Complaint and, therefore, denies them.

5. Beatit

300. Paragraph 300 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 300 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

301. Paragraph 301 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 301 of the Amended Complaint and, therefore, denies them.

302. Paragraph 302 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 302 of the Amended Complaint and, therefore, denies them.

303. Paragraph 303 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 303 of the Amended Complaint and, therefore, denies them.

6. Boltpower

304. Paragraph 304 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 304 of the Amended Complaint and, therefore, denies them.

305. Paragraph 305 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 305 of the Amended Complaint and, therefore, denies them.

306. Paragraph 306 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 306 of the Amended Complaint and, therefore, denies them.

307. Paragraph 307 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 307 of the Amended Complaint and, therefore, denies them.

7. DB Power/Valuelink

308. Paragraph 308 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 308 of the Amended Complaint and, therefore, denies them.

309. Paragraph 309 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 309 of the Amended Complaint and, therefore, denies them.

310. Paragraph 310 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 310 of the Amended Complaint and, therefore, denies them.

311. Paragraph 311 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 311 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

8. DieHard

312. Paragraph 312 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 312 of the Amended Complaint and, therefore, denies them.

313. Paragraph 313 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 313 of the Amended Complaint and, therefore, denies them.

314. Paragraph 314 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 314 of the Amended Complaint and, therefore, denies them.

315. Paragraph 315 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 315 of the Amended Complaint and, therefore, denies them.

9. Duralast

316. Paragraph 316 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 316 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

317. Paragraph 317 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 317 of the Amended Complaint and, therefore, denies them.

318. Paragraph 318 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 318 of the Amended Complaint and, therefore, denies them.

319. Paragraph 319 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 319 of the Amended Complaint and, therefore, denies them.

10. Everstart

320. Paragraph 320 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 320 of the Amended Complaint and, therefore, denies them.

321. Paragraph 320 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 320 of the Amended Complaint and, therefore, denies them.

322. Paragraph 322 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 322 of the Amended Complaint and, therefore, denies them.

323. Paragraph 323 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 323 of the Amended Complaint and, therefore, denies them.

11. Fconegy

324. Paragraph 324 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 324 of the Amended Complaint and, therefore, denies them.

325. Paragraph 325 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 325 of the Amended Complaint and, therefore, denies them.

326. Paragraph 326 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 326 of the Amended Complaint and, therefore, denies them.

327. Paragraph 327 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 327 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

12. Flylinktech

328. Paragraph 328 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 328 of the Amended Complaint and, therefore, denies them.

329. Paragraph 329 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 329 of the Amended Complaint and, therefore, denies them.

330. Paragraph 330 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 330 of the Amended Complaint and, therefore, denies them.

331. Paragraph 331 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 331 of the Amended Complaint and, therefore, denies them.

13. Imazing

332. Paragraph 332 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 332 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

333. Paragraph 333 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 333 of the Amended Complaint and, therefore, denies them.

334. Paragraph 334 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 334 of the Amended Complaint and, therefore, denies them.

335. Paragraph 335 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 335 of the Amended Complaint and, therefore, denies them.

14. Jumtop

336. Paragraph 336 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 336 of the Amended Complaint and, therefore, denies them.

337. Paragraph 337 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 337 of the Amended Complaint and, therefore, denies them.

338. Paragraph 338 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 338 of the Amended Complaint and, therefore, denies them.

339. Paragraph 339 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 339 of the Amended Complaint and, therefore, denies them.

15. KTI (K-Tool International)

340. Paragraph 340 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 340 of the Amended Complaint and, therefore, denies them.

341. Paragraph 341 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 341 of the Amended Complaint and, therefore, denies them.

342. Paragraph 342 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 342 of the Amended Complaint and, therefore, denies them.

343. Paragraph 343 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 343 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

16. Lemsir

344. Paragraph 344 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 344 of the Amended Complaint and, therefore, denies them.

345. Paragraph 345 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 345 of the Amended Complaint and, therefore, denies them.

346. Paragraph 346 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 346 of the Amended Complaint and, therefore, denies them.

347. Paragraph 347 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 347 of the Amended Complaint and, therefore, denies them.

17. Loftek

348. Paragraph 348 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 348 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

349. Paragraph 349 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 349 of the Amended Complaint and, therefore, denies them.

350. Paragraph 350 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 350 of the Amended Complaint and, therefore, denies them.

351. Paragraph 351 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 351 of the Amended Complaint and, therefore, denies them.

18. Matco Tools

352. Paragraph 352 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 352 of the Amended Complaint and, therefore, denies them.

353. Paragraph 353 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 353 of the Amended Complaint and, therefore, denies them.

354. Paragraph 354 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 354 of the Amended Complaint and, therefore, denies them.

355. Paragraph 355 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 355 of the Amended Complaint and, therefore, denies them.

19. Nexpow

356. Paragraph 356 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 356 of the Amended Complaint and, therefore, denies them.

357. Paragraph 357 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 357 of the Amended Complaint and, therefore, denies them.

358. Paragraph 358 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 358 of the Amended Complaint and, therefore, denies them.

359. Paragraph 359 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 359 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

20. PowerCache

360. Paragraph 360 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 360 of the Amended Complaint and, therefore, denies them.

361. Paragraph 361 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 361 of the Amended Complaint and, therefore, denies them.

362. Paragraph 362 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 362 of the Amended Complaint and, therefore, denies them.

363. Paragraph 363 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 363 of the Amended Complaint and, therefore, denies them.

21. Roav

364. Paragraph 364 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 364 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

365. Paragraph 365 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 365 of the Amended Complaint and, therefore, denies them.

366. Paragraph 366 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 366 of the Amended Complaint and, therefore, denies them.

367. Paragraph 367 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 367 of the Amended Complaint and, therefore, denies them.

22. Sanrock

368. Paragraph 368 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 368 of the Amended Complaint and, therefore, denies them.

369. Paragraph 369 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 369 of the Amended Complaint and, therefore, denies them.

370. Paragraph 370 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 370 of the Amended Complaint and, therefore, denies them.

371. Paragraph 371 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 371 of the Amended Complaint and, therefore, denies them.

23. Schumacher

372. Paragraph 372 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 372 of the Amended Complaint and, therefore, denies them.

373. Paragraph 373 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 373 of the Amended Complaint and, therefore, denies them.

374. Paragraph 374 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 374 of the Amended Complaint and, therefore, denies them.

375. Paragraph 375 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 375 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

24. Tooliom

376. Paragraph 376 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 376 of the Amended Complaint and, therefore, denies them.

377. Paragraph 377 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 377 of the Amended Complaint and, therefore, denies them.

378. Paragraph 378 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 378 of the Amended Complaint and, therefore, denies them.

379. Paragraph 379 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 379 of the Amended Complaint and, therefore, denies them.

25. Topdon

380. Paragraph 380 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 380 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

381. Paragraph 381 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 381 of the Amended Complaint and, therefore, denies them.

382. Paragraph 382 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 382 of the Amended Complaint and, therefore, denies them.

383. Paragraph 383 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 383 of the Amended Complaint and, therefore, denies them.

26. Topvision

384. Paragraph 384 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 384 of the Amended Complaint and, therefore, denies them.

385. Paragraph 385 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 385 of the Amended Complaint and, therefore, denies them.

386. Paragraph 386 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 386 of the Amended Complaint and, therefore, denies them.

387. Paragraph 387 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 387 of the Amended Complaint and, therefore, denies them.

27. Trekpow

388. Paragraph 388 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 388 of the Amended Complaint and, therefore, denies them.

389. Paragraph 389 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 389 of the Amended Complaint and, therefore, denies them.

390. Paragraph 390 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 390 of the Amended Complaint and, therefore, denies them.

391. Paragraph 391 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 391 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

28. Vavofo

392. Paragraph 392 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 392 of the Amended Complaint and, therefore, denies them.

393. Paragraph 393 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 393 of the Amended Complaint and, therefore, denies them.

394. Paragraph 394 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 394 of the Amended Complaint and, therefore, denies them.

395. Paragraph 395 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 395 of the Amended Complaint and, therefore, denies them.

29. Vekkia

396. Paragraph 396 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 396 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

397. Paragraph 397 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 397 of the Amended Complaint and, therefore, denies them.

398. Paragraph 398 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 398 of the Amended Complaint and, therefore, denies them.

399. Paragraph 399 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 399 of the Amended Complaint and, therefore, denies them.

30. Yaber

400. Paragraph 400 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 400 of the Amended Complaint and, therefore, denies them.

401. Paragraph 401 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 401 of the Amended Complaint and, therefore, denies them.

402. Paragraph 402 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 402 of the Amended Complaint and, therefore, denies them.

403. Paragraph 403 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 403 of the Amended Complaint and, therefore, denies them.

C. Smartech Brands

1. Smartech

404. Paragraph 404 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 404 of the Amended Complaint and, therefore, denies them.

405. Paragraph 405 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 405 of the Amended Complaint and, therefore, denies them.

406. Paragraph 406 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 406 of the Amended Complaint and, therefore, denies them.

407. Paragraph 407 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 407 of the Amended Complaint and, therefore, denies them.

D. Weego Brands

1. Weego

408. Paragraph 408 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 408 of the Amended Complaint and, therefore, denies them.

409. Paragraph 409 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 409 of the Amended Complaint and, therefore, denies them.

410. Paragraph 410 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 410 of the Amended Complaint and, therefore, denies them.

411. Paragraph 411 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 411 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

E. Winplus Brands

1. Type S

412. Winplus admits that model numbers AC56388-BLK, AC56789-AM, AC56794-1 are manufactured outside the United States and sold for importation into the United States, imported into, and sold within the United States under the brand name Type-S.

413. Winplus North America, Inc. admits that it or an affiliated entity has imported and sold after importation Accused Products sold under the brand name Type S but denies that it currently does so. Winplus denies that it manufactures Type S products. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 413 of the Amended Complaint as they pertain to Shenzhen Winplus and, therefore, denies them. Winplus is not affiliated with Shenzhen Winplus.

414. Winplus admits that the Type S products are sold on Amazon.com after importation into the United States. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 414 and, therefore, denies them. Winplus does not sell Type S Accused Products to Walmart.

415. Winplus admits that the Type S product packaging indicates that the products are made in China.

2. Winplus

416. Winplus admits that Winplus models AC55717-1, AC559296/1, AC55929-60 were manufactured outside the United States and have been imported into, and sold in the United States under the brand name Winplus. However, model numbers AC559296/1 and AC55929-60 are no longer manufactured or imported. Winplus denies that model AC530171-1 has been imported

DELTRAN EX1002
IPR2024-01219

into, and sold in the United States under the brand name Winplus. This model has, however, been imported into, and sold in the United States under the Type S brand.

417. Winplus North America, Inc. admits that it has imported and sold after importation Accused Products sold under the brand name Winplus but denies that it currently does so. Winplus denies that Winplus products are manufactured by Winplus. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 417 of the Amended Complaint as they pertain to Shenzhen Winplus and, therefore, denies them. Winplus is not affiliated with Shenzhen Winplus.

418. Winplus admits that Winplus products are sold on Amazon.com. Winplus does not sell Winplus Accused Products to Walmart, Pep Boys, Advanced Auto, or AutoZone.

419. Winplus admits that the packaging of Winplus jump starters indicates that the products are made in China.

F. Great Neck Brands

1. OEM Tools

420. Paragraph 420 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 420 of the Amended Complaint and, therefore, denies them.

421. Paragraph 421 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 421 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

422. Paragraph 422 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 422 of the Amended Complaint and, therefore, denies them.

423. Paragraph 423 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 423 of the Amended Complaint and, therefore, denies them.

G. ThiEye Brands

1. Buture

424. Paragraph 424 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 424 of the Amended Complaint and, therefore, denies them.

425. Paragraph 425 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 425 of the Amended Complaint and, therefore, denies them.

426. Paragraph 426 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 426 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

427. Paragraph 427 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 427 of the Amended Complaint and, therefore, denies them.

2. Fnnemge

428. Paragraph 428 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 428 of the Amended Complaint and, therefore, denies them.

429. Paragraph 429 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 429 of the Amended Complaint and, therefore, denies them.

430. Paragraph 430 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 430 of the Amended Complaint and, therefore, denies them.

431. Paragraph 431 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 431 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

3. Utrai

432. Paragraph 432 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 432 of the Amended Complaint and, therefore, denies them.

433. Paragraph 433 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 433 of the Amended Complaint and, therefore, denies them.

434. Paragraph 434 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 434 of the Amended Complaint and, therefore, denies them.

435. Paragraph 435 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 435 of the Amended Complaint and, therefore, denies them.

H. Energen & Performance Tool Brands

1. Energen

436. Paragraph 436 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 436 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

437. Paragraph 437 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 437 of the Amended Complaint and, therefore, denies them.

438. Paragraph 438 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 438 of the Amended Complaint and, therefore, denies them.

439. Paragraph 439 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 439 of the Amended Complaint and, therefore, denies them.

2. Performance Tool

440. Paragraph 440 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 440 of the Amended Complaint and, therefore, denies them.

441. Paragraph 441 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 441 of the Amended Complaint and, therefore, denies them.

442. Paragraph 442 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 442 of the Amended Complaint and, therefore, denies them.

443. Paragraph 443 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 443 of the Amended Complaint and, therefore, denies them.

I. Halo Brands

1. HALO

444. Paragraph 444 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 444 of the Amended Complaint and, therefore, denies them.

445. Paragraph 445 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 445 of the Amended Complaint and, therefore, denies them.

446. Paragraph 446 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 446 of the Amended Complaint and, therefore, denies them.

447. Paragraph 447 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus

DELTRAN EX1002
IPR2024-01219

lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 447 of the Amended Complaint and, therefore, denies them.

J. Clore Brands

1. Jump-N-Carry

448. Paragraph 448 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 448 of the Amended Complaint and, therefore, denies them.

449. Paragraph 449 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 449 of the Amended Complaint and, therefore, denies them.

450. Paragraph 450 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 450 of the Amended Complaint and, therefore, denies them.

451. Paragraph 451 of the Amended Complaint contains allegations directed to an entity other than Winplus, to which no response is required. To the extent a response is required, Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 451 of the Amended Complaint and, therefore, denies them.

VIII. HARMONIZED TARIFF SCHEDULE ITEM NUMBERS

452. Winplus admits that the Winplus Accused Products are classified under the following Harmonized Tariff Schedule number: 8507.60.0020. Winplus lacks sufficient

DELTRAN EX1002
IPR2024-01219

knowledge or information to admit or deny the remaining allegations contained in Paragraph 452 of the Amended Complaint and, therefore, denies them.

IX. DOMESTIC INDUSTRY RELATING TO THE ASSERTED PATENTS

453. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 453 of the Amended Complaint and, therefore, denies them.

A. Technical Prong

454. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 454 of the Amended Complaint and, therefore, denies them.

455. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 455 of the Amended Complaint and, therefore, denies them.

B. Economic Prong

456. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 456 of the Amended Complaint and, therefore, denies them.

457. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 457 of the Amended Complaint and, therefore, denies them.

458. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 458 of the Amended Complaint and, therefore, denies them.

459. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 459 of the Amended Complaint and, therefore, denies them.

460. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 460 of the Amended Complaint and, therefore, denies them.

461. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 461 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

462. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 462 of the Amended Complaint and, therefore, denies them.

X. RELATED LITIGATION

463. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 463 of the Amended Complaint and, therefore, denies them.

464. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 464 of the Amended Complaint and, therefore, denies them.

465. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 465 of the Amended Complaint and, therefore, denies them.

466. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 466 of the Amended Complaint and, therefore, denies them.

XI. GEO

467. Winplus lacks sufficient knowledge or information to admit or deny the remaining allegations contained in Paragraph 467 of the Amended Complaint and, therefore, denies them.

468. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 468 of the Amended Complaint and, therefore, denies them.

469. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 469 of the Amended Complaint and, therefore, denies them.

470. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 470 of the Amended Complaint and, therefore, denies them.

471. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 471 of the Amended Complaint and, therefore, denies them.

DELTRAN EX1002
IPR2024-01219

472. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 472 of the Amended Complaint and, therefore, denies them.

473. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 473 of the Amended Complaint and, therefore, denies them.

474. Winplus lacks sufficient knowledge or information to admit or deny the allegations contained in Paragraph 474 of the Amended Complaint and, therefore, denies them.

XII. REQUESTED RELIEF

475. Winplus denies that it infringes any claims of the Asserted Patents, and denies that NOCO is entitled to any relief whatsoever from the ITC as prayed for in the Amended Complaint or otherwise, including, but not limited to, general or limited exclusion orders, a cease and desist order, and/or a bond.

476. Winplus denies that it infringes any claims of the Asserted Patents, and denies that NOCO is entitled to any relief whatsoever from the ITC as prayed for in the Amended Complaint or otherwise, including, but not limited to, general or limited exclusion orders, a cease and desist order, and/or a bond.

RESPONSE TO THE ITC'S NOTICE

Pursuant to Rule 210.13(b), Winplus hereby responds to the Notice of Institution of Investigation (the "Notice") issued by the ITC and published in the Federal Register on March 23, 2021, 85 Fed. Reg. 15496. Without admitting any of the specific or general allegations set forth in the Complaint as referenced in the Notice, Winplus provides the following response:

Winplus admits that a complaint was filed on behalf of NOCO with the ITC on January 19, 2021, pursuant to Section 337. NOCO filed an amended complaint on February 3, 2021. Winplus also acknowledges that the Complaint alleges certain violations of Section 337 in the importation

DELTRAN EX1002
IPR2024-01219

into the United States, the sale for importation, and the sale within the United States after importation of certain portable battery jump starters and components thereof, by reason of infringement of certain claims of U.S. Patent Nos. 9,007,015 and 10,604,024, and U.S. Trademark Registration Nos. 4,811,656 and 4,811, 749. Winplus also acknowledges that the Complaint alleges that an industry in the United States exists, as required by Section 337, but Winplus lacks sufficient information and knowledge to form a belief as to the truth of NOCO's allegation that it meets the domestic industry requirement and denies such allegation on that basis. Winplus further acknowledges that NOCO requested that the ITC institute an investigation and, after the investigation, issue a general or limited exclusion order, and cease and desist orders, as set forth in the "Summary" section of the Notice, but denies that NOCO is entitled to any relief.

Furthermore, as set forth in the "Scope of Investigation" section of the Notice, Winplus acknowledges that the ITC ordered that an investigation be instituted pursuant to subsection (b) of Section 337. The "Scope of Investigation" section of the Notice speaks for itself. Winplus denies that it has violated Section 337 for any reason, including: (i) importation into the United States, (ii) sale for importation into the United States, or (iii) sale within the United States after importation of portable, battery-powered devices used to jump-start batteries such as those in automobiles, trucks, and other vehicles, and related components, namely battery cables and clamps, by reason of infringement of the Asserted Claims of the Asserted Patents and Asserted Trademarks. Winplus denies that there is a violation of Section 337 of the Tariff Act of 1930, as amended, by reason of the alleged infringement of any asserted claim of the Asserted Patents. NOCO did not assert the Asserted Trademarks against Winplus. Winplus further denies that there is a protectable domestic industry as required by subsection (a)(2) of Section 337. Except as expressly admitted, Winplus denies the allegations in the Notice.

DELTRAN EX1002
IPR2024-01219

RESPONSE PURSUANT TO 19 C.F.R. § 210.13(b)

Winplus provides certain information as required by 19 C.F.R. § 210.13(b) in Confidential Exhibit A based on its understanding of the nature and scope of Accused Products. Winplus specifically denies that any of the supplied data refers to or relates to any unlawful act under Section 337 or otherwise, and Winplus specifically denies that any of its products infringe any of the claims of the Asserted Patents. Discovery has only recently begun and is ongoing. Winplus reserves the right to amend and/or supplement the information provided in Confidential Exhibit A.

DELTRAN EX1002
IPR2024-01219

AFFIRMATIVE AND OTHER DEFENSES

Subject to the responses above, Winplus alleges and asserts the following defenses in response to the allegations in the Complaint, undertaking the burden of proof only as to those defenses deemed affirmative defenses by law, regardless of how such defenses are denominated herein. In addition to the defenses described below, Winplus specifically reserves the right to allege additional defenses as they become known through the course of discovery. Discovery has only recently begun and, therefore, Winplus has not fully collected and reviewed all information that may be relevant to the matters and issues raised herein. Accordingly, pursuant to 19 C.F.R. § 210.14, Winplus reserves the right to supplement, modify, and/or amend its defenses, and to take further positions as discovery proceeds in this Investigation.

Winplus adopts and incorporates by reference the applicable affirmative defenses of other Respondents currently named or subsequently named in this Investigation.

FIRST DEFENSE

(No Infringement)

Winplus does not infringe and has not infringed any valid and enforceable claim of the Asserted Patents under any theory (including directly, contributorily, by inducement, jointly, literally, and/or under the doctrine of equivalents. The asserted claims of the Asserted Patents are not entitled to any construction that would cover any Winplus product made, used, sold, offered for sale, or alleged to be imported into the United States.

NOCO has not met its burden of proof to show that the Winplus Accused Products meet every limitation of any asserted claim of the Asserted Patents. By way of non-limiting example, the asserted claims of the Asserted Patents all include as an element a "vehicle battery isolation

DELTRAN EX1002
IPR2024-01219

sensor" that, in addition to "isolation" is configured to detect presence of a vehicle battery connected between positive and negative polarity outputs of a jump starter. The Winplus Accused products do not include a sensor that isolates or detects the presence of a vehicle battery as required by the claims. Additionally, the asserted claims of the '015 Patent require a power switch connected between the internal power supply and output port. This element is not met by the Winplus Accused Products. Winplus's investigation is ongoing. Winplus reserves the right to alter, amend, or supplement this defense as the Investigation proceeds.

SECOND DEFENSE

(Invalidity)

One or more claims of the Asserted Patents and Asserted Trademarks are invalid or void for failure to satisfy one or more of the requirements in Part II of Title 35 of the United States Code, including, but not limited to §§ 101, 102, 103, and/or 112. More specifically, with respect to its defenses under 35 U.S.C. §§ 102 and 103, Winplus provides an identification of prior art for each of the asserted patents at Exhibit B attached hereto. The prior art listed therein is exemplary only and should not be construed as limiting in any way the defenses that Winplus will present in this investigation. Winplus's investigation is ongoing. In addition, Winplus may rely on any art that is cited on the face of the asserted patents, art that is asserted or identified bv any of the other Respondents, admissions in the patents, admissions in the patents or their file histories, and any other references that Winplus may identify as its investigation continues.

DELTRAN EX1002
IPR2024-01219

THIRD DEFENSE

(No Import Violation)

NOCO has failed to and will not be able to demonstrate that Winplus has imported, sold for importation, or sold after importation in the United States any product that infringes any of the asserted claims at the time of importation under any theory (including directly, contributorily, by inducement, jointly, literally, and/or under the doctrine of equivalents).

FOURTH DEFENSE

(Unenforceability)

NOCO's claims are barred in whole or in part by reason of estoppel, waiver, laches, patent misuse, unclean hands, and/or other equitable doctrines.

For example, NOCO is barred in whole or in part by the doctrines of estoppel, acquiescence, and/or waiver from enforcing the Asserted Patents against Winplus due to its inaction in timely asserting the patents.

By way of further example, NOCO's claims are barred in whole or in part due to implied license, estoppel, waiver, and/or patent misuse in light of NOCO's activities related to de jure and/or de facto standards. Standards play a critical role in facilitating

An intentional concealment of prior art that is material to the patentability of the inventions claimed in a patent, an affirmative misrepresentation of a material fact, and/or the submission of false material information with an intent to deceive the United States Patent & Trademark Office ("USPTO") constitutes inequitable conduct before the USPTO.

DELTRAN EX1002
IPR2024-01219

The asserted patents are unenforceable because one or more persons involved in the prosecution of the patents deliberately withheld one or more material prior art references from the USPTO and made material misrepresentations to the USPTO during the prosecution of the patents. The single most reasonable inference that the ALJ and Commission can draw from each of these acts is that the deliberate withholding of these material prior art references and the material misrepresentations were done with specific intent to deceive the USPTO.

Upon information and belief, NOCO and the named inventors on the Asserted Patents were well aware of various prior art products and product literature that disclosed many if not all of the claims of the Asserted Patents, including elements that the inventors argued to the USPTO during prosecution were not present in prior art. In short, the applicants withheld material prior art and mischaracterized or did not fully disclose the scope of the prior art the USPTO cited.

For instance, Shenzhen Carku Technology Co., Ltd. (Carku) began offering for sale portable, lithium ion batter jump starter products in or around 2013. Based on those products, NOCO sought additional information from Carku to evaluate whether it could provide such a product to NOCO.

Following its evaluation of Carku's products and after additional correspondence with Carku, NOCO decided to manufacture its own products based off of Carku's existing product, and apply for the Asserted Patents without telling the USPTO about Carku's prior art products and disclosures to NOCO.

Upon information and belief, representatives from Carku sent product catalogs, testing reports, and samples of its Epower products to NOCO in late 2013 and early 2014. On further information and belief, a representative from Carku met with Mr. Johnathan Nook of NOCO in

DELTRAN EX1002
IPR2024-01219

January 2014 to demonstrate its products to NOCO. Upon information and belief, the purportedly novel features claimed in the Asserted Patents were present in the Carku Epower products as well as other features found in the dependent claims. Upon information and belief, one or more of these features were disclosed in Carku's publicly available catalogs and brochures. This information was not disclosed to the USPTO during prosecution of the Asserted Patents.

Upon information and belief, the Carku Epower products were made publicly available and/or on sale before the effective filing date of the Asserted Patents. Therefore, the Carku Epower products constitute material prior art, the disclosure of which would have led the USPTO to not allow one or more claims of the Asserted Patents.

FIFTH DEFENSE

(Lack of a Domestic Industry)

NOCO has not and cannot prove the existence of a domestic industry, as required by 19 U.S.C § 1337(a)(2) and as defined under 19 U.S.C. § 1337(a)(3), in connection with any claim of the Asserted Patents, and therefore is not entitled to any relief.

NOCO has not established and cannot establish that it has made "significant investment" in plant and equipment or labor or capital relating to any article protected by any valid and enforceable claim of any Asserted Patent, sufficient to satisfy the economic prong of the domestic industry requirement.

NOCO has not established and cannot establish that it has made a "substantial investment" in licensing, research and development, or other qualifying activities related to any article protected by any valid and enforceable claim of any Asserted Patent, sufficient to satisfy the economic prong of the domestic industry requirement.

DELTRAN EX1002
IPR2024-01219

NOCO also has not established and cannot establish that it practices any valid and enforceable claim of any Asserted Patent sufficient to satisfy the technical prong of the domestic industry requirement.

SIXTH DEFENSE

(License and/or Exhaustion)

NOCO's infringement claims fail to the extent the Winplus Accused Products are expressly or impliedly licensed under the Asserted Patents, and/or to the extent NOCO's alleged rights in the patents have been exhausted.

SEVENTH DEFENSE

(Prosecution History Estoppel)

NOCO is estopped from construing a valid and enforceable claim, if any, of the Asserted Patents as infringed literally or under the doctrine of equivalents by Winplus due to admissions and/or statements made (a) to the United States Patent and Trademark Office during prosecution of the Asserted Patents or related patent applications or during *inter partes* review proceedings related to the Asserted Patents, and (b) in the specifications and claims of the Asserted Patents.

EIGHTH DEFENSE

(No Unfair Act)

Winplus has committed no unfair act.

DELTRAN EX1002
IPR2024-01219

ADDITIONAL DEFENSES

Winplus reserves the right to amend this Response to include other affirmative defenses that Winplus may learn of during the course of this Investigation, including without limitation, inequitable conduct, prior authorized sale and/or exhaustion, equitable estoppel, and/or license, as they become known throughout the course of discovery.

WHEREFORE, Winplus prays that the Commission:

(a) find that Winplus has not violated Section 337;

(b) find that Winplus has not infringed any claims of the Asserted Patents;

(c) find the Asserted Patents to be invalid and/or unenforceable;

(d) find that Complainant has failed to satisfy the domestic industry requirement;

(e) deny Complainant's requested relief as it relates to Winplus;

(f) terminate the investigation as to Winplus; and

(g) provide such other relief to Winplus as the Commission deems appropriate.

Dated: April 19, 2021

Respectfully submitted,

/s/ David Shaw

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

VERIFICATION OF WINPLUS NORTH AMERICA, INC. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Steve Lehman, Partner and Chief Corporate Development Officer of ADC Holdings, in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.
2. I have read Respondent Winplus North America, Inc.'s Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with its contents.
3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:
    (a) are not being made for any improper purpose;
    (b) are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;
    (c) have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and
    (d) to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information or belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 19th day of April 2021 at 1:15pm BST.

Steve Lehman
Partner and Chief Corporate Development Officer
ADC Holdings

CERTIFICATE OF SERVICE

I, Christopher A. Moyer, hereby certify that true and correct copies of the foregoing document, RESPONSE OF WINPLUS NORTH AMERICA, INC. TO AMENDED COMPLAINT AND THE COMMISSION'S NOTICE OF INVESTIGATION, has been filed and served on this 19th day of April, 2021 on the following:

The Honorable Lisa R. Barton Secretary to the Commission **U.S. International Trade Commission** 500 E Street, S.W., Room 112 Washington, D.C. 20436	☒**Via Electronic Filing [EDIS]**
The Honorable Clark S. Cheney Administrative Law Judge **U.S. International Trade Commission** 500 E Street, S.W., Room 317 Washington, D.C. 20436	☒**Via Email** cheney337@usitc.gov
Todd P. Taylor Investigative Attorney Office of Unfair Import Investigations **U.S. International Trade Commission** 500 E Street, SW, Suite 401 Washington, DC 20436	☒**Via Email** Todd.Taylor@usitc.gov Jeffrey.hsu@usitc.gov
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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
IPR2024-01219

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DELTRAN EX1002
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DELTRAN EX1002
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DELTRAN EX1002
IPR2024-01219

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO

The Noco Company, Inc.,	**Case No. 1:18cv2780**
Plaintiff,	
-vs-	**JUDGE PAMELA A. BARKER**
SmarTech Products, Inc., et al.,	
Defendants	**MEMORANDUM OPINION AND ORDER**

This matter is before the Court to construe the disputed terms of Claims 1, 9 and 19 of U.S. Patent No. 9,007,015. (Doc. Nos. 31, 32, 34, 35.) Also pending is Plaintiff's Renewed Motion to Strike, in part, Defendants' Amended Invalidity Contentions. (Doc. No. 28.) For the reasons that follow, Plaintiff's Renewed Motion to Strike is DENIED. The Court's construction of Claims 1, 9 and 19 of U.S. Patent No. 9,007,015 is set forth below.

I. Relevant Background

On November 30, 2018, Plaintiff The Noco Company, Inc. (hereinafter "Plaintiff" or "Noco") filed a Complaint against SmarTech Products, Inc. alleging various claims under federal and state law for trade dress and trademark infringement and dilution, unfair competition, and deceptive trade practices. (Doc. No. 1.)

Several months later, on March 4, 2019, Plaintiff filed an Amended Complaint against Defendants SmarTech Products, Inc. and SmarTech, Inc.[1], alleging the following: (1) trade dress infringement and unfair competition under the Lanham Act, 15 U.S.C. §§ 1114 and 1125(a) (Counts

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[11] Plaintiff also named The Home Depot, Inc. as a Defendant in the Amended Complaint. (Doc. No. 7.) On April 29, 2019, this Court entered a Stipulation & Order to dismiss The Home Depot, Inc., without prejudice pursuant to Fed. R. Civ. P. 41(a)(1)(A)(ii). (Doc. No. 22.)

One and Two); (2) trademark infringement and unfair competition under the Lanham Act, 15 U.S.C. §§ 1114 and 1125(a) (Counts Three and Four); (3) deceptive trade practices under Ohio Rev. Code §§ 4165.01 – 4165.04 (Count Five); and (4) Patent Infringement of U.S. Patent No. 9,007,015 under 35 U.S.C. § 271 (Count Six). (Doc. No. 7.)

Relevant to Plaintiff's patent infringement claim, the Amended Complaint alleges the following. Plaintiff designs and creates premium consumer battery chargers, jump starters, and other portable power devices used primarily in the automotive and maritime industries. (*Id.* at ¶ 9.) In 2014, Plaintiff introduced a lithium ion battery powered jump starter, known as the NOCO Genius Boost. (*Id.* at ¶ 27.) On July 3, 2014, Plaintiff filed a utility patent application covering the NOCO Genius Boost jump starter, which was granted and issued on April 14, 2015 as U.S. Patent No. 9,007,015 ("the '015 Patent"). (*Id.* at ¶ 30.)

The '015 Patent "discloses and claims a handheld device for jump starting a vehicle engine that includes a lithium ion battery and a microcontroller (computer) as well as sensors to detect whether (1) the device is connected to both terminals of a vehicle battery, and (2) whether the connection is the proper polarity—i.e., whether or not the positive charging clamp is connected to the positive battery terminal and the negative charging clamp is connected to the negative terminal." (*Id.* at ¶ 31.) According to Plaintiff, "[t]]he microcontroller is configured (i.e., programmed) to instruct the charger to provide power to the charging clamps only when the sensors provide signals that the charger is fully connected to the battery, and that the connection is in the correct polarity."[2] (*Id.*)

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[2] As explained in the specification to the '015 Patent, one of the purposes of the invention was to address problems with previous art which displayed certain safety issues; i.e., "when either the jumper terminals or clamps of the cables were inadvertently brought into contact with each other while the other ends were connected to a charged battery, or when the positive and negative terminals were connected to the opposite polarity terminals in the vehicle to be jumped, thereby causing a short circuit resulting in sparking and potential damage to batteries and/or bodily injury." *See* '015 Patent at

DELTRAN EX1002
IPR2024-01219

Plaintiff alleges that "Defendants infringe the '015 Patent in violation of 35 U.S.C. § 271 by making, using, selling, offering to sell and/or importing at least the following models of compact lithium jump starters sold under the brand name Smartech that have safety features claimed in the '015 patent: the JS-15000 smarter™ Portable 15000mAh Lithium Powered Vehicle Jump Starter/Power Bank, JS-10000 smarter™ Portable 10000mAh Lithium Vehicle Jump Starter/Power Bank, and the JS-8000 smarter™ Portable 8000mAh Lithium Vehicle Jump Starter/Power Bank (collectively, the "Infringing Models")." (*Id.* at ¶ 33.)

On March 6, 2019, then-assigned District Judge Patricia Gaughan conducted a Case Management Conference, at which various case management deadlines were set including the exchange of initial infringement, non-infringement, and invalidity contentions and productions. (Doc. No. 12.)

On March 18, 2019, Defendant SmarTech Inc. filed its Answer, Affirmative Defenses, and Counterclaims. (Doc. No. 16.) Among other things, Defendant asserted counterclaims for declaratory judgment of non-infringement and invalidity of the '015 Patent. (*Id.*) With regard to its invalidity counterclaim, Defendant alleged that "[a]ll claims set forth in the '015 patent are invalid for failure to comply with the conditions of patentability set forth in 35 U.S.C. §§ 102, 103 and/or 112." (*Id.* at ¶ 70.) Defendant explained that "for example, and without limitation, the claims of the '015 patent are invalid under 35 U.S.C. §§ 102 and/or 103 because they are anticipated or rendered obvious by prior art and/or prior use." (*Id.*)

Col. 1, lns 16-23. The instant invention is designed to address these safety issues by disclosing a design whereby the microcontroller is programmed to instruct the charger to provide power to the charging clamps only when sensors indicate that they are properly connected.

DELTRAN EX1002
IPR2024-01219

On June 26, 2019, this matter was transferred to the undersigned pursuant to General Order 2019-013.

On July 9, 2019, Plaintiff filed a Motion to Strike Defendants' Invalidity Contentions on the grounds that Defendants failed to comply with the requirements of Local Patent Rule 3.5(c). (Doc. No. 23.) Defendant SmarTech filed a Brief in Opposition, to which Plaintiff replied. (Doc. Nos. 25, 26.)

On July 31, 2019, the Court conducted a status conference with counsel during which the Plaintiff's Motion to Strike was discussed. (Doc. No. 27.) In a Minute Order issued that date, the Court noted that it had "evaluated the positions of the parties relative [to Plaintiff's Motion], to include confirming that counsel for Defendants can and will correct the deficiencies regarding its invalidity contentions by August 7, 2019, and that the other dates set in this case will not be affected." (*Id.*) Accordingly, the Court denied Plaintiff's Motion and ordered that counsel for Defendants serve Plaintiff's counsel with its amended invalidity contentions by August 7, 2019. (*Id.*)

On August 12, 2019, Plaintiff filed a Renewed Motion to Strike, in part, Defendant's Amended Invalidity Contentions, in which it argued that Defendants had still not complied with Local Patent Rule 3.5(c). (Doc. No. 28.) Defendant filed a Brief in Opposition, to which Plaintiff replied. (Doc. Nos. 29, 30.)

The parties thereafter filed their Markman Briefs on October 3, 2019. (Doc. Nos. 31, 32.) Responses were filed on October 31, 2019. (Doc. Nos. 34, 35.) On November 5, 2019, the parties filed their Joint Claim Construction and Prehearing Statement. (Doc. No. 36.)

II. Renewed Motion to Strike Invalidity Contentions (Doc. No. 28)

DELTRAN EX1002
IPR2024-01219

In its Renewed Motion to Strike, Plaintiff argues that Defendant's Amended Invalidity Contentions relating to Claim 1 should be stricken because they fail to comply with Local Patent Rule 3.5(c).[3] (Doc. No. 28.) That Rule provides as follows:

> Not later than eighty (80) days after service of the Responsive Pleading, each party asserting that a claim of a patent is invalid or unenforceable, shall serve on all parties its Invalidity and Unenforceability Contentions which shall contain at least the following information:
>
> (a) The identity of each item of prior art that allegedly anticipates each asserted claim or renders it obvious. Each prior art patent shall be identified by its number, country of origin, and date of issue. Each prior art publication shall be identified by its title, date of publication, and where feasible, author and publisher. ***
>
> (b) Whether each item of prior art anticipates each asserted claim or renders it obvious under 35 U.S.C. §102 or §103. If obviousness is alleged, an explanation of why the prior art renders the asserted claim obvious, including an identification of any combinations of prior art showing obviousness;
>
> **(c) For each alleged item of prior art, a chart identifying specifically where each limitation of each asserted claims are found, including for each limitation that such party contends is governed by 35 U.S.C. § 112(6), the identity of the structure(s), act(s), or material(s) in each item of prior art that performs the claimed function; *****

Local Patent Rules 3.5(a) – (c) (emphasis added).

Plaintiff argues that Defendant's Amended Invalidity Contentions do not satisfy Rule 3.5(c) because they "fail to specifically identify where within each alleged prior art reference (e.g. Thomason, Dao, Xinfang, etc.) one can find each claim 1 limitation (e.g., the claimed 'output port'

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[3] Plaintiff's Renewed Motion to Strike relates only to Defendant's invalidity contentions as to Claims 1A, 1B, and 1C of the '015 Patent. (Doc. No. 28.) Defendant's invalidity contention as to Claim 1A is as follows: "Claim 1 is obvious under 35 U.S.C. § 103 when the teachings of Thomason '467, in view of Dao '488 and Xinfang '466 are combined." (Doc. No. 28-1.) Defendant's invalidity contention as to Claim 1B states: "Claim 1 is obvious under 35 U.S.C. § 103 when the teachings of Krieger '698 and Xinfang '446 are combined." (*Id.*) Finally, Defendant's invalidity contention as to Claim 1C is as follows: "Claim 1 is obvious under 35 U.S.C. § 103 [when] the teachings of Purkey '174 and Xinfang '446 are combined." (*Id.*)

DELTRAN EX1002
IPR2024-01219

or 'vehicle battery isolation sensor' or 'reverse polarity sensor.')." (Doc. No. 28 at p. 4.) Rather, Plaintiff claims that Defendant "merely asserts that all of these limitations are allegedly somewhere in the combination of the various prior art references." (*Id.*) Plaintiff maintains that it is prejudiced because "by refusing to comply with its disclosure obligations, defendants are attempting to obscure the nature and scope of their alleged prior art, conceal their invalidity theories, and hide possible claim construction disputes." (*Id.* at p. 5.)

Defendant argues that Plaintiff's Motion should be denied because Defendant properly identified the relevant prior art in its recitation of Claim 1 on pages 2 and 3 of its Amended Preliminary Invalidity Contentions. (Doc. No. 29 at p. 2.) Specifically, Defendant notes that, in the narrative portion of its Amended Invalidity Contentions, it explains as follows:

> Claim 1 of the '015 Patent was rejected as being obvious under 35 U.S.C. § 103 by the Patent Examiner in the prosecution of the application in the U.S. Patent Office. In order to overcome this prior art rejection, the applicant amended Claim 1 with new limiting language shown by the underlined portion below. This language was found by the Patent Examiner to make the claim allowable:
>
> 1. Apparatus for jump starting a vehicle engine, comprising:
>
> an internal power supply;
>
> an output port having positive and negative polarity outputs;
>
> a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;
>
> a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;

DELTRAN EX1002
IPR2024-01219

> a power switch connected between said internal power supply and said output port; and
>
> a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch, such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

(Doc. No. 28-1 at pp. 2-3.) In response to Plaintiff's Renewed Motion to Strike, Defendant explains that "[t]he thrust of SmarTech's contention with respect to Claim 1 is that NOCO is estopped under the doctrine of file wrapper estoppel to now argue that the language in Claim 1 that was rejected by the Examiner (i.e., the non-underlined portions of Claim 1) is novel." (Doc. No. 29 at p. 2.) Defendant asserts that "the prior art upon which SmarTech relies includes the non-underlined portions of Claim 1, which the Examiner already found is derived from Thomason '467 in view of Dao '488." (*Id.*)

Defendant further maintains that "[t]he additional prior art upon which SmarTech relies with respect to Claim 1 is directed at and applied to the underlined language." (*Id.*) In this regard, Defendant provides the following additional explanation of its invalidity contentions:

> To be clear, the Xinfang patent '446 reference discloses a circuit board with an LED module which provides an output signal (LED) indicating a test circuit 64 for testing the battery voltage (col. 6, ln. 55 to col. 7, ln. 3), and an over discharge circuit 68 (col. 6 ln. 56). This easily could be modified by someone skilled in the art to provide detection on proper battery pole connection. Furthermore, the Krieger et al. patent 7,656,118 discloses reverse polarity protection (col. 5, lns. 19-29; col. 6, lns. 1-37; col. 7, lns. 23-49; col. 8, lns. 31-67; col. 9, lns. 1-36; col. 10, lns. 42-62); and the Purkey patent publication '174 discloses the isolation circuit 40 (para. 0017, 0020-0023, 0048,

DELTRAN EX1002
IPR2024-01219

> 0049, and 0053-0056). These circuits would teach someone skilled in the art to easily modify the device taught by Thompson '467 and Dao '488 to obtain the claimed results of Claim 1 of the patent in suit.

(*Id.* at p. 3.) Defendant maintains that its invalidity contentions are sufficient and "in any event the foregoing discussion should ameliorate any concerns that NOCO purports to have" regarding the sufficiency of SmarTech's invalidity contentions. (*Id.* at p. 5.)

In its Reply Brief, Plaintiff argues that the additional information provided in Defendant's brief in opposition should have been included in its invalidity contention charts. (Doc. No. 30 at p. 2.) Plaintiff further asserts that "file wrapper estoppel" is not applicable to the literal scope of the claims and that, in any event, Defendant should have incorporated the specific information on which its estoppel theory relies into the invalidity contention chart. (*Id.*) Plaintiff argues that "there is real prejudice to NOCO because it is being forced to progress through claim construction without legitimate invalidity contentions" and maintains that there should be "some repercussions" for Defendant's alleged failure to satisfy its obligations under the Local Rules. (*Id.*) Plaintiff asserts that "the deficient contentions regarding claim 1 should be stricken and defendants precluded in this action from asserting invalidity contentions with respect to the limitations of claim 1." (*Id.* at p. 6.)

Contentions under the Local Patent Rules are meant to provide "reasonable notice" of the reasons why a party "believes it has a reasonable chance of proving" its claims and defenses. *Datatrak Intl., Inc. v. Medidata Sols., Inc.*, 2015 WL 12734894 at *3 (N.D. Ohio, July 10, 2015). *See also Hytera Communications Corp., Ltd. v. Motorola Solutions, Inc.*, 2019 WL 3006825 at * 1 (N.D. Ohio July 10, 2019). "They do not require disclosure of all of the specific evidence that a party will rely on to prove their position." *Hytera Communications Corp., Ltd.*, 2019 WL 3006825 at * 1 (citing *Core Wireless Licensing, S.A.R.L. v. LG Elecs., Inc.*, 2016 WL 3655302 at *1, 4 (E.D. Tex. 2016)).

DELTRAN EX1002
IPR2024-01219

The Court has carefully reviewed the parties' briefs, as well as the Defendant's Amended Invalidity Contentions. Based on that review, the Court cannot say that the Defendant's initial contentions are so deficient that they should be stricken. While the invalidity contention chart itself could have included greater detail, Defendant provides additional explanations of the bases of its invalidity contentions with respect to Claims 1A, 1B, and 1C in (1) the narrative preceding the chart in its Amended Preliminary Invalidity Contentions (Doc. No. 28-1 at pp. 2-3); and (2) the more detailed explanation set forth on page 3 of its Brief in Opposition (Doc. No. 29) to Plaintiff's Renewed Motion to Strike, set forth above. Indeed, with respect to the latter, Plaintiff appears to acknowledge that this description would have satisfied Local Rule 3.5(c) had it been included in the chart. (Doc. No. 30 at pp. 2-3.)

Certainly, it would have been preferable for Defendant to have included the additional information provided in its Brief in Opposition to Plaintiff's Renewed Motion in its Amended Preliminary Invalidity Contentions. However, the Court finds that Plaintiff has not demonstrated that it has been prejudiced to an extent that would warrant the rather drastic sanction of striking Defendant's invalidity contentions as to this key Claim. *See Braun v. Ultimate Jetcharters, Inc.*, 2014 WL 12584328 at * 1 (N.D. Ohio Feb. 25, 2014) (finding that motions to strike are disfavored because they are a "drastic remedy"). *See also Datatrak,* 2015 WL 12734894 at * 3 (declining to strike contentions where defendant had reasonable notice of plaintiff's infringement contentions); *Hytera*, 2019 WL 3006825 at * 2 (same). Under the particular circumstances presented, the Court finds that this litigation would be better served through resolution of the issues on the merits rather than through a motion to strike.

DELTRAN EX1002
IPR2024-01219

Accordingly, Plaintiff's Renewed Motion to Strike, in Part, Defendant's Amended Preliminary Invalidity Contentions (Doc. No. 28) is denied.

III. Claims Construction

A. Standard of Review

An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the product accused of infringing. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). It is the first step, commonly known as claim construction or interpretation, that is at issue at this juncture.

Construction of patent claims is a question of law for the Court. *Markman,* 52 F.3d at 970-71. In construing claim terms, "the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to 'particularly point[ ] out and distinctly claim[ ] the subject matter which the patentee regards as his invention.'" *Interactive Gift Express, Inc. v. Compuserve, Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001) (quoting 35 U.S.C. § 112, ¶ 2). "Words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). The ordinary and customary meaning of a claim term "is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention[.]" *Id.* at 1313 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). "Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.*

DELTRAN EX1002
IPR2024-01219

Accordingly, the first step is to look to the claim itself. *See Verbovsky v. Goodbaby Int'l Holdings, Inc.*, 2017 WL 3840416 at *1 (N.D. Ohio Sept. 1, 2017). As the Federal Circuit has explained, "the context in which a term is used in the asserted claim can be highly instructive." *Phillips*, 415 F.3d at 1314. Additionally, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. *Id.* Moreover, it is important to remember that, "[i]n some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314. In these situations, a general purpose dictionary can be helpful. *Id.*

While the language of the claim itself is critical to a court's analysis, "[t]he claims . . . do not stand alone." *Id.* at 1315. Rather, "they are part of 'a fully integrated written instrument,' *Markman*, 52 F.3d at 978, consisting principally of a specification that concludes with the claims." *Id.* For that reason, claims "must be read in view of the specification, of which they are a part." *Markman*. 52 F.3d at 979. Indeed, the specification "is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Phillips,* 415 F.3d at 1315. As explained by the Federal Circuit:

> Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

DELTRAN EX1002
IPR2024-01219

Id. at 1316 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)). However, while the court may look to the specification to interpret the meaning of a claim term, it may not read a limitation from the written description into a claim. *Id.* at 1323.

A court may also consider the patent's prosecution history when conducting claim construction. *Id.* at 1317. The prosecution history, which is designated as part of the "intrinsic evidence," consists of the complete record of the proceedings before the Patent and Trademark Office ("PTO") and includes the prior art cited during the examination of the patent. *Id.* Like the specification, the prosecution history "provides evidence of how the PTO and the inventor understood the patent." *Id.* Indeed, the "prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id. See also Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005).

All other evidence is considered "extrinsic" and may be relied upon by the court in its discretion. *Markman*, 52 F.3d at 980; *Phillips*, 415 F.3d at 1317. Extrinsic evidence, however, is less reliable than intrinsic evidence in determining how to read claim terms. *Phillips*, 415 F.3d at 1318. Thus, a court should restrict its reliance on extrinsic evidence to educating itself regarding the field of invention or to determining what a person of ordinary skill in the art would have understood the claim terms to mean. *Id.* at 1319; *see also Markman*, 52 F.3d at 986 ("It is not ambiguity in the document that creates the need for extrinsic evidence but rather unfamiliarity of the court with the terminology of the art to which the patent is addressed."). Extrinsic evidence may not be used to vary or contradict the terms of the claims. *Markman*, 52 F.3d at 981.

B. Analysis

DELTRAN EX1002
IPR2024-01219

In their Markman Briefs, the parties address various terms in Claims 1, 9 and 19 of the '015 Patent. The Court will address the parties' arguments with respect to each Claim separately, below.

1. Claim 1

Claim 1 states as follows:

1. Apparatus for jump starting a vehicle engine, comprising:

an internal power supply;

an output port having positive and negative polarity outputs;

a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;

a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;

a power switch connected between said internal power supply and said output port; and

a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch, such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

'015 Patent at Col. 8 lns. 4-37 (Doc. No. 7-4 at PageID#98.)

DELTRAN EX1002
IPR2024-01219

The parties disagree as to the proper construction of seven key terms within Claim 1. For each of these terms, Plaintiff argues that no construction is necessary. (Doc. No. 32.) Plaintiff asserts generally that "there is no legitimate reason to construe the claim terms in a manner that departs from their ordinary meaning as understood by a person of ordinary skill in the art because no terms were defined during the prosecution of the '015 Patent." (*Id.* at p. 3.) Thus, Plaintiff maintains that "a proper construction of the claims' terms should be either apparent from the terms themselves, as used in the particular claim, or with reference to their use in the '015 Patent's specifications." (*Id.*)

To the extent that this Court believes construction is necessary, Plaintiff notes that many of the particular claim terms in the '015 Patent that are at issue herein were recently construed by another Judge in this District in *The Noco Company, Inc. v. Shenzhen Changxinyang Technology, Ltd.*, Lead Case No. 1:17cv2282, 2019 WL 1723358 (N.D. Ohio) (Boyko, J.) In that case, the court appointed a Special Master to render proposed constructions of various disputed claim terms in the '015 Patent. *Id.* at * 2. The Special Master issued a Report & Recommendation in which he recommended constructions of several terms which are at issue in the instant case. (Doc. No. 32-1.) After considering the parties' objections to certain terms, Judge Boyko subsequently accepted and adopted the Special Master's recommendations. *See Noco v. Shenzhen*, 2019 WL 1723358 at * 4. Here, Plaintiff argues that, to the extent this Court deems construction necessary, the Court should adopt the Special Master's constructions of the various terms that are at issue herein.

Defendant SmarTech believes that each of the seven disputed terms require construction by this Court. (Doc. No. 31.) The seven key terms at issue and Defendant's proposed constructions of each term are summarized below:

DELTRAN EX1002
IPR2024-01219

Term or Phrase	SmarTech's Proposed Construction
internal power supply	power supply contained within the apparatus
output port	external opening in device through which power from an internal power supply is supplied or transmitted
vehicle battery isolation sensor connected in circuit	a vehicle battery isolation sensor separate from the reverse polarity sensor
reverse polarity sensor connected in circuit	a reverse polarity sensor separately connected to a distinct circuit from the vehicle battery isolation sensor
power switch connected between said internal power supply and said output port	power switch is in electronic communication with and physically positioned between the internal power supply, which is housed in the apparatus, and the output port
input signals from said vehicle isolation sensor and said reverse polarity sensor	an input signal received from said vehicle isolation sensor and a separate input signal received from said reverse polarity sensor
such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle batter with said positive and negative polarity outputs	such that said power switch is turned on to cause the internal power supply to be connected to the output port in response to a signal from the vehicle battery isolation sensor indicating the presence of a vehicle battery at the output port and a separate signal from the reverse polarity sensor indicating proper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs, and is not turned on when the signal from the battery isolation sensor indicates the absence of a vehicle battery at the output port or when the reverse polarity sensor indicates improper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs

In summary, Defendant argues that its "proposed construction of Claim 1 recognizes that (1) the vehicle battery isolation sensor and the reverse polarity sensor are separate and distinct sensors that send separate and distinct signals to the microcontroller and are separate from the jumper cables

DELTRAN EX1002
IPR2024-01219

and (2) that the power switch is located within the device between the internal power supply and the output port to turn on and off the power connection between the two." (Doc. No. 31 at p. 11.)

The Court will address the parties' arguments with respect to each of the specifically disputed terms separately.

a. "Internal power supply"

Defendant argues, summarily, that the term "internal power supply" should be construed as meaning "power supply contained within the apparatus." (Doc. No. 31 at p. 11.) In support, Defendant cites the definition of the term "internal" in the Merriam-Webster Dictionary as "existing or situated within the limits or surface of something." (*Id.*) Defendant maintains, without further explanation, that its proposed construction "recognizes the plain and ordinary meaning of the claim language." (*Id.*)

Plaintiff first notes that this particular claim term was not construed by the Special Master and/or Judge Boyko in *Noco v. Shenzhen, supra*. Plaintiff does not believe, however, that any construction of this term is necessary. (Doc. No. 32 at p. 13.) Specifically, Plaintiff asserts that "non-technical terms, such as 'internal,' should not be construed for the trier of fact." (Doc. No. 35 at p. 17.) Plaintiff argues that "SmarTech provides no explanation why a lay juror would not be able to understand what the word 'internal' means," noting that "the only justification SmarTech provides is that its construction is consistent with the claim language." (*Id.*) Plaintiff maintains that "mere consistency with the patent is not a reason to construe non-technical terms for the finder of fact." (*Id.*)

Plaintiff further argues that this Court should not adopt Defendant's proposed construction because Defendant is "attempting impermissibly to restrict claim 1 of the '015 Patent to its preferred

DELTRAN EX1002
IPR2024-01219

embodiment by defining the term 'internal' to mean 'contained within the apparatus.'" (Doc. No. 32 at p. 13.) Plaintiff argues that the invention described in Figures 1 through 4 of the '015 Patent "encompasses more than just the preferred embodiment: it encompasses '[a]ny and all such variations . . . within the scope of' claims 1 through 23." (*Id.* citing '015 Patent, Col. 8, lns 1-2.)

The Court finds that Defendant has failed to demonstrate that construction of the term "internal power supply" is necessary. The Federal Circuit has recognized that "district courts are not (and should not be) required to construe every limitation present in a patent's asserted claims." *O2 Micro Intern. Ltd. v. Beyond Innovation Tech. Co., Ltd*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (citing *Biotec Biologische Naturverpackungen GmbH & Co. KG v. Biocorp, Inc.,* 249 F.3d 1341, 1349 (Fed. Cir. 2001) and *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997)). Rather, "[c]laim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement." *U.S. Surgical*, 103 F.3d at 1568. "A determination that a claim term 'needs no construction' or has the 'plain and ordinary meaning' may be inadequate when a term has more than one 'ordinary' meaning or when reliance on a term's 'ordinary' meaning does not resolve the parties' dispute." *Id.* at 1361. In sum, "[w]hen the parties present a fundamental dispute regarding the scope of a claim term, it is the court's duty to resolve it." *O2 Micro Intern.*, 521 F.3d at 1362.

Here, Defendant does not sufficiently explain why the term "internal power supply" requires construction for the trier of fact. Defendant's entire argument with respect to this term (in both its Opening Claims Construction Brief and Response Brief) is one short paragraph. Defendant does not articulate how construction of the term "internal power supply" would resolve a fundamental dispute between the parties, nor does it sufficiently argue that the term's ordinary meaning is otherwise

DELTRAN EX1002
IPR2024-01219

insufficient to explain what is covered by the claim. In the absence of any meaningful argument establishing that construction of the term "internal power supply" is necessary to resolve a fundamental dispute regarding the '015 Patent, the Court declines to construe this term. Accordingly, based on the arguments presented herein, the Court finds that Defendant has failed to show that the term "internal power supply" requires construction.

Moreover, the Court notes that, aside from a brief reference to the Merriam-Webster Dictionary, Defendant does not present any meaningful argument to support its proposed construction that the term "internal" means "contained within the apparatus." Notably, Defendant cites no language in the claim itself, or the specification, to support its proposed construction of this specific term. Nor does Defendant cite any sources from the prosecution history to support its position that the term "internal power supply" should be construed as being limited to a "power supply contained within the apparatus."

As Plaintiff notes, the '015 Patent provides that "[t]he invention having been thus described, it will be apparent to those skilled in the art that the same may be varied in many ways without departing from the spirit or scope of the invention." *See* '015 Patent, Col. 7, lns 65-67 to Col 8., ln 1. The '015 Patent further states that "[a]ny and all such variations are intended to be encompassed within the scope of the following claims." '015 Patent, Col. 8, lns 1-2.

Thus, although the Figures in the specification to the '015 Patent may show the "internal power supply" as being contained within the apparatus, it does not necessarily follow that the term "internal power supply" should be restricted in this fashion. Indeed, in *Phillips, supra*, the Federal Circuit explained as follows:

> [T]he line between construing terms and importing limitations [from the specification] can be discerned with reasonable certainty and predictability if the court's focus

DELTRAN EX1002
IPR2024-01219

> remains on understanding how a person of ordinary skill in the art would understand the claim terms. For instance, although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. *See, e.g., Nazomi Communications, Inc. v. ARM Holdings, PLC,* 403 F.3d 1364, 1369 (Fed.Cir.2005) (claims may embrace "different subject matter than is illustrated in the specific embodiments in the specification"); *Liebel–Flarsheim*, 358 F.3d at 906–08; *Teleflex,* 299 F.3d at 1327; *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1121 (Fed.Cir.1985). In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment. *Gemstar–TV Guide*, 383 F.3d at 1366. That is not just because section 112 of the Patent Act requires that the claims themselves set forth the limits of the patent grant, but also because persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments.
>
> To avoid importing limitations from the specification into the claims, it is important to keep in mind that the purposes of the specification are to teach and enable those of skill in the art to make and use the invention and to provide a best mode for doing so. *See Spectra–Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1533 (Fed.Cir.1987). One of the best ways to teach a person of ordinary skill in the art how to make and use the invention is to provide an example of how to practice the invention in a particular case. Much of the time, upon reading the specification in that context, it will become clear whether the patentee is setting out specific examples of the invention to accomplish those goals, or whether the patentee instead intends for the claims and the embodiments in the specification to be strictly coextensive. *See SciMed Life Sys.*, 242 F.3d at 1341. The manner in which the patentee uses a term within the specification and claims usually will make the distinction apparent. *See Snow v. Lake Shore & M.S. Ry. Co.*, 121 U.S. 617, 630, 7 S.Ct. 1343, 30 L.Ed. 1004 (1887) (it was clear from the specification that there was "nothing in the context to indicate that the patentee contemplated any alternative" embodiment to the one presented).

Phillips, 415 F.3d at 1323.

Here, Defendant has not demonstrated that the term "internal power supply" should be restricted to its "preferred embodiment" of "power supply within the apparatus." As noted above, Defendant does not cite any language in the claim, specifications, or the prosecution history that would support such a construction. Nor does Defendant address the language cited by Plaintiff that "[a]ny and all such variations are intended to be encompassed within the scope of the following claims." *See* '015 Patent, Col. 8, lns 1-2.

DELTRAN EX1002
IPR2024-01219

Accordingly, the Court rejects Defendant's proposed construction of the term "internal power supply" and, further, agrees with Plaintiff that Defendant has failed to demonstrate that this particular term requires construction.

b. "Output port"

Defendant argues that the term "output port" should be construed to mean an "external opening in device through which power from an internal power supply is supplied or transmitted." (Doc. No. 31 at p. 12.) Defendant argues that:

> As shown in Figures 3 and 4 [of the specification], the output port 303 receives plug 401 of the jumper cable. To do so, the output port must be an external opening on the housing of the device as shown in Figure 3. See '015 Patent, col. 7, ll. 30-35. The specification also recognizes that the port must exist to receive the plug of the jumper cables, noting that "[d]evice 400 has a plug 401 configured to plug into 12 volt output port 30." Id. at col. 7, ll. 47-49; see also, Id. at col. 7, ll 61-64 ("In the event that the battery voltage becomes depleted, the handheld booster device 300 should be properly connected to the battery very simply by plugging in the plug 401 to the port 303").
>
> Finally, the '015 patent describes how the output port is customized to receive the plug: "The port 303 and plug 401 may be dimensioned so that the plug 401 will only fit into the port 303 in a specific orientation, thus ensuring that clamp 403a will correspond to positive polarity and clamp 403b will correspond to negative polarity, of the handheld device 300." Id. at col. 7, ll 52-55.

(*Id.* at pp. 12-13.)

Plaintiff maintains that no construction of this term is necessary. (Doc. No. 32 at p. 6.) However, Plaintiff also notes that this particular claim term in the '015 Patent was recently construed *Noco Company, Inc. v. Shenzhen, supra.* In that case, the Special Master issued a Report & Recommendation in which he recommended the following construction of the term "output port:" "component through which power from an internal power supply is transmitted." (Doc. No. 32-1 at p. 13.) Neither party objected to the Special Master's proposed construction of this particular term

DELTRAN EX1002
IPR2024-01219

and Judge Boyko subsequently accepted and adopted it. *See Noco v. Shenzhen*, 2019 WL 1723358 at * 4.

In the instant case, Plaintiff asserts that "the Special Master's prior construction of the phrase 'output port' is consistent with its use in the '015 Patent and should be adopted by this Court." (Doc. No. 32 at p. 6-7.) In its Response Brief, Defendant does not directly address Plaintiff's argument that the Special Master's construction should be adopted with respect to this term. (Doc. No. 34.) Rather, Defendant simply references its prior argument (set forth above) and reiterates that "output port" should be construed as an "external opening" to receive the jumper cable plug. (*Id.* at p. 3.)

The Court finds the reasoning of the Special Master in *Noco v. Shenzhen, supra* to be instructive relative to the construction of the term "output port." *See Kim v. The Earthgrains Co.*, 2005 WL 66071 at * 10 (N.D. Ill Jan. 10, 2005) (finding another district court's claim construction to be instructive); *Lamps Plus v. Dolan*, 2003 WL 22435702 at * 2 (N.D. Tex. Aug. 26, 2003) (although courts cannot give preclusive effect to prior claim construction against new defendant, court may defer to previous claims construction on case by case basis).

For the following reasons, the Court agrees with Plaintiff that the Special Master's construction of the term "output port" as a "component through which power from an internal power supply is transmitted" is consistent with the claim language and specification of the '015 Patent. While Defendant argues that the term "output port" should be construed as an "external opening," the Special Master correctly noted that "an opening is not a positive structural recitation, but instead defines an absence of something (i.e., a hole defined by some surrounding structure)." (Doc. No. 32-1 at pp. 12-13.) The Court finds that it makes more logical sense to construe the term "output port" in the '015 Patent as a structural element; i.e. a component through which power is transmitted from

DELTRAN EX1002
IPR2024-01219

the internal power supply. The Court agrees with the Special Master that this construction (i.e., the output port as a "component" rather than an "external opening") is more consistent with the claim language and the specification.

Moreover, the Court rejects Defendant's proposed inclusion of the term "supplied" in addition to the term "transmitted" with respect to this term. Defendant does not offer any explanation as to why the use of the term "supplied" is necessary or supported by either the claim language or the specification. Indeed, as Plaintiff correctly notes, Defendant provides no argument or evidence that the output port "supplies" power.[4] Thus, the Court rejects Defendant's proposed use of the term "supplied."

Accordingly, and for all the reasons set forth above, the Court construes the term "output port" in the '015 Patent as follows: "component through which power from an internal power supply is transmitted."

c. "Vehicle Battery Isolation Sensor Connected in Circuit" and "Reverse Polarity Sensor Connected in Circuit"

Defendant proposes that the term "vehicle battery isolation sensor connected in circuit" be construed as follows: "a vehicle battery isolation sensor separate from the reverse polarity sensor and a jumper cable." (Doc. No. 31 at p. 13.) Defendant proposes the term "reverse polarity sensor connected in circuit" be construed as follows: "a reverse polarity sensor separately connected to a distinct circuit from the vehicle battery isolation sensor and a jumper cable." (*Id.*)

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[4] The Court notes that the terms "supplied" and "transmitted" are generally defined as having different meanings. The Merriam-Webster Dictionary defines the word "supplied" as (1) to make available for use, to satisfy the needs or wishes of, to provide for; (2) to substitute for another; or (3) to add as a supplement. That Dictionary defines the word "transmitted" as (1) to send or convey from one person or place to another, to cause or allow to be spread; (2) to cause something to pass or be conveyed through space or a medium, to admit the passage of, to send out (a signal) either by radio waves or over a wire. *See* www.merriam-webster.com/dictionary.

DELTRAN EX1002
IPR2024-01219

In support of this proposed construction, Defendant argues that "vehicle battery isolation sensor" and the "reverse polarity sensor" should be construed as being separate from each other and separate from the jumper cable. (Doc. No. 31 at p. 13.) Defendant argues that "this construction is fully supported by the patent specification and the prosecution history of the '015 patent." (*Id.*) Defendant asserts that nothing in the specification or the claims sets forth an embodiment of the device where the "vehicle battery sensor" and the "reverse polarity sensor" are contained in a single sensor or where these sensors are components of the jumper cable. (*Id.* at p. 14.) Finally, Defendant argues that Plaintiff has admitted in the prosecution history that the sensors are separate and distinct from one another.[5] (*Id.*)

Plaintiff maintains that no construction of these terms is necessary. (Doc. No. 32 at p. 7-8.) However, Plaintiff also notes that the claim terms "vehicle battery isolation sensor" and "reverse polarity sensor" in the '015 Patent were recently construed by both the Special Master and the Court in *Noco v. Shenzhen, supra.* Plaintiff argues that "to the extent this Court believes construction is necessary, NOCO proposes that this Court adopt the Special Master's construction of these claim terms." (*Id.* at p. 8.)

In *Noco v. Shenzhen, supra*, the Special Master reviewed the prosecution history for the '015 Patent and found that "it is clear that the Patent Owner relied upon the 'separate' nature of the two sensors with respect to one another to overcome prior cited art." (Doc. No. 32-1 at p. 9.) He

[5] Defendant notes that, after the '015 Patent was issued, Dogguan Juxing Power Co., Ltd. filed a petition for an *inter partes* review with the Patent Trial and Appeal Board. (Doc. No. 31 at p. 6.) Plaintiff filed a Preliminary Response on May 7, 2018, which is attached as an exhibit to Defendant's Markman Brief. (Doc. No. 31-3.) In that response, Plaintiff stated that Claim 1 of the '015 Patent ""has in essence a redundancy feature through which, unless the inputs from *two separate sensors* indicate that a battery is both present and connected with the proper polarity, the power switch will not be turned on, and the charging operation will never commence." (Doc. No. 31-3 at pg. 4) (emphasis added). Plaintiff added that the patent "achieves the redundancy *through two separate, fully disclosed sensors*, shown in Figure 2A-4 of the Patent." (*Id.*) (emphasis added).

DELTRAN EX1002
IPR2024-01219

concluded that it was therefore "appropriate to characterize the two sensor elements in the claim construction as 'separate' from one another." (*Id.*) The Special Master rejected the additional use of the word "distinct" as redundant. (*Id.*)

The Special Master then considered, and rejected, the argument that the two sensors are separate from the jumper cable, as follows:

> Lastly, Defendant argued that the two sensors are not only separate from one another, but also separate from a jumper cable. … In support for this position, Defendant asserted that "neither the specification nor the claims envision an embodiment where the 'vehicle battery isolation sensor' and 'reverse polarity sensor' are components of the jumper cable. As such, the two sensors must also be separate from the jumper cable." …
>
> Claim 1 uses the term "comprising" as its transitional phrase, which the courts have construed as being open-ended. *CIAS v. Alliance Gaming Corp*., 504 F.3d 1356 (Fed. Cir. 2007). Consequently, the lack of explicit, differing embodiments does not operate to inferentially limit the claim. In fact, while Figs. 3-4 of the '015 Patent illustrate sensor components within a housing 300, and a jumper cable 400 external to the housing, the '015 patent disclosure states:
>
> > The invention having been thus described, it will be apparent to those skilled in the art that the same may be varied in many ways without departing from the spirit or scope of the invention. Any and all such variations are intended to be encompassed within the scope of the following claims.
>
> (See Col. 7, line 65 - Col. 8, line 2 of the '015 Patent).
>
> Since no statements exist in the detailed description requiring the sensors being separate from the jumper cable, and no prosecution history indicates applicant's intention that the jumper cable be separate from the sensors, such language regarding the jumper cable should not be included in the claim construction. Thus the following constructions are recommended: (1) a reverse polarity sensor separate from the vehicle battery isolation sensor, and (2) a vehicle battery isolation sensor separate from the reverse polarity sensor.

(Doc. No. 32-1 at p. 9-10.)

Shenzhen thereafter filed an Objection to the above construction. Judge Boyko rejected Shenzhen's objection and adopted the Special Master's construction:

DELTRAN EX1002
IPR2024-01219

> Upon review of the Special Master's Proposed Constructions, Defendants' Objections and Plaintiff's Response, the Court overrules Defendants' Objections and adopts the Special Master's Proposed Construction of "reverse polarity sensor" and "vehicle battery isolation sensor." The Court agrees with the Special Master that Claim 1 should not be construed to require the sensors be separate from a jumper cable. As the Special Master correctly recited, Claim 1 begins, "Apparatus for jump starting a vehicle engine, comprising:." The Federal Circuit has held "In the patent claim context the term "comprising" is well understood to mean "including but not limited to." *CIAS, Inc. v. All. Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007). In *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 811 (Fed.Cir.1999) the Federal Circuit explained that patent drafters "use the signal 'comprising,' which is generally understood to signify that the claims do not exclude the presence in the accused device or method of factors in addition to those explicitly recited." The patent disclosure further contains the following language: "the invention having been thus described, it will be apparent to those skilled in the art that the same may be varied in many ways without departing from the spirit or scope of the invention. Any and all such variations are intended to be encompassed within the scope of the following claims." ('015 Patent, Col 7, line 65, Col 8, line 2). Thus, the term "comprising" does not limit the claim to only those embodiments as described therein and the patent disclosure further recognizes other variations will be encompassed in the patent's scope.
>
> Also, because the claim does not describe how the sensors are to be connected in circuit with the jump starter's positive and negative polarity outputs, the claim language does not preclude embodiments where conceptually the sensors may be located on jumper cables. Moreover, dependent Claim 21 clearly contemplates the use of jumper cables. Thus, a plain reading of the language of Claim 1 does not impose a limitation that the sensors be separate from a jumper cable and the Court agrees with the Special Master's Proposed Construction and adopts the same.

Noco v. Shenzhen, 2019 WL 1723358 at * 5.

Defendant argues that "[i]n every possible embodiment included in the '015 Patent the jumper cable is external to the vehicle battery charger," and is not an element of the device. (Doc. No. 34 at p. 4.) Defendant asserts as follows:

> Further, a construction that would allow the "vehicle battery isolation sensor" and "reverse polarity sensor" to be located on the jumper cables would contradict the plain language of Claim 1. Claim 1 purports that the "vehicle battery isolation sensor" and the "reverse polarity sensor" must be "connected in circuit with said positive and negative polarity outputs." As the jumper cable is external and separate to the positive and negative polarity outputs, a sensor that is located on the jumper cables cannot be "connected in circuit" with the polarity output port because it can be manually

DELTRAN EX1002
IPR2024-01219

> separated from the device by the user. Therefore, construing the "vehicle battery isolation sensor" and the "reverse polarity sensor" to be separate from the jumper cable is consistent with the plain claim language in Claim 1 of the '015 patent.

(*Id.*)

Plaintiff argues that Defendant's argument must fail because it seeks to limit the claim to its preferred embodiment. (Doc. No. 35 at p. 9.) Plaintiff further argues that there is nothing in the language of the '015 Patent that requires that the sensors be contained within the portable device housing, while the jumper cable device is an attachment to the portable device. (*Id.*) In this regard, Plaintiff notes that dependent claim 21 expressly provides that the device of claim 1 also comprises jumper cables. (*Id.* at p. 10.)

The Court agrees with Plaintiff that the Special Master's construction of the terms "vehicle battery isolation sensor" and "reverse polarity sensor" is instructive and persuasive. Based on the prosecution history noted by the Special Master in *Noco v. Shenzhen, supra* and set forth above, the Court agrees that the two sensors are "separate" from one another. The Court finds that Defendant's proposed use of the additional term "distinct" is redundant and unnecessary.

That leaves the issue of whether the sensors should be construed as separate from the jumper cables. For the following reasons, the Court agrees with the reasoning set forth in *Noco v. Shenzhen, supra* and finds that a plain reading of the language of Claim 1 does not impose a limitation that the sensors be separate from the jumper cable. As Plaintiff correctly notes, Claim 1 of the '015 Patent uses the term "comprising" as its transitional phrase, which the Federal Circuit has found to be open-ended. *See CIAS Inc. v. All. Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007) ("In the patent claim context the term 'comprising' is well understood to mean 'including but not limited to.'"); *Vivid Techsn, Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 811 (Fed. Cir. 1999) (explaining that patent

DELTRAN EX1002
IPR2024-01219

claims "use the signal 'comprising,' which is generally understood to signify that the claims do not exclude the presence in the accused device or method of factors in addition to those explicitly recited."). Moreover, as noted above, the '015 Patent specifically states that "the invention having been thus described, it will be apparent to those skilled in the art that the same may be varied in many ways without departing from the spirit or scope of the invention." *See* '015 Patent at Col. 7, lns 65-68 to Col. 8, ln 1. Thus, the Court rejects Defendant's proposed construction that the sensors are separate from the jumper cable, as improperly attempting to limit the claim to its preferred embodiment.

The Claim's use of the phrase "connected in circuit" does not require a different result. The fact that the claim provides that the sensors must be connected in circuit with the polarity outputs does not necessarily require that they be separate from the jumper cables. As Judge Boyko noted in *Noco v. Shenzhen*, "because the claim does not describe how the sensors are to be connected in circuit with the jump starter's positive and negative polarity outputs, the claim language does not preclude embodiments where conceptually the sensors may be located on jumper cables." *Noco v. Shenzhen*, 2019 WL 1723358 at * 5. Defendant has not pointed to any language in the claim or the specification that would require a different result.

Accordingly, the Court construes the terms "vehicle battery isolation sensor connected in circuit" as follows: "a vehicle battery isolation sensor separate from the reverse polarity sensor." The Court construes the term "reverse polarity sensor connected in circuit" as: "a reverse polarity sensor separate from the vehicle battery isolation sensor."

d. "Power Switch connected between said internal power supply and said output port"

DELTRAN EX1002
IPR2024-01219

Defendant argues that this term should be construed as follows: "power switch is in electronic communication with and physically positioned between the internal power supply, which is housed in the apparatus, and the output port." (Doc. No. 31 at p. 18.) Defendant maintains that "connected between" refers to an electronic communication that controls the flow of power from the internal power supply to the output port. (*Id.*) It asserts that, to control this flow of power, the power switch must be located within the housing of the device and be interposed between the internal power supply and the external opening of the output port. (*Id.*) Defendant argues this construction is consistent with the remainder of Claim 1, as follows:

> Claim 1 later indicates that the power switch causes a connection of power from the internal power supply to the output port if the signals from the vehicle isolation sensor and the reverse polarity sensor indicate that the jumper cables are properly connected to the car battery. ('015 patent, col. 8, ll 25-37.) As such, the power is switched off after the power travels from the internal power supply but prior to it reaching the output port for the jumper cables and the output port is not powered until it receives those signals from the sensor. Therefore, the power switch must be physically located within the connection between the internal power supply and the output port to cause or prevent that electronic connection. This is also reflected in all of the embodiments of the device included in the patent specification and there is no suggestion that the power switch could operate as described without being located between the internal power supply and the output port.

(*Id.* at p. 19.)

Plaintiff argues no construction is necessary for this term, and notes that both the Special Master and Judge Boyko in *Noco v. Shenzhen, supra* reached the same conclusion. (Doc. No. 32 at p. 8.) Plaintiff asserts that non-technical terms such as "connected' should not be construed for the trier of fact. (*Id.* at p. 9.) Plaintiff further argues that Defendant's use of the phrase "housed in the apparatus" is an impermissible attempt to limit the '015 Patent to its preferred embodiment. (*Id.*)

In *Noco v. Shenzhen, supra*, the Special Master found that no construction was necessary for this term. In so doing, the Special Master rejected a nearly identical proposed construction raised by

DELTRAN EX1002
IPR2024-01219

defendants therein, finding that the prosecution history, claim language, and representative figures did not describe any unique positioning of the power switch. *Noco v. Shenzhen*, 2019 WL 1723358 at * 6. Judge Boyko overruled defendant's objection and adopted the Special Master's proposed construction of this term. *Id.*

The Court agrees with the Special Master and the court in *Noco v. Shenzhen, supra* that the claim language and specification of the '015 Patent are silent as to the physical location of the power switch. Moreover, Defendant does not cite any source from the prosecution history to support its proposed construction placing the power switch inside the apparatus. The Court agrees with Plaintiff that Defendant's proposed construction would impermissibly limit the '015 Patent to its preferred embodiment. *See Phillips*, 415 F.3d at 1232 (noting that "we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.")

Accordingly, the Court agrees with both Plaintiff and the reasoning set forth in *Noco v. Shenzehn, supra* and finds that this term is clear and unambiguous on its face and needs no construction.

e. "Input signals from said vehicle isolation sensor and a separate input signal from said reverse polarity sensor"

Defendant argues that this term should be construed as follows: "an input signal received from said vehicle isolation sensor and a separate input signal received from said reverse polarity sensor." (Doc. No. 31 at p. 13.) Defendant maintains that the specification and prosecution history support its proposed construction that the sensors send distinct signals to the microcontroller. (*Id.*)

Plaintiff argues that no construction is necessary for this term. (Doc. No. 32 at p. 9-10.) However, to the extent the Court determines construction is necessary, Plaintiff argues this Court

DELTRAN EX1002
IPR2024-01219

should adopt the Special Master's prior construction of this term in *Noco v. Shenzhen, supra*, which Plaintiff states is "consistent with the plain language of the '015 Patent and its prosecution history." (*Id.* at p. 10.)

The Special Master's prior construction of this term, which was adopted by Judge Boyko in *Noco v. Shenzhen, supra*, is as follows: "distinct input signals from said vehicle isolation sensor and reverse polarity sensor, respectively." (Doc. No. 32-1 at p. 11.) The Special Master explained as follows:

> The Plaintiff contends that no construction is necessary, while the Defendant argues that the above phrase should be interpreted as "an input signal received from said vehicle isolation sensor and a distinct input signal received from said reverse polarity sensor." (See Plaintiffs Opening Claim Construction Brief, Section F, pp. 10-11; Defendant's Opening Claim Construction Brief, Section B, pp. 12-15).
>
> While the sensors 10 and 12 disclosed in Figs. 2A-4 show unique outputs CBREV and CBOON, respectively, that are provided to separate pins of a microcontroller MCU as input signals (see Fig. 2A-1, 2A-2 and 2A-4), no teaching exists within the detailed description of the '015 patent that indicates such an arrangement is required. However, in the Patent Owner's IPR Preliminary Response, in distinguishing over the Krieger reference, the Patent Owner stated:
>
> > ... nothing in Krieger discloses that the switch 12 is initially turned on in response to signals received from both the reverse polarity sensor and a vehicle isolation sensor. Instead it is clear from the disclosure that the switch in Krieger will be turned on only in response to a correct polarity being detected by the reverse polarity sensor, without regard to any separate information provided by any other circuit element.
>
> (IPR Preliminary Response, p. 19, lines 4-9)(Emphasis added).
>
> From this statement, the Patent Owner was clearly indicating that each of the sensors provide sensed information that is separate from one another. In a signal sense this is relevant, as one of ordinary skill in the art knows that two signals from separate sensors can nevertheless combine by superposition, but in this instance, according to the Patent Owner, the information provided by each sensor remains separate or distinct.
>
> This point was recognized by the PTAB, wherein in the IPR Decision, which was a decision to deny institution of the IPR proceeding, the Panel stated:

DELTRAN EX1002
IPR2024-01219

> Consistent with Patent Owner's arguments, see Prelim. Resp. 17-20, the claim requires the microcontroller to process two distinct signals before providing an output signal to tum the power switch on.

(See Decision, IPR2018-00503, p. 12, section 3, lines 231-24). Further, the PTAB stated:

> Patent Owner reasonably describes this as a 'redundancy feature through which ... the power switch will not be turned on' unless distinct signals indicate the presence of a battery and a proper polarity connection of the battery.

(Id. at p. 12, line 27 -p. 13, line 2). And finally, the PTAB stated:

> As set forth above, limitations [f] and [g] of claim 1 require the microcontroller to process two distinct signals before providing an output signal to tum the power switch on ....

(Id. at p. 19, lines 2 3-2 5).

> Thus the Patent Owner stressed the receipt of separate information from the input signals output by the sensors, which the PTAB reasonably concluded to be distinct signals. Thus, it is recommended that the above phrase be construed as "distinct input signals from said vehicle isolation sensor and said reverse polarity sensor, respectively."

(Doc. No. 32-1 at pp. 10-11.)

The Court agrees with the Special Master's reasoning, above, and finds that his proposed construction is consistent with the prosecution history detailed above. Accordingly, the Court construes the term "input signals from said vehicle isolation sensor and said reverse polarity sensor" as follows: "distinct input signals from said vehicle isolation sensor and reverse polarity sensor, respectively."

f. "such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity

DELTRAN EX1002
IPR2024-01219

outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle batter with said positive and negative polarity outputs"

Defendant argues that that the above term should be construed as follows: "Such that said power switch is turned on to cause the internal power supply to be connected to the output port in response to a signal from the vehicle battery isolation sensor indicating the presence of a vehicle battery at the output port and a separate signal from the reverse polarity sensor indicating proper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs, and is not turned on when the signal from the battery isolation sensor indicates the absence of a vehicle battery at the output port or when the reverse polarity sensor indicates improper polarity connection of positive and negative terminals of the vehicle battery with the positive and negative polarity outputs." (Doc. No. 31 at p. 18) (proposed changes from '015 Patent underlined).

Plaintiff argues no construction is necessary for this term, and notes that both the Special Master and Judge Boyko in *Noco v. Shenzhen, supra* reached the same conclusion. (Doc. No. 32 at p.11-12.) Specifically, Plaintiff asserts that the meaning of this claim term is readily apparent from a review of the '015 Patent claim language and that "repeating the name of each respective sensor multiple times in the same claim step is redundant, cumbersome, and unnecessary." (*Id.* at p. 12.) Moreover, Plaintiff argues that Defendant "has not pointed to any ambiguity, technical requirements, or other reason that might support a reason to construe these terms." (Doc. No. 35 at p. 16.)

The Court agrees with Plaintiff. Defendant has not identified a need to specify, in this term, that the signals are distinct as that is properly addressed in the claims constructions above, most

DELTRAN EX1002
IPR2024-01219

notably this Court's construction of the term "input signals from said vehicle isolation sensor and said reverse polarity sensor." Further, the Court agrees with Plaintiff that the additional language proposed by Defendant would overly complicate an already lengthy term.

Accordingly, the Court finds that no construction is necessary for this term.

2. Claim 9: "internal components of the apparatus"

Claim 9 of the '015 Patent provides as follows: "The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus." *See* '015 Patent at Col. 8, lns. 61-64.

Defendant argues that the term "internal components of the apparatus" should be construed as "components housed within said apparatus." (Doc. No. 31 at p. 19.) Defendant's entire argument as to this term is as follows: "This is simply a clarification to indicate that the component must be housed within the device, otherwise they could not be internal components. (See '015 Patent, Figure 3 (a perspective view of the handheld jump starter device), col 3, ll. 56-58, and col. 7, ll. 31-37). This construction is consistent with the claim language and patent specification and should be adopted by the Court." (*Id.* at p. 20.)

Plaintiff argues that no construction is necessary for this term. (Doc. No. 32 at p. 13.) It argues that Defendant's construction is an attempt to impermissibly limit the '015 Patent to its preferred embodiment by defining the term "internal" to mean "housed within said apparatus." (*Id.*) Plaintiff further asserts that the term "internal" is a non-technical term that does not require construction. (Doc. No. 35 at p. 17-18.)

DELTRAN EX1002
IPR2024-01219

The Court agrees with Plaintiff for the reasons discussed *supra* in connection with its analysis of the claim 1 term "internal power supply." Defendant has not demonstrated that construction of the term "internal components of the apparatus" is necessary. Moreover, Defendant has failed to show that the term "internal components of the apparatus" should be restricted to its preferred embodiment of "component housed within the apparatus."

Accordingly, the Court rejects Defendant's proposed construction of the term "internal components of the apparatus" and, further, agrees with Plaintiff that Defendant has failed to demonstrate that this particular claim term requires construction.

3. Claim 19: "is unable to"

Claim 19 provides as follows: "The apparatus of claim 1, further comprising a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery." *See* '015 Patent, Col. 10, lns. 1-5.

Defendant argues that the term "is unable to" should be construed to mean "does not." (Doc. No. 31 at p. 20.) Defendant's entire argument as to this claim is as follows: "This is to clarify that when the vehicle battery isolation sensor does not detect the presence of a vehicle battery, the manual override switch can be activated. This construction is consistent with the claim language and patent specification. Therefore, it should be adopted by the Court." (*Id.*)

Plaintiff argues that no construction is necessary for this term. (Doc. No. 32 at p. 14.) It maintains that the term "is unable to" is non-technical and its meaning is readily apparent to a lay juror. (Doc. No. 35 at p. 19.)

DELTRAN EX1002
IPR2024-01219

The Court agrees with Plaintiff. Defendant has not demonstrated that construction of the term "is unable to" is necessary. Accordingly, the Court rejects Defendant's proposed construction of the term "is unable to" and, further, agrees with Plaintiff that Defendant has failed to demonstrate that this particular claim term requires construction.

IV. Conclusion

For the reasons set forth above, Plaintiff's Renewed Motion to Strike, in Part, Defendant's Amended Invalidity Contentions (Doc. No. 28) is DENIED. The Court's construction of Claims 1, 9 and 19 of U.S. Patent No. 9,007,015 is set forth above.

IT IS SO ORDERED

s/Pamela A. Barker
PAMELA A. BARKER
U. S. DISTRICT JUDGE

Date: April 16, 2020

DELTRAN EX1002
IPR2024-01219

LM2621 Low Input Voltage, Step-Up DC-DC Converter

Check for Samples: LM2621

FEATURES

- Small VSSOP8 Package (Half the Footprint of Standard 8-Pin SOIC Package)
- 1.09 mm Package Height
- Up to 2 MHz Switching Frequency
- 1.2V to 14V Input Voltage
- 1.24V - 14V Adjustable Output Voltage
- Up to 1A Load Current
- 0.17 Ω Internal MOSFET
- Up to 90% Regulator Efficiency
- 80 µA Typical Operating Current
- <2.5µA Ensured Supply Current In Shutdown

APPLICATIONS

- PDAs, Cellular Phones
- 2-Cell and 3-Cell Battery-Operated Equipment
- PCMCIA Cards, Memory Cards
- Flash Memory Programming
- TFT/LCD Applications
- 3.3V to 5.0V Conversion
- GPS Devices
- Two-Way Pagers
- Palmtop Computers
- Hand-Held Instruments

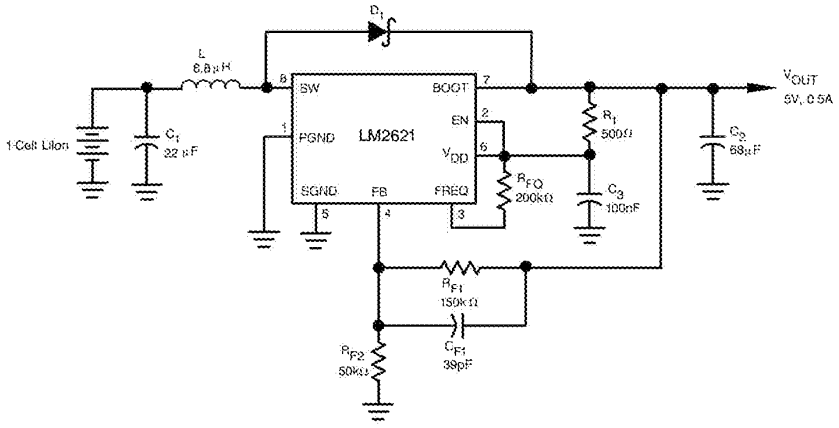
DESCRIPTION

The LM2621 is a high efficiency, step-up DC-DC switching regulator for battery-powered and low input voltage systems. It accepts an input voltage between 1.2V and 14V and converts it into a regulated output voltage. The output voltage can be adjusted between 1.24V and 14V. It has an internal 0.17Ω N-Channel MOSFET power switch. Efficiencies up to 90% are achievable using the LM2621.

The high switching frequency (adjustable up to 2MHz) of the LM2621 allows for tiny surface mount inductors and capacitors. Because of the unique constant-duty-cycle gated oscillator topology very high efficiencies are realized over a wide load range. The supply current is reduced to 80µA because of the BiCMOS process technology. In the shutdown mode, the supply current is less than 2.5µA.

The LM2621 is available in a VSSOP-8 package. This package uses half the board area of a standard 8-pin SOIC and has a height of just 1.09 mm.

Typical Application Circuit



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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IPR2024-01219

Connection Diagram

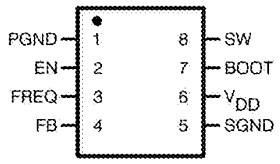


Figure 1. VSSOP-8 (DGK) Package - Top View

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

ABSOLUTE MAXIMUM RATINGS(1)(2)

SW Pin Voltage	−0.5 V to 14.5V
BOOT, V_{DD}, EN and FB Pins	−0.5V to 10V
FREQ Pin	100µA
θ_{JA}(3)	240°C/W
T_{Jmax}(3)	150°C
Storage Temperature Range	−65°C to +150°C
Lead Temp. (Soldering, 5 sec)	260°C
Power Dissipation (T_A=25°C)(3)	500mW
ESD Rating(4)	2kV

(1) Absolute maximum ratings indicate limits beyond which damage to the device may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
(3) The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{jmax} (maximum junction temperature), θ_{JA} (junction to ambient thermal resistance), and T_A (ambient temperature). The maximum allowable power dissipation at any temperature is $P_{dmax} = (T_{jmax} - T_A)/ \theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.
(4) The human body model is a 100 pF capacitor discharged through a 1.5 kΩ resistor into each pin. For Pin 8 (SW) the ESD rating is 1.5 kV.

OPERATING CONDITIONS(1)

V_{DD} Pin	2.5V to 5V
FB, EN Pins	0 to V_{DD}
BOOT Pin	0 to 10V
Ambient Temperature (T_A)	−40°C to +85°C

(1) Absolute maximum ratings indicate limits beyond which damage to the device may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.

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CAR-RPA-ITC-05251
DELTRAN EX1002
IPR2024-01219

ELECTRICAL CHARACTERISTICS

Limits in standard typeface are for T_J = 25°C, and limits in **boldface** type apply over the full operating temperature range of −40°C to +85°C. Unless otherwise specified: V_{DD}= V_{OUT}= 3.3V.

Symbol	Parameter	Condition	Typ	Min	Max	Units
V_{IN_ST}	Minimum Start-Up Supply Voltage(1)	I_{LOAD} = 0mA	1.1		**1.2**	V
V_{IN_OP}	Minimum Operating Supply Voltage (once started)	I_{LOAD} = 0mA	0.65			V
V_{FB}	FB Pin Voltage		1.24	**1.2028**	**1.2772**	V
V_{OUT_MAX}	Maximum Output Voltage		14			V
V_{HYST}	Hysteresis Voltage(2)		30		**45**	mV
η	Efficiency	V_{IN} = 3.6V; V_{OUT} = 5V; I_{LOAD} = 500mA	87			%
		V_{IN} = 2.5V; V_{OUT} = 3.3V; I_{LOAD} = 200mA	87			
D	Switch Duty Cycle		70	**60**	**80**	%
I_{DD}	Operating Quiescent Current(3)	FB Pin > 1.3V; EN Pin at V_{DD}	80		**110**	µA
I_{SD}	Shutdown Quiescent Current(2)	V_{DD}, BOOT and SW Pins at 5.0V; EN Pin <200mV	0.01		**2.5**	µA
I_{CL}	Switch Peak Current Limit		2.85			A
R_{DS_ON}	MOSFET Switch On Resistance		0.17			Ω
Enable Section						
V_{EN_LO}	EN Pin Voltage Low(4)				**0.15V_{DD}**	V
V_{EN_HI}	EN Pin Voltage High(4)			**0.7V_{DD}**		V

(1) Output in regulation, V_{OUT} = $V_{OUT\ (NOMINAL)}$ ± 5%
(2) This is the total current into pins V_{DD}, BOOT, SW and FREQ.
(3) This is the current into the V_{DD} pin.
(4) When the EN pin is below V_{EN_LO}, the regulator is shut down; when it is above V_{EN_HI}, the regulator is operating.

PIN DESCRIPTION

Pin	Name	Function
1	PGND	Power Ground
2	EN	Active-Low Shutdown Input
3	FREQ	Frequency Adjust. An external resistor connected between this pin and Pin 6 (V_{DD}) sets the switching frequency of the LM2621.
4	FB	Output Voltage Feedback
5	SGND	Signal Ground
6	V_{DD}	Power Supply for Internal Circuitry
7	BOOT	Bootstrap Supply for the Gate Drive of Internal MOSFET Power Switch
8	SW	Drain of the Internal MOSFET Power Switch

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IPR2024-01219

TYPICAL PERFORMANCE CHARACTERISTICS

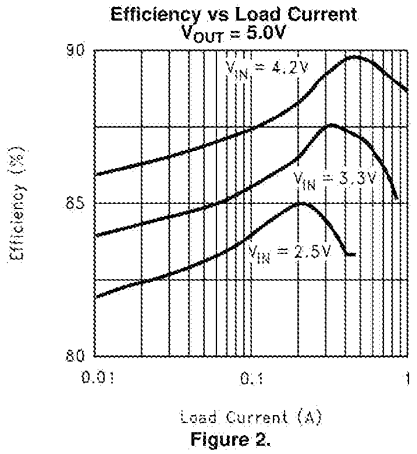


Figure 2.

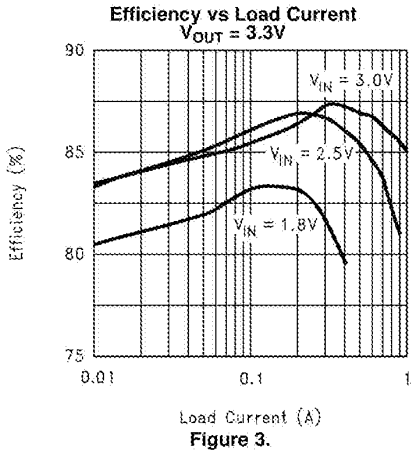


Figure 3.

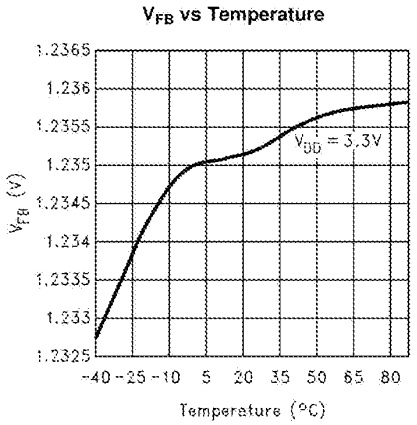


Figure 4.

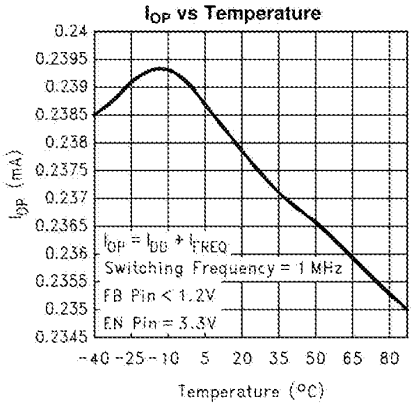


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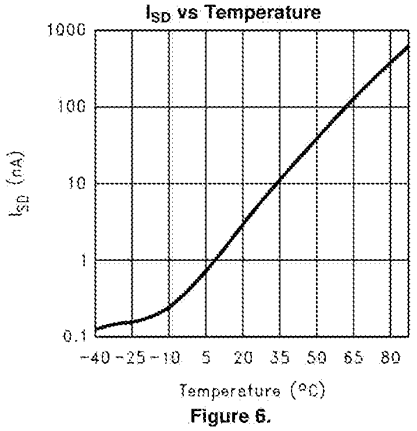


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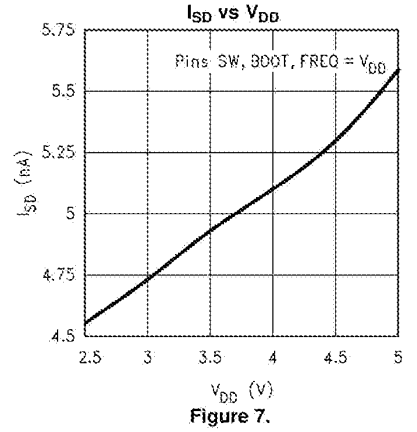


Figure 7.

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TYPICAL PERFORMANCE CHARACTERISTICS (continued)

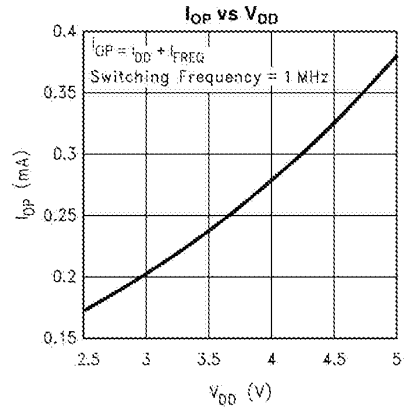


Figure 8.

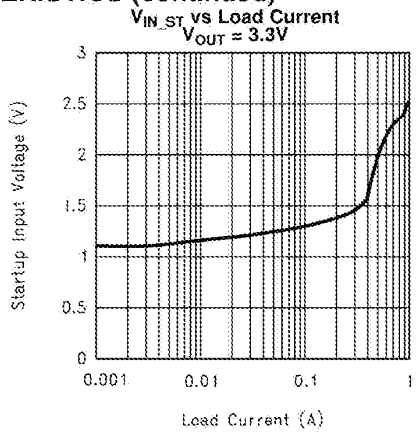


Figure 9.

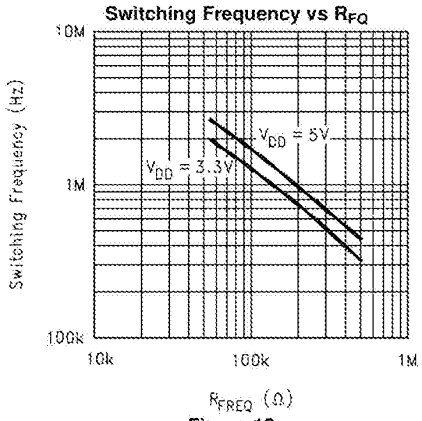


Figure 10.

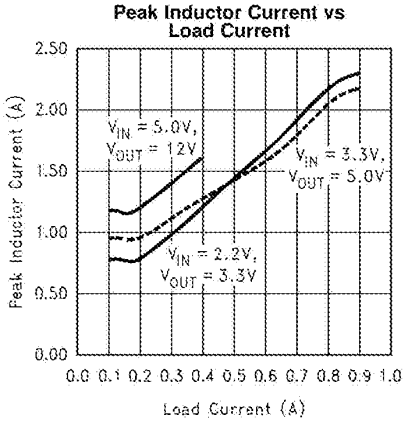


Figure 11.

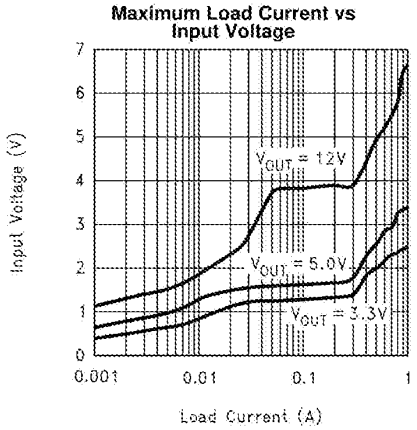


Figure 12.

CAR-RPA-ITC-05254
DELTRAN EX1002
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DETAILED DESCRIPTION

OPERATING PRINCIPLE

The LM2621 is designed to provide step-up DC-DC voltage regulation in battery-powered and low-input voltage systems. It combines a step-up switching regulator, N-channel power MOSFET, built-in current limit, thermal limit, and voltage reference in a single 8-pin VSSOP package Figure 13. The switching DC-DC regulator boosts an input voltage between 1.2V and 14V to a regulated output voltage between 1.24V and 14V. The LM2621 starts from a low 1.1V input and remains operational down to 0.65V.

This device is optimized for use in cellular phones and other applications requiring a small size, low profile, as well as low quiescent current for maximum battery life during stand-by and shutdown. A high-efficiency gated-oscillator topology offers an output of up to 1A.

Additional features include a built-in peak switch current limit, and thermal protection circuitry.

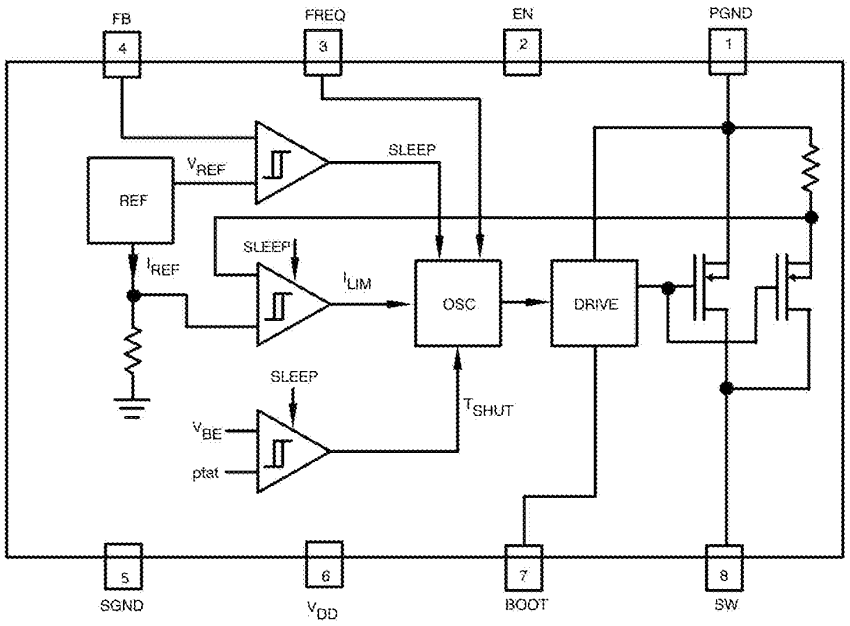


Figure 13. Functional Diagram

GATED OSCILLATOR CONTROL SCHEME

A unique gated oscillator control scheme enables the LM2621 to have an ultra-low quiescent current and provides a high efficiency over a wide load range. The switching frequency of the internal oscillator is programmable using an external resistor and can be set between 300 kHz and 2 MHz.

This control scheme uses a hysteresis window to regulate the output voltage. When the output voltage is below the upper threshold of the window, the LM2621 switches continuously with a fixed duty cycle of 70% at the switching frequency selected by the user. During the first part of each switching cycle, the internal N-channel MOSFET switch is turned on. This causes the current to ramp up in the inductor and store energy. During the second part of each switching cycle, the MOSFET is turned off. The voltage across the inductor reverses and forces current through the diode to the output filter capacitor and the load. Thus when the LM2621 switches continuously, the output voltage starts to ramp up. When the output voltage hits the upper threshold of the window, the LM2621 stops switching completely. This causes the output voltage to droop because the energy stored in the output capacitor is depleted by the load. When the output voltage hits the lower threshold of the hysteresis window, the LM2621 starts switching continuously again causing the output voltage to ramp up towards the upper threshold. Figure 14 shows the switch voltage and output voltage waveforms.

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Because of this type of control scheme, the quiescent current is inherently very low. At light loads the gated oscillator control scheme offers a much higher efficiency compared to the conventional PWM control scheme.

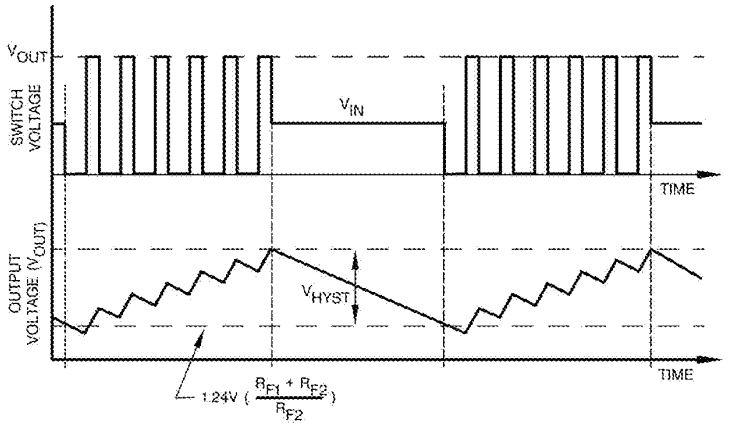


Figure 14. Typical Step-Up Regulator Waveforms

LOW VOLTAGE START-UP

The LM2621 can start-up from input voltages as low as 1.1V. On start-up, the control circuitry switches the N-channel MOSFET continuously at 70% duty cycle until the output voltage reaches 2.5V. After this output voltage is reached, the normal step-up regulator feedback and gated oscillator control scheme take over. Once the device is in regulation it can operate down to a 0.65V input, since the internal power for the IC can be boot-strapped from the output using the V_{DD} pin.

SHUTDOWN

The LM2621 features a shutdown mode that reduces the quiescent current to less than a ensured 2.5µA over temperature. This extends the life of the battery in battery powered applications. During shutdown, all feedback and control circuitry is turned off. The regulator's output voltage drops to one diode drop below the input voltage. Entry into the shutdown mode is controlled by the active-low logic input pin EN (Pin 2). When the logic input to this pin pulled below $0.15V_{DD}$, the device goes into shutdown mode. The logic input to this pin should be above $0.7V_{DD}$ for the device to work in normal step-up mode.

OUTPUT VOLTAGE RIPPLE FREQUENCY

A major component of the output voltage ripple is due to the hysteresis used in the gated oscillator control scheme. The frequency of this voltage ripple is proportional to the load current. The frequency of this ripple does not necessitate the use of larger inductors and capacitors however, since the size of these components is determined by the switching frequency of the oscillator which can be set upto 2MHz using an external resistor.

INTERNAL CURRENT LIMIT AND THERMAL PROTECTION

An internal cycle-by-cycle current limit serves as a protection feature. This is set high enough (2.85A typical, approximately 4A maximum) so as not to come into effect during normal operating conditions. An internal thermal protection circuitry disables the MOSFET power switch when the junction temperature (T_J) exceeds about 160°C. The switch is re-enabled when T_J drops below approximately 135°C.

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IPR2024-01219

Design Procedure

SETTING THE OUTPUT VOLTAGE

The output voltage of the step-up regulator can be set between 1.24V and 14V by connecting a feedback resistive divider made of R_{F1} and R_{F2}. The resistor values are selected as follows:

$$R_{F2} = R_{F1} / [(V_{OUT} / 1.24) - 1] \quad (1)$$

A value of 150kΩ is suggested for R_{F1}. Then, R_{F2} can be selected using the above equation. A 39pF capacitor (C_{F1}) connected across R_{F1} helps in feeding back most of the AC ripple at V_{OUT} to the FB pin. This helps reduce the peak-to-peak output voltage ripple as well as improve the efficiency of the step-up regulator, because a set hysteresis of 30mV at the FB pin is used for the gated oscillator control scheme.

BOOTSTRAPPING

When the output voltage (V_{OUT}) is between 2.5V and 5.0V a bootstrapped operation is suggested. This is achieved by connecting the V_{DD} pin (Pin 6) to V_{OUT}. However if the V_{OUT} is outside this range, the V_{DD} pin should be connected to a voltage source whose range is between 2.5V and 5V. This can be the input voltage (V_{IN}), V_{OUT} stepped down using a linear regulator, or a different voltage source available in the system. This is referred to as non-bootstrapped operation. The maximum acceptable voltage at the BOOT pin (Pin 7) is 10V.

SETTING THE SWITCHING FREQUENCY

The switching frequency of the oscillator is selected by choosing an external resistor (R_{FQ}) connected between FREQ and V_{DD} pins. See the graph titled " Switching Frequency vs RFQ" in the TYPICAL PERFORMANCE CHARACTERISTICS section of the datasheet for choosing the R_{FQ} value to achieve the desired switching frequency. A high switching frequency allows the use of very small surface mount inductors and capacitors and results in a very small solution size. A switching frequency between 300kHz and 2MHz is recommended.

INDUCTOR SELECTION

The LM2621's high switching frequency enables the use of a small surface mount inductor. A 6.8µH shielded inductor is suggested. The inductor should have a saturation current rating higher than the peak current it will experience during circuit operation (see graph titled " Peak Inductor Current vs. Load Current" in the TYPICAL PERFORMANCE CHARACTERISTICS section). Less than 100mΩ ESR is suggested for high efficiency.

Open-core inductors cause flux linkage with circuit components and interfere with the normal operation of the circuit. They should be avoided. For high efficiency, choose an inductor with a high frequency core material, such as ferrite, to reduce the core losses. To minimize radiated noise, use a toroid, pot core or shielded core inductor. The inductor should be connected to the SW pin as close to the IC as possible. See Table 1 for a list of the inductor manufacturers.

OUTPUT DIODE SELECTION

A Schottky diode should be used for the output diode. The forward current rating of the diode should be higher than the load current, and the reverse voltage rating must be higher than the output voltage. Do not use ordinary rectifier diodes, since slow switching speeds and long recovery times cause the efficiency and the load regulation to suffer. Table 1 shows a list of the diode manufacturers.

INPUT AND OUTPUT FILTER CAPACITORS SELECTION

Tantalum chip capacitors are recommended for the input and output filter capacitors. A 22µF capacitor is suggested for the input filter capacitor. It should have a DC working voltage rating higher than the maximum input voltage. A 68µF tantalum capacitor is suggested for the output capacitor. The DC working voltage rating should be greater than the output voltage. Very high ESR values (>3Ω) should be avoided. Table 1 shows a list of the capacitor manufacturers.

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Table 1. Suggested Manufacturers List

Inductors	Capacitors	Diodes
Coilcraft Tel: (800) 322-2645 Fax: (708) 639-1469	**Sprague/ Vishay** Tel: (207) 324-4140 Fax: (207) 324-7223	**Motorola** Tel: (800) 521-6274 Fax: (602) 244-6609
Coiltronics Tel: (407) 241-7876 Fax: (407) 241-9339	**Kemet** Tel: (864) 963-6300 Fax: (864) 963-6521	**International Rectifier (IR)** Tel: (310) 322-3331 Fax: (310) 322-3332
Pulse Engineering Tel: (619) 674-8100 Fax: (619) 674-8262	**Nichicon** Tel: (847) 843-7500 Fax: (847) 843-2798	**General Semiconductor** Tel: (516) 847-3222 Fax: (516) 847-3150

PC BOARD LAYOUT

High switching frequencies and high peak currents make a proper layout of the PC board an important part of design. Poor design can cause excessive EMI and ground-bounce, both of which can cause malfunction and loss of regulation by corrupting voltage feedback signal and injecting noise into the control section.

Power components - such as the inductor, input and output filter capacitors, and output diode - should be placed as close to the regulator IC as possible, and their traces should be kept short, direct and wide. The ground pins of the input and output filter capacitors and the PGND and SGND pins of LM2621 should be connected using short, direct and wide traces. The voltage feedback network (R_{F1}, R_{F2}, and C_{F1}) should be kept very close to the FB pin. Noisy traces, such as from the SW pin, should be kept away from the FB and V_{DD} pins. The traces that run between V_{out} and the FB pin of the IC should be kept away from the inductor flux. Always provide sufficient copper area to dissipate the heat due to power loss in the circuitry and prevent the thermal protection circuitry in the IC from shutting the IC down.

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Application examples

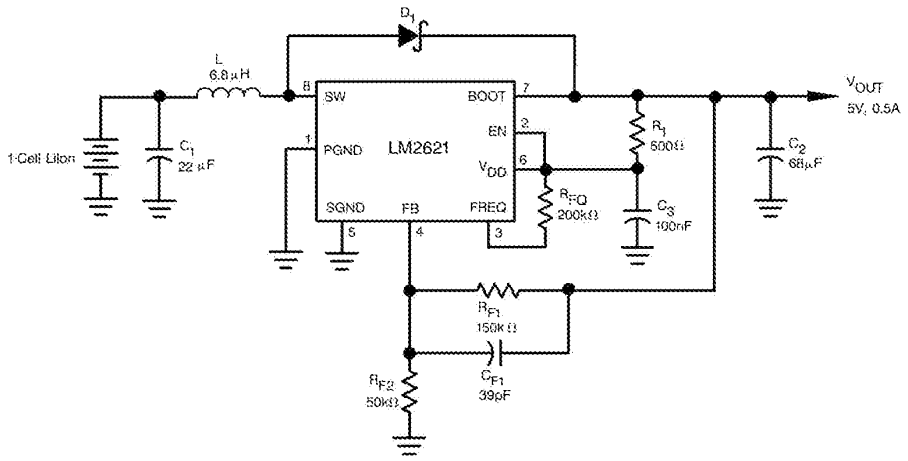


Figure 15. EXAMPLE 1 – 5V/0.5A Step-Up Regulator

U1	Texas Instruments	LM2621MM
C1	Vishay/Sprague	595D226X06R3B2T, Tantalum
C2	Vishay/Sprague	595D686X0010C2T, Tantalum
D1	Motorola	MBRS140T3
L	Coilcraft	DT1608C-682

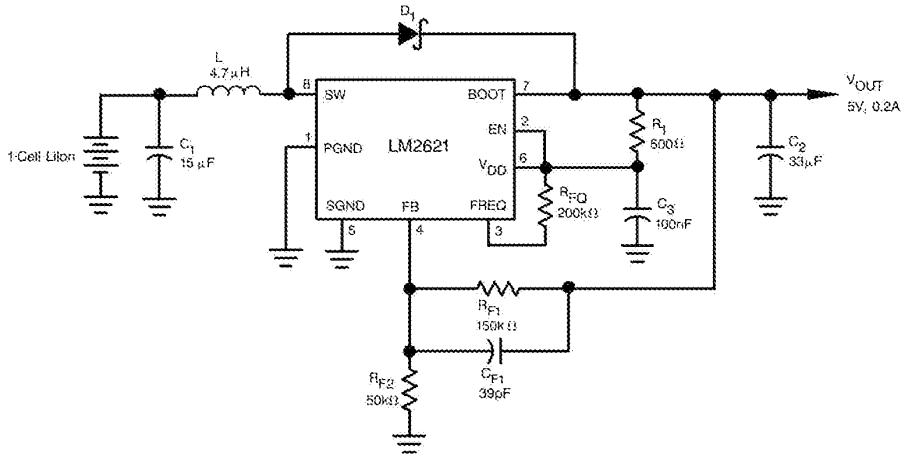


Figure 16. EXAMPLE 2 – 2mm Tall 5V/0.2A Step-Up Regulator for Low Profile Applications

U1	Texas Instruments	LM2621MM
C1	Vishay/Sprague	592D156X06R3B2T, Tantalum
C2	Vishay/Sprague	592D336X06R3C2T, Tantalum
D1	Motorola	MBRS140T3
L	Vishay/Dale	ILS-3825-03

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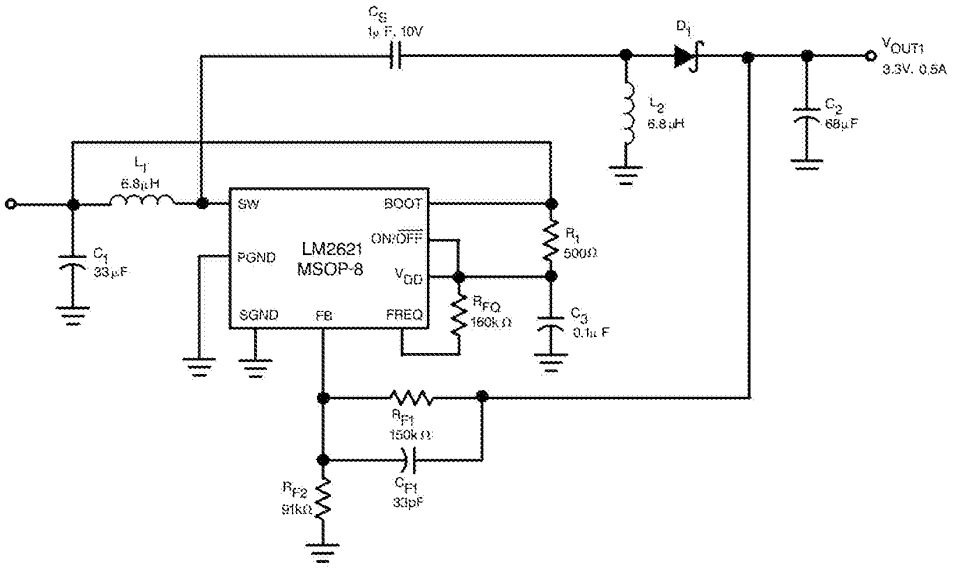


Figure 17. EXAMPLE 3 – 3.3V/0.5A SEPIC Regulator

U1	Texas Instruments	LM2621MM
C1	Vishay/Sprague	595D226X06R3B2T, Tantalum
C2	Vishay/Sprague	595D686X0010C2T, Tantalum
D1	Motorola	MBRS140T3
L1, L2	Coilcraft	DT1608C-682
C_S	Vishay/Vitramon	VJ1210Y105M , Ceramic

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM2621MM/NOPB	ACTIVE	VSSOP	DGK	8	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 85	S06A	
LM2621MMX	NRND	VSSOP	DGK	8		TBD	Call TI	Call TI	-40 to 85	S06A	
LM2621MMX/NOPB	ACTIVE	VSSOP	DGK	8	3500	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 85	S06A	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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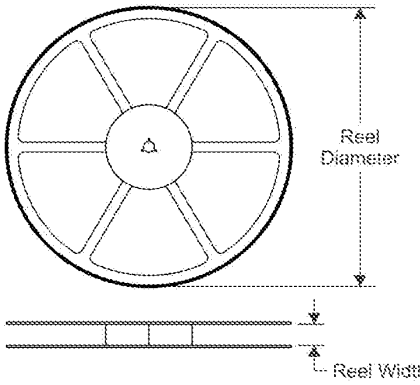
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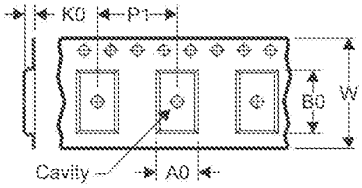
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

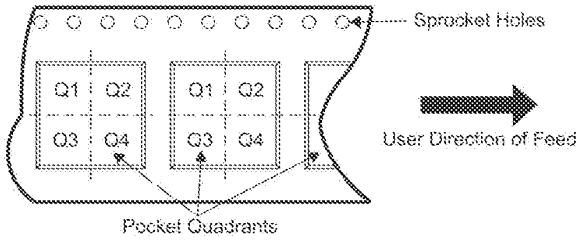


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



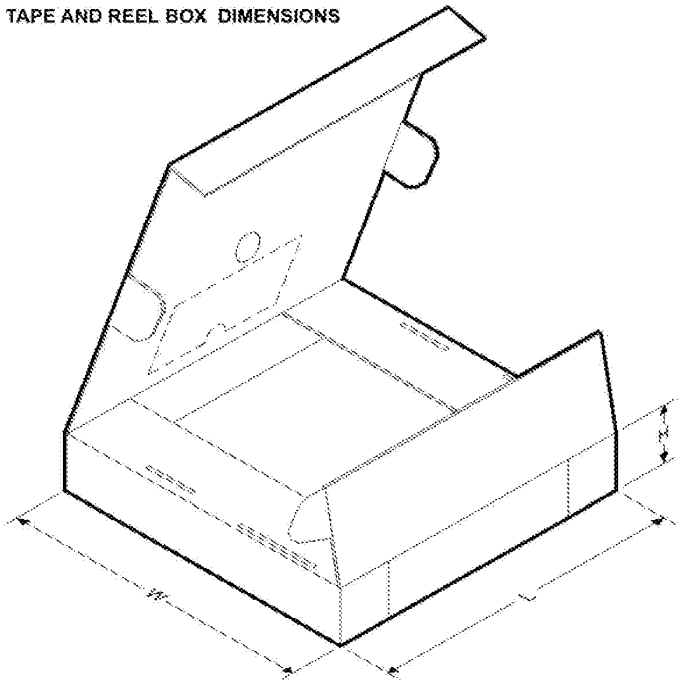
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM2621MM/NOPB	VSSOP	DGK	8	1000	178.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
LM2621MMX/NOPB	VSSOP	DGK	8	3500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1

CAR-RPA-ITC-05263

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IPR2024-01219

TAPE AND REEL BOX DIMENSIONS



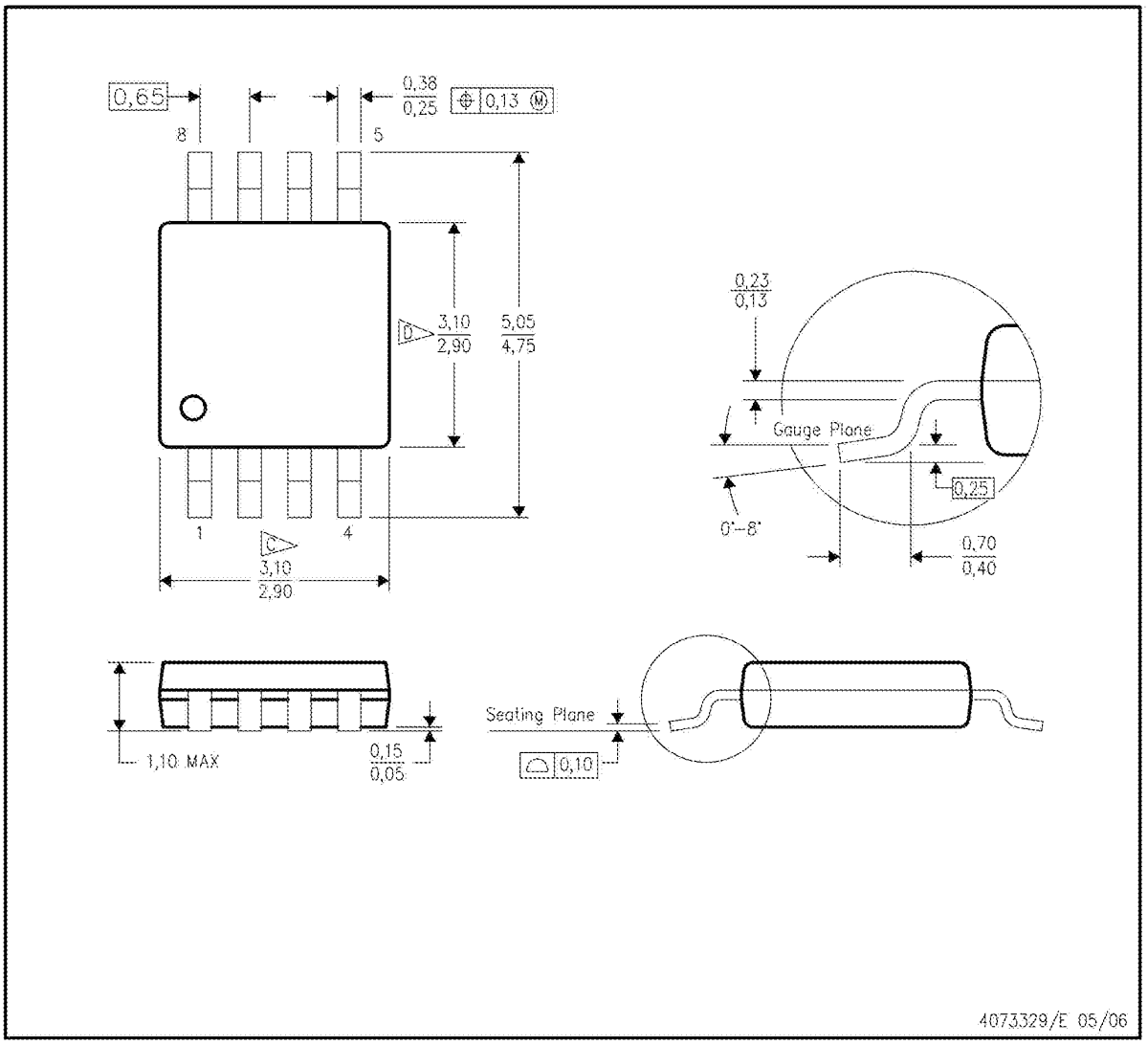
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM2621MM/NOPB	VSSOP	DGK	8	1000	210.0	185.0	35.0
LM2621MMX/NOPB	VSSOP	DGK	8	3500	367.0	367.0	35.0

CAR-RPA-ITC-05264

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IPR2024-01219

DGK (S–PDSO–G8) PLASTIC SMALL–OUTLINE PACKAGE



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per end.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
E. Falls within JEDEC MO–187 variation AA, except interlead flash.

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In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Clark S. Cheney
Administrative Law Judge

In the Matter of **CERTAIN PORTABLE BATTERY JUMP STARTERS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1256**

SHENZHEN CARKU TECHNOLOGY CO., LTD., 70MAI CO., LTD. ANTIGRAVITY BATTERIES LLC, GOOLOO TECHNOLOGIES LLC, GREAT NECK SAW MANUFACTURERS, INC., HORIZON TOOL, INC., MATCO TOOLS CORPORATION, NEKTECK, INC., PARIS CORPORATION, POWERMAX BATTERY (U.S.A.), INC. AND SHENZHEN GOOLOO E-COMMERCE CO., LTD.'S RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

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DELTRAN EX1002
IPR2024-01219

PRELIMINARY STATEMENT

Pursuant to Rule 210.13, Respondents Antigravity Batteries LLC ("Antigravity"), Horizon Tool, Inc. ("Horizon Tool"), Gooloo Technologies LLC and Shenzhen Gooloo E-Commerce Co., Ltd. (collectively "Gooloo"), Great Neck Saw Manufacturers, Inc. ("Great Neck"), Matco Tools Corporation ("Matco"), Nekteck, Inc. ("Nekteck"), Paris Corporation ("Paris"), and PowerMax Battery (U.S.A.), Inc. ("PowerMax"), Shenzhen Carku Technology Co., Ltd. ("Carku"), and 70mai Co., Ltd. ("70mai") (collectively the "Carku Foreign Respondents") (collectively the "Carku Respondents") hereby respond to the Amended Complaint[1] under Section 337 of the Tariff Act of 1930, as filed by The NOCO Company ("NOCO") on February 3, 2021 and the supplements[2] to the Complaint filed on February 5, 2021, February 8, 2021, February 22, 2021, February 23, 2021, March 4, 2021, and April 1, 2021 (collectively "the Complaint"), and the March 17, 2021 Notice of Investigation issued by the United States International Trade Commission ("the Commission").

RESPONSE TO THE NOTICE OF INVESTIGATION

Responding to the Notice of Investigation, the Carku Respondents admit that the Commission has initiated an Investigation under Section 337 and that each of the Carku Respondents are named as a Respondent herein. The Carku Respondents otherwise deny the

[1] The Carku Respondents note that NOCO filed a Second Amended Complaint on April 21, 2021, which purports to add Shenzhen Gooloo E-Commerce Co., Ltd. by correcting the Notice of Investigation, among other revisions. There appears to have been no assessment the sufficiency of allegations against Shenzhen Gooloo E-Commerce Co., Ltd. prior to the Notice of Investigation. To the extent it is found that Shenzhen Gooloo E-Commerce Co., Ltd. was already properly named in the Notice of Investigation, Shenzhen Gooloo E-Commerce Co., Ltd. provides a response to the complaint as contained herein. Gooloo further objects to any allegations against Shenzhen Gooloo E-Commerce Co., Ltd. as inadequate. To the extent any allegations are directed against Shenzhen Gooloo E-Commerce Co., Ltd. and Gooloo Technologies LLC, Gooloo objects to those allegations and is treating them as allegations against the collective Gooloo Respondents, as set forth herein. To the extent NOCO's Second Amended Complaint contains any factual allegations to which the Carku Respondents must respond, the Carku Respondents deny that allegation.

[2] To the extent any supplement to the Amended Complaint contains any factual allegation to which the Carku Respondents must respond, the Carku Respondents deny that allegation.

DELTRAN EX1002
IPR2024-01219

existence of the predicates and requirements for liability under such investigation and therefore deny the allegations in the Notice of Investigation, to the extent such allegations exist. The Carku Respondents deny that they have violated any provision of Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337. The Carku Respondents deny any violation of Section 337 through the importation into the United States, the sale for importation, and the sale within the United States after importation of certain portable battery jump starters and components thereof by reason of infringement of certain claims of U.S. Patent Nos. 9,007,015 ("'015 Patent) and/or 10,604,024 ("'024 Patent"), (collectively, the "Asserted Patents") and infringement of U.S. Trademark Reg. Nos. 4,811,656 ("'656 Trademark") and/or 4,811,749 ("'749 Trademark"), (collectively, the "Asserted Trademarks"). The Carku Respondents further deny that an industry in the United States exists or is in the process of being established as required by subsection (a)(2) of Section 337. The Carku Respondents deny that NOCO is entitled to any relief in this proceeding.

STATEMENT PURSUANT TO COMMISSION RULE 210.13(b)

The Carku Respondents understand that NOCO in its Complaint accuses Antigravity products XP-10-HD, XP-1, XP-10, and XP-3 (the "Antigravity Accused Products"), Horizon Tool products Boost (No. 550), Boost Max (No. 560), Boost Ultra (No. 590), and Micro-Boost (No. 540) (the "Horizon Tool Accused Products"), Gooloo products GP1500, GP200, GP37-Plus, GP80 (800A) and GT-1500 (the "Gooloo Accused Products"), Great Neck products 24474 (8000mAh), 24475 (12000mAh), and 24476 (18000mAh) (the "Great Neck Accused Products"), Matco products MICROJUMP, MINIJUMP3, and VERSAPRO3 (the "Matco Accused Products"), Nekteck products NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), NKJS12000 (600A/16800mAh), and NK-JS12000 (D45) (800A/20000mAh)

DELTRAN EX1002
IPR2024-01219

(the "Nekteck Accused Products"), Paris products 22, 44.1, 66.2, 154, and 22s (the "Paris Accused Products"), PowerMax products PM91004 and PM91006 (the "PowerMax Accused Products"), 70mai product Midrive PS02 (11100 mAh 600A) (the "70mai Accused Products") (collectively the "Carku Respondents' Accused Products") of infringing the '015 and '024 Patents. Statistical data regarding the quantity and value of imports of these products is provided in Confidential Exhibits A-1 to A-11.

The Harmonized Tariff Schedule Number of the Carku Respondents' Accused Products may be at least classification 8507.60.0020 or one or more sub-classifications under those numbers.

The Carku Respondents have substantial capacity to produce the Carku Respondents' Accused Products.

The Carku Respondents believe that the United States is a significant market for the Carku Respondents' Accused Products and is significant to the Carku Respondents operations relative to certain other markets.

RESPONSE TO COMPLAINT

The Carku Respondents have not had sufficient time and opportunity to collect and review all of the information that may be relevant and necessary to respond to the allegations raised in the Complaint. The Carku Respondents reserve the right to take further positions and raise additional defenses that may become apparent as a result of additional time that may be discovered subsequent to the filing of this Response.

Unless specifically admitted below, the Carku Respondents deny each and every allegation set forth in the Complaint and any amendments and exhibits attached thereto. The Carku Respondents note that Exhibits 134 to 160 attached to NOCO's fourth supplement to the

amended complaint are not referenced in any paragraph of the Complaint. To the extent Exhibits 134 to 160 contain any infringement allegation as to the Carku Respondents, the Carku Respondents deny those allegations. To the extent Exhibits 134 to 160 contain any remaining factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations, and on that basis deny those allegations.

Gooloo notes that the Complaint does not contain any allegations against Respondent Shenzhen Gooloo E-Commerce Co., Ltd. Gooloo further notes that Exhibits 134 to 160 attached to NOCO's fourth supplement to the amended complaint are not referenced in or incorporated by any paragraph of the Complaint and therefore the Complaint does not sufficiently incorporate any allegations against Shenzhen Gooloo E-Commerce Co., Ltd. Shenzhen Gooloo E-Commerce Co., Ltd., therefore, does not have any allegations to which it must respond in the Complaint, and to the extent that there are any applicable allegations directed to Shenzhen Gooloo E-Commerce Co., Ltd., denies them. To the extent that Exhibits 134 and 147, or any of Exhibits 134 to 160, constitute allegations against Shenzhen Gooloo E-Commerce Co., Ltd., Shenzhen Gooloo E-Commerce Co., Ltd., denies these allegations.

I. INTRODUCTION

1. The Carku Respondents admit that NOCO has asked the Commission to institute an investigation pursuant to Section 337 related to certain portable battery jump starters and components thereof. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

2. The Carku Respondents admit that the Complaint names as Proposed Respondents 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax. The Carku Respondents admit that the Carku Respondents' Accused

Products have been named as Accused Products. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

3. The Carku Respondents admit that the Complaint alleges that the Carku Respondents infringe one or more of certain claims of the Asserted Patents, but deny that any Carku Respondent has committed any act of infringement. The Carku Respondents admit that documents purporting to be certified copies of the Asserted Patents were attached to the Complaint as Exhibits 1-2 and purport to name NOCO as the applicant and assignee.[3] The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

4. The Carku Respondents admit that documents purporting to be non-certified copies of the Asserted Trademarks were attached to the Complaint as Exhibits 3-4 and purport to list NOCO. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

5. Denied.

6. The Carku Respondents that the Complaint purports to provide a general description of certain technical matters relating to the category of the Accused Products in this paragraph of the Complaint, but the Carku Respondents deny that this description is accurate or complete, or that the language used is correct. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

7. Denied.

8. The Carku Respondents admit that the Complaint seeks a general exclusion order, cease and desist orders, and the imposition of a bond on any imports during the Presidential

[3] The Carku Respondents note that documents purporting to be certified copies of the Asserted Patents were attached as Exhibits 1-2 as part of the April 1, 2021 Supplement to the Complaint.

review period. The Carku Respondents deny that NOCO is entitled to any such relief. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

9. The Carku Respondents admit that the Complaint seeks, in the alternative, a limited exclusion order. The Carku Respondents deny that NOCO is entitled to any such relief. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

II. THE PARTIES

A. Complainant NOCO

10. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

11. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

12. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

13. The Carku Respondents admit that documents purporting to be certified copies of the recorded assignments of the Asserted Patents were attached to the Complaint as Exhibits 6-7. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.[4]

14. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. Proposed Respondents

15. The Carku Respondents admit that a document purporting to be a declaration of Anne Hurst was attached to the Complaint as confidential Exhibit 44C. To the extent Exhibit

[4] The Carku Respondents note that documents purporting to be certified copies of the recorded assignments were attached as Exhibits 6-7 as part of the April 1, 2021 Supplement to the Complaint.

44C contains any factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations, and on that basis deny those allegations. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

1. Carku Respondents

(a) Advance Auto Parts, Inc.

16. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

17. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Antigravity Batteries LLC

18. Antigravity admits that it is a company organized and existing under the laws of the United States. Antigravity admits that its principal place of business is at 15622 Broadway Center Street, Gardena, California 90248. Antigravity denies the remaining allegations in this paragraph of the Complaint. 70mai, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

19. Antigravity admits that it imports and sells the Antigravity Accused Products. Antigravity denies the remaining allegations in this paragraph of the Complaint. 70mai, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Aukey Technology Co., Ltd.

20. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Aukey Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

21. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Aukey Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(d) Autogen Technology Co., Ltd.

22. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Autogen Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

23. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Autogen Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(e) Gooloo Technologies LLC

24. Gooloo admits that it is a company organized and existing under the laws of China. Gooloo denies that its principal place of business is at 303 Room Bantian Business Center Bantian Wuhe Road, Longgang Dist., Shenzhen China 51800. Gooloo admits that its principal place of business is at A718 O'Box Building Banxuegang Avenue, Bantian Street, Loggang District, Shenzhen China. Gooloo admits that it is affiliated with Shenzhen Gooloo E-Commerce Co., Ltd. Gooloo denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

25. Gooloo admits that it sells the Gooloo Accused Products. Gooloo admits that Shenzhen Gooloo E-Commerce Co., Ltd. imports the Gooloo Accused Products. Gooloo denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(f) Guangzhou Unique Electronics Co., Ltd.

26. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Guangzhou Unique Electronics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

27. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Guangzhou Unique Electronics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(g) Horizon Tool, Inc.

28. Horizon Tool admits that it is a company organized and existing under the laws of the United States. Horizon Tool admits that its principal place of business is at 7918 Industrial Village Road, Greensboro, North Carolina 27409. Horizon Tool admits that it is affiliated with AllStart LLC and Cal-Van & Horizon Tool Inc. Horizon Tool denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

29. Horizon Tool admits that it imports and sells the Horizon Tool Accused Products. Horizon Tool denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(h) Huizhou Grepro E-Commerce

30. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Huizhou Grepro E-Commerce so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual

allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

31. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Huizhou Grepro E-Commerce so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(i) Medcursor, Inc.

32. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Medcursor, Inc. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

33. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Medcursor, Inc. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(j) Nekteck, Inc.

34. Nekteck admits that it is a company organized and existing under the laws of the United States. Nektek admits that its principal place of business is at 421 S Brookhurst Street, Suite 127, Anaheim, California 92804. Nekteck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool,

Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

35. Nekteck admits that it imports and sells the Nekteck Accused Products. Nekteck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(k) PowerMax Battery (U.S.A.), Inc.

36. PowerMax admits that it is a company organized and existing under the laws of the United States. PowerMax admits that its principal place of business is at 1520 S Grove Avenue, Ontario, California 91761. PowerMax denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

37. PowerMax admits that it imports and sells the PowerMax Accused Products. PowerMax denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(l) Prime Global Products, Inc.

38. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

39. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(m) Shenzhen Carku Technology Co., Ltd.

40. Carku admits that it is a corporation organized and existing under the laws of China. Carku admits that its principal place of business is at Building A, Qixing Creative Workshop (Dalang), Lianrun Road, Gaofeng Community, Dalang Street, Longhua New District, China. Carku admits that MigOwatt Group LLC is a customer of Carku. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

41. Carku admits that it manufactures jump starter products in China. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(n) Shenzhen Moock Technology Co., Ltd.

42. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Moock Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

43. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Moock Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(o) Shenzhen Take Tools Co., Ltd.

44. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

45. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(p) Sictec Instruments Co., Ltd.

46. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Sictec Instruments Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

47. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Sictec Instruments Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(q) Walmart Inc.

48. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

49. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(r) 70mai Co., Ltd.

50. 70mai denies that it is a company organized and existing under the laws of the United States. 70mai admits that its principal place of business is at Room 2220, Building 2, No. 588, Zixing Road, Minhang District, Shanghai, China. 70mai denies the remaining allegations in this paragraph of the Complaint. Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

51. 70mai admits that it imports and sells the 70mai Accused Products. 70mai denies the remaining allegations in this paragraph of the Complaint. Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Boltpower Respondents

(a) Anker Technology (UK) Ltd.

52. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

53. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Arteck Electronic Co., Ltd.

54. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

55. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Best Parts, Inc.

56. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

57. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(d) Circus Link, Inc.

58. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Circus Link, Inc. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

59. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Circus Link, Inc. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(e) Deltran USA, LLC

60. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

DELTRAN EX1002
IPR2024-01219

61. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(f) FlyLink Tech Technologies Co., Ltd.

62. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

63. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(g) Fconegy Co., Ltd.

64. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Fconegy Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

65. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Fconegy Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(h) Guangdong Boltpower Energy Co., Ltd.

66. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

67. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(i) Guangzhou Autolion Electric Technology Co., Ltd.

68. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

69. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(j) Integrated Supply Network, LLC

70. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Integrated Supply Network, LLC so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

71. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Integrated Supply Network, LLC so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(k) K-Tool International

72. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

73. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(l) Lowe's Companies, Inc.

74. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

75. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(m) Matco Tools Corporation

76. Matco admits that it is a company organized and existing under the laws of the United States. Matco admits that its principal place of business is at 4403 Allen Road Stow, Ohio 44224. Matco denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

77. Matco admits that it sells the Matco Accused Products. Matco denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(n) MonoPrice, Inc.

78. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

79. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(o) National Automotive Parts Association, LLC

80. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

81. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(p) O'Reilly Automotive, Inc.

82. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

83. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(q) Pep Boys

84. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Pep Boys so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

85. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Pep Boys so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(r) Schumacher Power Technology Ltd.

86. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

87. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

87a). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

87b). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(s) Shenzhen Chic Electrics Co., Ltd.

88. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Chic Electrics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

89. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Chic Electrics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(t) Shenzhen Dingjiang Technology Co., Ltd. LLLC

90. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

91. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(u) Shenzhen Lianfatong Technology Co., Ltd.

92. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Lianfatong Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

93. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Lianfatong Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(v) Shenzhen Li Feng Maoyiyouxiangongsi

94. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Li Feng Maoyiyouxiangongsi so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

95. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Li Feng Maoyiyouxiangongsi so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to

admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(w) Shenzhen Mediatek Tong Technology Co., Ltd.

96. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

97. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(x) Shenzhen Topdon Technology Co., Ltd.

98. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

99. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(y) Shenzhen Valuelink E-Commerce Co., Ltd.

100. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

101. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(z) Smart Well Enterprise Limited

102. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Smart Well International Development Limited[5] so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still

[5] The Carku Respondents note that only Smart Well Enterprise Limited is named in the Original Complaint so the Carku Respondents understand that the dismissal of Smart Well International Development Limited dismisses Smart Well Enterprise Limited from this investigation.

contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

103. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Smart Well International Development Limited so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(aa) Tii Trading Inc.

104. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

105. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(bb) Zhejiang Qingyou Electronic Commerce Co., Ltd.

106. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

107. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Smartech Respondents

(a) Smartech Products, Inc.

108. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

109. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

4. Weego Respondents

(a) Shenzhen Jieruijia Technology Co., Ltd.

110. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

111. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Paris Corporation

112. Paris admits that it is a company organized and existing under the laws of the United States. Paris admits that its principal place of business is at 800 Highland Drive Westhampton, New Jersey 08060. Paris denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

113. Paris admits that it imports and sells the Paris Accused Products. Paris denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

5. WinPlus Respondents

(a) Shenzhen Winplus Technology Co., Ltd.

114. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Winplus Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

115. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Winplus Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Winplus North America, Inc.

116. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

117. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

6. Great Neck Respondents

(a) AutoZone, Inc.

118. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

119. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Great Neck Global, Inc. & Great Neck Saw Manufacturers, Inc.

120. The Notice of Investigation only lists Great Neck Saw Manufacturers, Inc. in its list of Respondents, not Great Neck Global, Inc. Great Neck denies that Great Neck Global, Inc. is a Respondent in this investigation and understands that no response is required to this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

121. Great Neck admits that it is a company organized and existing under the laws of the United States. Great Neck admits that its principal place of business is at 165 East 2nd Street, Mineola, New York 11501. Great Neck admits that it is associated with Great Neck Global, Inc. but Great Neck notes that the Notice of Investigation does not list Great Neck Global, Inc. as a Respondent. Great Neck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

122. The Notice of Investigation only lists Great Neck Saw Manufacturers, Inc. in its list of Respondents, not Great Neck Global, Inc. Great Neck denies that Great Neck Global, Inc. is a Respondent in this investigation and understands that no response is required to this paragraph of the Complaint. Great Neck admits that it sells the Great Neck Accused Products in the United States. Great Neck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

7. ThiEye Respondents

(a) Dongguan Hangchebao Energy Technology Co., Ltd.

123. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

124. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) ThiEye Technologies Co., Ltd.

125. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

126. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

8. Energen/ Performance Tool Respondents

(a) Best Buy Co., Inc.

127. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

128. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Chao Fung Trading Co. Ltd.

129. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Chao Fung Trading Co. Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

130. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Chao Fung Trading Co. Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Energen, Inc.

131. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

132. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(d) Wilmar Corporation

133. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Wilmar Corporation so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

134. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Wilmar Corporation so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

9. Halo Respondents

(a) Halo2Cloud, LLC

134a). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

134b). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) QVC, Inc.

134c). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

134d). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Zagg Co. Rrd Gst

134e). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

134f). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

10. Jump-n-Carry Respondents

134g). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

134h). The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

III. THE PRODUCTS AT ISSUE

135. The Carku Respondents admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but the Carku Respondents deny that this description is accurate or complete, or that the language used is

correct. The Carku Respondents deny that the Carku Respondents' Accused Products infringe the Asserted Patents. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

136. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

137. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

138. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

A. Complainant's Jump Starters

139. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

140. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

141. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

142. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. Respondents' Jump Starters

143. Gooloo admits that Figure 2 purports to include an image of the GP1500. The Carku Respondents admit that the Carku Respondents' Accused Products are made in China and that they are imported into the United States. The Carku Respondents deny that the Carku

Respondents' Accused Products infringe the Asserted Patents. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

144. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

145. The Carku Respondents admit that the Carku Respondents' Accused Products are sold online and in brick and mortar locations. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

IV. THE ASSERTED PATENTS

146. The Carku Respondents deny that NOCO's characterization of the Asserted Patents is accurate or correct. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

147. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

A. U.S. Patent No. 9,007,015

1. Identification of the Patent and Ownership

148. The Carku Respondents admit that Exhibit 1 to the Complaint purports to be a copy of the '015 Patent. The Carku Respondents admit that the '015 Patent is entitled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection" and that the '015 Patent purports to name Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill as inventors. The Carku Respondents admit that the '015 Patent recites purported continuity on its face. The Carku Respondents deny that any claim in the '015 Patent is entitled to a priority date earlier than the actual filing date of the '015 Patent. Carku denies that Jonathan L. Nook,

William K. Nook, James R. Stanfield, and Derek M. Underhill are the proper inventors of the '015 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

149. The Carku Respondents admit that Appendices A1 and A2 purport to be a certified copy of the prosecution history for the '015 Patent and the references cited therein. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

150. The Carku Respondents admit that Exhibit 6 purports to be a certified copy of the assignment history for the '015 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Non-Technical Description of the Patent

151. The Carku Respondents admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but the Carku Respondents deny that this description is accurate or complete, or that the language used its correct. The Carku Respondents deny that NOCO's characterization of the '015 Patent in this paragraph of the Complaint is accurate or correct. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

152. The Carku Respondents admit that the '015 Patent purports to have 23 claims with one independent claim. The Carku Respondents admit that NOCO asserts claims 1, 4, 11, 14, 18, 19, and 21 in the Complaint. The Carku Respondents deny that they infringe any claim

of the '015 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Foreign Counterparts of the Patent

153. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

154. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

4. Licensees to the Patent

155. The Carku Respondents admit that Exhibit 5C purports to list licensees of the '015 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. U.S. Patent No. 10,604,024

1. Identification of the Patent and Ownership

156. The Carku Respondents admit that Exhibit 1 to the Complaint purports to be a copy of the '024 Patent. The Carku Respondents admit that the '024 Patent is entitled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection" and that the '024 Patent purports to name Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill as inventors. The Carku Respondents admit that the '024 Patent recites purported continuity on its face. The Carku Respondents deny that any claim in the '024 Patent is entitled to a priority date earlier than the actual filing date of the '024 Patent. Carku denies that Jonathan L. Nook, William K. Nook, James R. Stanfield, and Derek M. Underhill are the proper inventors of the

'024 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

157. The Carku Respondents admit that Appendices B1 and B2 purport to be a certified copy of the prosecution history for the '024 Patent and the references cited therein. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

158. The Carku Respondents admit that Exhibit 7 purports to be a certified copy of the assignment history for the '024 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Non-Technical Description of the Patent

159. The Carku Respondents admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but the Carku Respondents deny that this description is accurate or complete, or that the language used its correct. The Carku Respondents deny that NOCO's characterization of the '024 Patent in this paragraph of the Complaint is accurate or correct. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

160. The Carku Respondents admit that the '024 Patent purports to have 30 claims with three independent claims. The Carku Respondents admit that NOCO asserts claims 1, 4, 5, 6, 16, 19, 23, 24, 26, 29, 30 in the Complaint. The Carku Respondents deny that they infringe any claim of the '024 Patent. The Carku Respondents lack sufficient knowledge or information

to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Foreign Counterparts of the Patent

161. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

4. Licensees to the Patent

162. The Carku Respondents admit that Exhibit 5C purports to list licensees of the '024 Patent. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

V. THE ASSERTED TRADEMARKS

A. U.S. Trademark Reg. No. 4,811,656

163. The Carku Respondents admit that Exhibit 3 purports to be a non-certified copy of Reg. No. 4,811,656. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

164. The Carku Respondents admit that Appendix C purports to be a certified copy of the prosecution history for Reg. No. 4,811,656. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. U.S. Trademark Reg. No. 4,811,749

165. The Carku Respondents admit that Exhibit 4 purports to be a non-certified copy of Reg. No. 4,811,749. The Carku Respondents lack sufficient knowledge or information to

admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

166. The Carku Respondents admit that Appendix D purports to be a certified copy of the prosecution history for Reg. No. 4,811,749. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

VI. UNFAIR ACTS OF THE PROPOSED RESPONDENTS

A. Infringement of the Asserted Patents

167. The Carku Respondents admit that the Carku Respondents' Accused Products have been sold for importation into the United States, imported into the United States and sold within the United States after importation. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

168. Denied.

169. The Carku Respondents admit that the Carku Respondents' Accused Products have been sold for importation into the United States, imported into the United States and sold within the United States after importation. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

1. Claim Chart 01 - Carku Respondents' Accused Products

(a) Carku Design

170. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but deny that this description is accurate or complete, or that the language used is correct. 70mai admits that the 70mai Accused Products are manufactured by

Carku. Antigravity admits that the Antigravity Accused Products are manufactured by Carku. Gooloo admits that the Gooloo Accused Products are manufactured by Carku. Horizon Tool admits that the Boost (No. 550), Boost Max (No. 560), and Micro-Boost (No. 540) of the Horizon Tool Accused Products are manufactured by Carku. Nekteck admits that the NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), and NK-JS12000 (600A/16800mAh) of the Nekteck Accused Products are manufactured by Carku. PowerMax admits that the PowerMax Accused Products are manufactured by Carku. Carku admits that it manufactures the 70mai Accused Products, Antigravity Accused Products, Gooloo Accused Products, Boost (No. 550), Boost Max (No. 560), Micro-Boost (No. 540), NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), NK-JS12000 (600A/16800mAh), PowerMax Accused Products, P800AJS, KP120, KP200, T6, T8 (Newer Model), T8 Max, T8 Pro, Epower-125 (2000A), MK200 (1500A), MK800 (2000A), Epower-146, Epower-172, Epower-155, MJS-P111B (4000A), RP-PI-01 (1000A), GP-JS-1500A (GP71C), and GP-JS-500A. Carku denies that the Tacklife T8 Pro is representative of the Carku Design Accused Products. Carku objects that the terms "Carku Design" and "Carku Accused Products" have not been defined. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax deny the remaining allegations in this paragraph of the Complaint. Great Neck, Matco and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

171. 70mai, Antigravity, Gooloo, Horizon Tool, Nekteck, and PowerMax admit that they import and sell the 70mai Accused Products, Antigravity Accused Products, Gooloo Accused Products, Horizon Tool Accused Products, Nekteck Accused Products, and PowerMax

Accused Products. 70mai, Antigravity, Gooloo, Horizon Tool, Nekteck, and PowerMax deny the remaining allegations in this paragraph of the Complaint. Carku admits that it sells for importation the 70mai Accused Products, Antigravity Accused Products, Gooloo Accused Products, Boost (No. 550), Boost Max (No. 560), Micro-Boost (No. 540), NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), NK-JS12000 (600A/16800mAh), PowerMax Accused Products, P800AJS, KP120, KP200, T6, T8 (Newer Model), T8 Max, T8 Pro, Epower-125 (2000A), MK200 (1500A), MK800 (2000A), Epower-146, Epower-172, Epower-155, MJS-P111B (4000A), RP-PI-01 (1000A), GP-JS-1500A (GP71C), and GP-JS-500A. Carku denies the remaining allegations in this paragraph of the Complaint. Great Neck, Matco and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

172. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax admit that Exhibit 111 purports to be a claim chart. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax deny that the chart demonstrates infringement by any Accused Product. Carku denies that the Tacklife T8 Pro is representative of the Carku Design Accused Products. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax deny the remaining allegations in this paragraph of the Complaint. Great Neck, Matco and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

173. 70mai, Antigravity, Gooloo, Horizon Tool, Nekteck, and PowerMax admit that they import and sell the 70mai Accused Products, Antigravity Accused Products, Gooloo Accused Products, Horizon Tool Accused Products, Nekteck Accused Products, and PowerMax

Accused Products. 70mai, Antigravity, Gooloo, Horizon Tool, Nekteck, and PowerMax deny the remaining allegations in this paragraph of the Complaint. Carku admits that it sells for importation the 70mai Accused Products, Antigravity Accused Products, Gooloo Accused Products, Boost (No. 550), Boost Max (No. 560), Micro-Boost (No. 540), NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), NK-JS12000 (600A/16800mAh), PowerMax Accused Products, P800AJS, KP120, KP200, T6, T8 (Newer Model), T8 Max, T8 Pro, Epower-125 (2000A), MK200 (1500A), MK800 (2000A), Epower-146, Epower-172, Epower-155, MJS-P111B (4000A), RP-PI-01 (1000A), GP-JS-1500A (GP71C), and GP-JS-500A. Carku denies the remaining allegations in this paragraph of the Complaint. Great Neck, Matco and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

174. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax admit that Exhibit 111 purports to be a claim chart. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax deny that the chart demonstrates infringement by any Accused Product. Carku denies that the Tacklife T8 Pro is representative of the Carku Design Accused Products. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Nekteck, and PowerMax deny the remaining allegations in this paragraph of the Complaint. Great Neck, Matco and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Claim Chart 02 - Boltpower Accused Products

(a) Boltpower Design

175. Horizon Tool, Matco and Carku admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but Horizon Tool,

Matco and Carku deny that this description is accurate or complete, or that the language used is correct. Horizon Tool, Matco and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

176. Matco admits that it sells the Matco Accused Products. Carku admits that it sells for importation the VERSAPRO3 and MINIJUMP3. Horizon Tool admits that it imports and sells the Matco Accused Products. Horizon Tool, Matco and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

177. Matco admits that Exhibit 112 purports to be a claim chart. Matco denies that that the chart demonstrates infringement by any Matco Accused Product. Matco denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

178. Matco admits that it sells the Matco Accused Products. Carku admits that it sells for importation the VERSAPRO3 and MINIJUMP3. Horizon Tool admits that it imports and sells the Matco Accused Products. Horizon Tool, Matco and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck,

Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

179. Matco admits that Exhibit 112 purports to be a claim chart. Matco denies that the chart demonstrates infringement by any Matco Accused Product. Matco denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Claim Chart 03 - Smartech Accused Products

(a) Smartech Design

180. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

181. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

182. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

183. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

184. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

4. Claim Chart 04 - Weego Accused Products

(a) Weego Design

185. Paris and Carku admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but Paris and Carku deny that this description is accurate or complete, or that the language used is correct. Paris and Carku deny that the 22s is representative of the Weego Design Accused Products. Paris and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

(b) Infringement of the '015 Patent

186. Paris admits that it imports and sells the Paris Accused Products. Carku admits that it sells for importation the 22 and 22s. Paris and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

187. Paris admits that Exhibit 114 purports to be a claim chart. Paris denies that the chart demonstrates infringement by any Paris Accused Product. Paris denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

(c) Infringement of the '024 Patent

188. Paris admits that it imports and sells the Paris Accused Products. Carku admits that it sells for importation the 22 and 22s. Paris and Carku deny the remaining allegations in this paragraph by the Complaint. 70mai, Antigravity, Gooloo, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

189. Paris admits that Exhibit 114 purports to be a claim chart. Paris denies that the chart demonstrates infringement by any Paris Accused Product. Paris denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

5. Claim Chart 05 - Winplus Accused Products

(a) Winplus Design

190. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

191. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

192. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

193. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

194. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

6. Claim Chart 06 - Great Neck Accused Products

(a) Great Neck Design

195. Great Neck, Horizon Tool, and Carku admit that NOCO purports to provide a general description of certain technical matters in this paragraph of the Complaint, but Great, Horizon Tool, and Carku Neck deny that this description is accurate or complete, or that the language used is correct. Great Neck denies that the 24474 is representative of the Great Neck Accused Products. Great Neck, Horizon Tool, and Carku admit that the Great Neck Accused Products are offered under the OEM Tools brand. Great Neck, Horizon Tool, and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

(b) Infringement of the '015 Patent

196. Great Neck admits that it sells the Great Neck Accused Products. Carku admits that it sells for importation the Great Neck Accused Products. Horizon Tool admits that it imports the Great Neck Accused Products. Great Neck, Horizon Tool, and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

197. Great Neck admits that Exhibit 116 purports to be a claim chart. Great Neck denies that the chart demonstrates infringement by any Great Neck Accused Product.[6] Great Neck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis denies those allegations.

7. Claim Chart 07 - ThiEye Accused Products

(a) ThiEye Design

198. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

199. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

200. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

201. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

202. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

[6] The Amended Complaint does not contain any allegations concerning the '024 Patent for the Great Neck Accused Products, but to the extent NOCO argues otherwise, Great Neck, Horizon Tool, and Carku deny those allegations. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny any allegations concerning the '024 Patent, and on that basis denies those allegations.

8. Claim Chart 08 - Energen/Performance Tools Accused Products

(a) Energen/Performance Tool Design

203. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

204. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

205. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

206. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

207. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

9. Claim Chart 09 - HALO Accused Products

(a) HALO Design

208. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

209. Carku admits that it sells for importation the Bolt Flashlight. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or

information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

210. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

211. Carku admits that it sells for importation the Bolt Flashlight. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

212. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

10. Claim Chart 10 - Clore Accused Products

(a) Clore Design

213. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(b) Infringement of the '015 Patent

214. Carku admits that it sells for importation the JNC325. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

215. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

(c) Infringement of the '024 Patent

216. Carku admits that it sells for importation the JNC325. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

217. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. Infringement of the Asserted Trademarks

218. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

219. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

220. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

221. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

222. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

223. Carku admits that Exhibits 27, 50, and 121 purport to include Amazon webpages. Carku denies that the exhibits cited by NOCO demonstrate that Carku uses any trademark.

Carku denies the "Audew brand," an undefined term, uses any purported NOCO trademark. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

224. Carku admits that Exhibits 29 and 52 purport to include Amazon webpages. Carku denies that the exhibits cited by NOCO demonstrate that Carku uses any trademark. Carku denies the "Autown brand," an undefined term, uses any purported NOCO trademark. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

225. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

226. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

227. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

228. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

229. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

230. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

231. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

VII. SPECIFIC INSTANCES OF IMPORTATION AND SALE

232. Carku admits that it manufactures portable battery jump starters outside of the United States. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax admit that the Carku Respondents' Accused Products are imported and sold in the United States. The Carku Respondents deny the remaining allegations in this paragraph of the Complaint.

A. Carku Brands

1. AllStart

233. Horizon Tool admits that it imports and sells the Horizon Tool Accused Products under the brand name AllStart. Horizon Tool admits that the Horizon Tool Accused Products are manufactured outside of the United States. Carku admits that it manufactures the Boost (No. 550), Boost Max (No. 560), and Micro-Boost (No. 540) outside of the United States under the brand name AllStart. Horizon Tool and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

234. Horizon Tool admits that it imports the Horizon Tool Accused Products. Horizon Tool admits that the Horizon Tool Accused Products are manufactured by Carku and RoyPow Technology Co., Ltd. Carku admits that it manufactures the Boost (No. 550), Boost Max (No.

560), and Micro-Boost (No. 540). Horizon Tool and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

235. Horizon Tool admits that it sells the Horizon Tool Accused Products in the United States. Horizon Tool admits that Exhibit 46 purports to be a receipt, packaging images, and website images. Horizon Tool denies that it sells the Horizon Tool Accused Products to Walmart and Advance Auto. Horizon Tool denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

236. Horizon Tool and Carku admit that Exhibit 46 purports to be a receipt, packaging images, and website images. Horizon Tool and Carku admit that a packaging image in Exhibit 46 purports to say "Made in China." Horizon Tool and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Antigravity Batteries

237. Antigravity admits that it imports and sells the Antigravity Accused Products under the brand name Antigravity. Antigravity admits that the Antigravity Accused Products are manufactured outside of the United States. Carku admits that it manufactures the Antigravity Accused Products outside of the United States under the brand name Antigravity. Antigravity and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Gooloo,

Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

238. Antigravity admits that it imports the Antigravity Accused Products. Antigravity admits that the Antigravity Accused Products are manufactured by Carku. Carku admits that it manufactures the Antigravity Accused Products. Antigravity and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

239. Antigravity admits that it sells the Antigravity Accused Products in the United States. Antigravity admits that Exhibit 48 purports to be a receipt, packaging images, and website images. Antigravity admits that the Antigravity Accused Products were sold by Walmart. Antigravity denies the remaining allegations in this paragraph of the Complaint. 70mai, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

240. Antigravity and Carku admit that Exhibit 48 purports to be a receipt, packaging images, and website images. Antigravity and Carku admit that a packaging image purports to say "Made in China." Antigravity and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Audew

241. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Guangzhou Unique Electronics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the Epower-146 (1000A/10800mAh), Epower-172 (1500A/17000mAh) and Epower-155 (1500/2000mAh) outside of the United States under the brand name Audew. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

242. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Guangzhou Unique Electronics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the Epower-146 (1000A/10800mAh), Epower-172 (1500A/17000mAh) and Epower-155 (1500/2000mAh). Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

243. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Guangzhou Unique Electronics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to

admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

244. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Guangzhou Unique Electronics Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that Exhibit 121 purports to be a receipt, website images, and packaging images, and an answer to a Complaint. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

4. Autogen

245. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Autogen Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the MJS-P111B (4000A) outside of the United States under the brand name Autogen. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

246. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Autogen Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual

allegations, Carku admits that it manufactures the MJS-P111B (4000A). Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

247. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Autogen Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

248. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Autogen Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that Exhibit 51 purports to be a receipt, website images, and packaging images. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

5. Freeman

249. Carku admits that it manufactures the P800AJS outside of the United States under the brand name Freeman. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and

PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

250. Carku admits that it manufactures the P800AJS. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

251. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

252. Carku admits that Exhibit 66 purports to be a receipt and packaging images. Carku admits that one packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

6. Gooloo

253. Gooloo admits that it imports and sells the Gooloo Accused Products under the brand name Gooloo outside of the United States. Carku admits that it manufactures the Gooloo Accused Products outside of the United States under the brand name Gooloo. Carku and Gooloo deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

254. Gooloo admits that it imports for sale the Gooloo Accused Products under the brand name Gooloo. Carku admits that it manufactures the Gooloo Accused Products. Carku and Gooloo deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

255. Gooloo admits that Exhibit 67 purports to be a receipt, packaging images and website images. Gooloo admits that it sells the Gooloo accused products in the United States. Gooloo admits that the Gooloo Accused Products are sold by Walmart. Gooloo denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

256. Gooloo and Carku deny that Exhibit 57 contains packaging images of the Gooloo Accused Products. Gooloo and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

7. Grepro

257. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Huizhou Grepro E-Commerce so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the GP-JS-1500A (GP71C) and GP-JS-500A

outside of the United States under the brand name Grepro. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

258. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Huizhou Grepro E-Commerce so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the GP-JS-1500A (GP71C) and GP-JS-500A. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

259. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Huizhou Grepro E-Commerce so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that Exhibit 131 purports to be a receipt, packaging images, website images, and a U.S. trademark registration. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

8. <u>iClever</u>

260. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

261. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

262. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

263. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

9. M Moock

264. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Moock Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the MK200 (1500A) and MK800 (2000A) outside of the United States under the brand name M Moock. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

265. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Moock Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that it manufactures the MK200 (1500A) and MK800 (2000A). Carku denies the remaining allegations in this paragraph of the Complaint. 70mai,

Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

266. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Moock Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

267. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Shenzhen Moock Technology Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, Carku admits that Exhibit 125 purports to be a receipt, packaging images, website images, and a trademark registration. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

10. Nekteck

268. Nekteck admits that it imports and sells the Nekteck Accused Products under the brand name Nekteck. Nekteck admits that the Nekteck Accused Products are manufactured outside of the United States. Carku admits that it manufactures the NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), and NK-JS12000

(600A/16800mAh) products outside of the United States under the brand name Nekteck. Nekteck and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

269. Nekteck admits that it imports for sale the Nekteck Accused Products. Carku admits that it manufactures the NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), and NK-JS12000 (600A/16800mAh). In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Medcursor, Inc. and Sictec Instruments. To the extent this paragraph of the Complaint still contains factual allegations concerning Medcursor, Inc. and Sictec Instruments, Nekteck and Carku deny that the NK-JS19800 (2000A/19800mAh), NK-JS12000 (D31) (500A/12000mAh), and NK-JS12000 (600A/16800mAh) are manufactured by Medcursor and Sictec Instruments. Nekteck and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

270. Nekteck admits that it sells the Nekteck Accused Products in the United States. Nekteck admits that Exhibit 132 purports to be a receipt, packaging images, website images, complaint for patent infringement, and a declaration of use and/or excusable nonuse of a mark in commerce. Nekteck admits that Exhibit 78 purports to be a receipt, packaging images, website images, and a complaint for patent infringement. Nekteck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool,

Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

271. Nekteck admits that it sells the Nekteck Accused Products in the United States. Nekteck and Carku admit that Exhibit 132 purports to be a receipt, packaging images, website images, and complaint for patent infringement. Nekteck and Carku admit that Exhibit 78 purports to be a receipt, packaging images, website images, a complaint for patent infringement, and a declaration of use and/or excusable nonuse of a mark in commerce. Nekteck and Carku admit that a packaging image purports to say "Made in China." Nekteck and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

11. PowerMax

272. PowerMax admits that it imports and sells the PowerMax Accused Products under the brand name PowerMax. PowerMax admits that the PowerMax Accused Products are manufactured outside of the United States. Carku admits that it manufactures the PowerMax Accused Products outside of the United States under the brand name PowerMax. PowerMax and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

273. PowerMax admits that it imports for sale the PowerMax Accused Products. PowerMax admits that the PowerMax Accused Products are manufactured by Carku. Carku

admits that it manufactures the PowerMax Accused Products. PowerMax and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

274. PowerMax admits that it sells the PowerMax Accused Products in the United States. PowerMax admits that Exhibit 84 purports to be a receipt and packaging images. PowerMax denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

275. PowerMax and Carku admit that the PowerMax Accused Products are manufactured in China. PowerMax and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

12. Tacklife

276. Carku admits that it manufactures the KP120, KP200, T6, T8 (Newer Model), T8 Max, T8 MAX, and T8 Pro outside of the United States under the brand name Tacklife. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

277. Carku admits that it manufactures the KP120, KP200, T6, T8 (Newer Model), T8 Max, T8 MAX, and T8 Pro outside of the United States. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

278. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

279. Carku admits that Exhibit 126 purports to be a receipt, website images, packaging images, and a trademark registration. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

13. Xiaomi

280. 70mai admits that it imports and sells the 70mai Accused Product under the brand name 70mai. 70mai denies that the brand name of the 70mai Accused Product is Xiaomi. 70mai admits that the 70mai Accused Product is manufactured outside of the United States. Carku admits that it manufactures the 70mai Accused Product outside of the United States under the brand name 70mai. 70mai and Carku that Exhibit 130C purports to be a supplemental declaration of Ann Hurst. 70mai and Carku deny the remaining allegations in this paragraph of the Complaint. Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

281. 70mai admits that it imports for sale the 70mai Accused Product. Carku admits that it manufactures the 70mai Accused Product. Carku and 70mai deny the remaining allegations in this paragraph of the Complaint. Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

282. 70mai admits that Exhibit 129 purports to be a receipt, packaging images and website images. 70mai admits that it sells the 70mai Accused Product. 70mai denies the remaining allegations in this paragraph of the Complaint. Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

283. 70mai and Carku admit that Exhibit 129 purports to be a receipt, packaging images, and website images. 70mai and Carku admit that a packaging image purports to say "Made in China." Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. Boltpower Brands

1. Ampeak

284. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

285. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

286. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

287. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Arteck

288. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

289. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

290. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

291. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Autown

292. Carku admits that it manufactures the RP-PI-01 (1000A) outside the United States under the brand name Autown. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

293. Carku admits that it manufactures the RP-PI-01 (1000A) outside the United States. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack

sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

294. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

295. Carku admits that Exhibit 52 purports to contain packaging images. Carku admits that one packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

4. Battery Tender

296. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

297. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

298. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

299. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

5. Beatit

300. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

301. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

302. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

303. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

6. Boltpower

304. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

305. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

306. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

307. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

7. DB Power/Valuelink

308. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

309. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

310. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

311. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

8. Diehard

312. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

313. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

314. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

315. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

9. Duralast

316. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

317. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

318. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

319. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

10. EverStart

320. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

321. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

322. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

323. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

11. Fconegy

324. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Fconegy Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

325. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Fconegy Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

326. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Fconegy Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

327. In its Fourth Supplement to the Amended Complaint, NOCO withdrew its allegations against Fconegy Co., Ltd. so there are no allegations to respond to in this paragraph of the Complaint. To the extent this paragraph of the Complaint still contains factual allegations, the Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

12. Flylinktech

328. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

329. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

330. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

331. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

13. Imazing

332. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

333. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

334. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

335. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

14. Jumtop

336. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

337. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

338. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

339. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

15. KTI (K-Tool International)

340. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

341. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

342. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

343. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

16. Lemsir

344. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

345. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

346. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

347. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

17. Loftek

348. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

349. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

350. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

351. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

18. Matco Tools

352. Matco denies that it imports the Matco Accused Products. Matco admits that it sells the Matco Accused Products. Horizon Tool admits that it imports and sells the Matco Accused Products under the brand name Matco. Matco and Horizon Tool admit that the Matco Accused Products are manufactured outside of the United States. Carku admits that the VERSAPRO3 and MINIJUMP3 are manufactured outside of the United States under the brand name Matco. Carku, Matco and Horizon Tool deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

353. Matco denies that it imports for sale the Matco Accused Products. Matco admits that the Matco Accused Products are manufactured by Carku and Boltpower. Horizon Tool admits that it imports for sale the Matco Accused Products. Carku admits that it manufactures the VERSAPRO3 and MINIJUMP3. Carku, Matco and Horizon Tool deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

354. Matco and Horizon Tool admit that they sell the Matco Accused Products in the United States. Matco and Horizon Tool admit that Exhibit 76 purports to be a receipt, packaging images, and website images. Matco and Horizon Tool deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

355. Carku, Matco, and Horizon admit that Exhibit 76 purports to be a receipt, packaging images, and website images. Carku, Matco, and Horizon admit that a packing image purports to say "Made in China." Carku, Matco, and Horizon Tool deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

19. Nexpow

356. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

357. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

358. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

359. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

20. PowerCache

360. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

361. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

362. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

363. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

21. Roav

364. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

365. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

366. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

367. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

22. Sanrock

368. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

369. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

370. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

371. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

23. Schumacher

372. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

373. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

374. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

375. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

24. Tooliom

376. Carku admits that it manufactures the Epower-125 (2000A) outside of the United States under the brand name Tooliom. Carku denies the remaining allegations in this paragraph

of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

377. Carku admits that it manufactures the Epower-125 (2000A). Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

378. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

379. Carku admits that Exhibit 91 purports to include packaging images. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

25. Topdon

380. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

381. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

382. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

383. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

26. Topvision

384. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

385. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

386. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

387. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

27. Trekpow

388. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

389. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

390. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

391. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

28. Vavofo

392. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

393. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

394. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

395. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

29. Vekkia

396. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

397. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

398. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

399. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

30. Yaber

400. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

401. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

402. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

403. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

C. Smartech Brands

1. Smartech

404. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

405. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

406. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

407. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

D. Weego Brands

1. Weego

408. Paris admits that it imports and sells the Paris Accused Products under the brand name Weego. Paris admits that the Paris Accused Products are manufactured outside of the United States. Carku admits that the 22 and 22s are manufactured outside of the United States under the brand name Weego. Paris and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

409. Paris admits that it imports for sale the Paris Accused Products. Paris admits that the Paris Accused Products are manufactured by Carku, Shenzhen Jieruijia Technology Co., Ltd.

and Shenzhen Grepow Battery Co., Ltd. Carku admits that it manufactures the 22 and 22s. Paris and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

410. Paris admits that it sells the Paris Accused Products in the United States. Paris admits that the Paris Accused Products are sold by Walmart. Paris admits that Exhibit 101 purports to be a receipt, packaging images, and website images. Paris denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

411. Paris and Carku admit that Exhibit 76 purports to be a receipt, packaging images, and website images. Paris and Carku admit that a packaging image purports to say "Made in China." Paris and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

E. Winplus Brands

1. Type S

412. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

DELTRAN EX1002
IPR2024-01219

413. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

414. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

415. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Winplus

416. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

417. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

418. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

419. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

F. Great Neck Brands

1. OEM Tools

420. Great Neck admits that it sells the Great Neck Accused Products under the brand name OEM Tools. Great Neck admits that the Great Neck Accused Products are manufactured outside of the United States. Horizon Tool admits that it imports the Great Neck Accused Products under the brand name OEM Tools. Carku admits that it manufactures outside of the United States the Great Neck Accused Products under the brand name OEM Tools. Great Neck, Horizon Tool, and Carku deny the remaining allegations in this paragraph of the Complaint.

70mai, Antigravity, Gooloo, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

421. Great Neck denies that it manufactures or imports for sale the Great Neck Accused Products. Great Neck admits that the Great Neck Accused Products are sold under the brand name OEM Tools. Horizon Tool admits that it imports for sale the Great Neck Accused Products under the brand name OEM Tools. Carku admits that it manufactures the Great Neck Accused Products. Great Neck notes that the Notice of Investigation only lists Great Neck Saw Manufacturers, Inc. as a Respondent. Great Neck, Horizon Tool, and Carku deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

422. Great Neck admits that it sells the Great Neck Accused Products in the United States. Great Neck admits that Exhibit 80 purports to be a receipt, packaging images, and website images. Great Neck denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Carku, Gooloo, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

423. Great Neck, Horizon Tool, and Carku admit that Exhibit 80 purports to be a receipt, packaging images, and website images. Great Neck, Horizon Tool, and Carku admit that a packaging image purports to say "Made in China." Great Neck, Carku, and Horizon Tool deny the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo,

Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

G. ThiEye Brands

1. Buture

424. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

425. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

426. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

427. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Fnnemge

428. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

429. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

430. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

431. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

3. Utrai

432. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

433. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

434. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

435. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

H. Energen & Performance Tool Brands

1. Energen

436. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

437. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

438. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

439. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

2. Performance Tool

440. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

441. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

442. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

443. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

I. Halo Brands

1. HALO

444. Carku admits that it manufactures the Bolt Flashlight outside of the United States under the brand name Halo. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

445. Carku admits that it manufactures the Bolt Flashlight. Carku denies the remaining allegations in this paragraph of the complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

446. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

447. Carku admits that Exhibit 69 purports to be a receipt and packaging images. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or

information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

J. Clore Brands

1. Jump-N-Carry

448. Carku admits that it manufactures the JNC325 outside of the United States under the brand name Jump-N-Carry. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

449. Carku admits that it manufactures the JNC325 outside of the United States. Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

450. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

451. Carku admits that Exhibit 107 purports to be a receipt and packaging images. Carku admits that a packaging image purports to say "Made in China." Carku denies the remaining allegations in this paragraph of the Complaint. 70mai, Antigravity, Gooloo, Great Neck, Horizon Tool, Matco, Nekteck, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

VIII. HARMONIZED TARIFF SCHEDULE ITEM NUMBERS

452. The Carku Respondents deny that classifications 8504.40, 8506.50, 8507.60, 8507.10, 8511.40, 8511.50, 8516.60, 8516.71, and 8539.50.00 of the Harmonized Tariff Schedule of the United States apply to the Carku Respondents' Accused Products. Classification 8507.60.0020 of the Harmonized Tariff Schedule of the United States or one or more sub-classifications under those numbers apply to the Accused Products. The Carku Respondents lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis deny those allegations.

IX. DOMESTIC INDUSTRY

453. Denied.

A. Technical Prong

454. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

455. The Carku Respondents admit that confidential Exhibit 10C purports to be a claim chart. The Carku Respondents deny that the chart demonstrates that the NOCO Domestic Industry Product practices the Asserted Patents. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

456. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

B. Economic Prong

457. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

458. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

459. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

460. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

461. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

462. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

X. RELATED LITIGATION

463. Nekteck admits that Exhibit 108 purports to be a list of lawsuits. Nekteck admits that on March 13, 2020, NOCO filed a complaint against Nekteck in the U.S. District Court for the Southern District of Ohio alleging infringement of one or more claims of the '015 Patent, Civil Action No. 2:20-cv-01356-SDM-CMV. That case is currently stayed. Carku admits that on May 19, 2020, NOCO filed a complaint against Carku in the High Court of Justice, Business and Property Courts of England and Wales, Claim No. HP-2020-000018. This case is ongoing. Gooloo admits that on May 28, 2020, NOCO filed a complaint against Gooloo in the U.S. District Court for the Northern District of Ohio alleging infringement of one or more claims of the '015 Patent, Civil Action No. 1:20-cv-01171. The case is currently stayed. Carku, Gooloo, and Nekteck lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis denies those allegations. 70mai, Antigravity, Great Neck, Horizon Tools, Matco, Paris, and PowerMax lack sufficient knowledge

or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

464. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

465. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

466. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

XI. GEO

467. Denied.

468. Nekteck admits that on March 13, 2020, NOCO filed a complaint against Nekteck in the U.S. District Court for the Southern District of Ohio alleging infringement of one or more claims of the '015 Patent, Civil Action No. 2:20-cv-01356-SDM-CMV. That case is currently stayed. Carku admits that on May 19, 2020, NOCO filed a complaint against Carku in the High Court of Justice, Business and Property Courts of England and Wales, Claim No. HP-2020-000018. This case is currently ongoing. Gooloo admits that on May 28, 2020, NOCO filed a complaint against Gooloo in the U.S. District Court for the Northern District of Ohio alleging infringement of one or more claims of the '015 Patent, Civil Action No. 1:20-cv-01171. The case is currently stayed. Carku, Gooloo, and Nekteck lack sufficient knowledge or information to admit or deny the remaining allegations in this paragraph of the Complaint, and on that basis denies those allegations. 70mai, Antigravity, Great Neck, Horizon Tools, Matco, Paris, and PowerMax lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

469. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

470. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

471. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

472. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

473. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

474. The Carku Respondents lack sufficient knowledge or information to admit or deny the allegations in this paragraph of the Complaint, and on that basis deny those allegations.

XII. REQUESTED RELIEF

475. Denied.

476. The Carku Respondents deny that NOCO is entitled to any of the relief requested in this paragraph of the Complaint, including subparagraphs a) through f).

AFFIRMATIVE DEFENSES

1. The Carku Respondents assert the following affirmative defenses in response to the allegations of the Complaint. The Carku Respondents note that this investigation is in its early stages and that discovery has just commenced. The Carku Respondents do not know the full extent of their defenses to NOCO's allegations. Accordingly, the Carku Respondents reserve the right to supplement and amend their defenses and to assert additional defenses as this Investigation proceeds.

First Affirmative Defense - Non-infringement

2. Although the Carku Respondents do not bear the burden of proof on this issue, the Carku Respondents have not directly infringed, indirectly infringed, contributed to, or induced infringement of any valid or enforceable claim of the Asserted Patents, either literally or under the doctrine of equivalents, and have not otherwise committed any acts in violation of 35 U.S.C. § 271 and/or 19 U.S.C. §1337.

Second Affirmative Defense - Invalidity

3. All asserted claims of the Asserted Patents are invalid for failure to meet one or more of the requirements set forth in Title 35 of the United States Code, including Sections 101, 102, 103, 112 and/or any other applicable statutory provisions.

4. Respondents reserve the right to amend or supplement their contentions regarding the invalidity of the Asserted Patents pursuant to the procedural schedule to be issued by the Administrative Law Judge in this Investigation.

1. The '015 Patent

5. All asserted claims of the '015 Patent are invalid for failure to meet one or more of the requirements set forth in Title 35 of the United States Code, including Sections 101, 102, 103, 112, and/or any other statutory provisions.

6. One or more claims of the '015 Patent are invalid for failure to satisfy the requirements of 35 U.S.C. § 101. In particular, one or more claims of the '015 Patent do not relate to a new and useful process, machine, manufacture, or composition of nature, or any new and useful improvement thereof.

7. One or more claims of the '015 Patent are invalid for improper inventorship. *See Trovan, Ltd. v. Sokymat SA, Irori*, 299 F.3d 1292, 1301 (Fed. Cir. 2002) ("A patent is invalid if

more or less than the true inventors are named."). As described in IPR2020-00994, Ex. 1018 and in detail below in support of the Carku Respondents' Sixth Affirmative Defense, on information and belief NOCO, and at least Jonathan Nook, and Derek Underhill viewed a sample of Carku's intelligent jumper cables and other jump starter products prior to the filing date or priority date of the '015 Patent. Carku's intelligent jumper cables, products, and related information that were viewed by at least Jonathan Nook and Derek Underhill included features such as reverse polarity protection, reverse charge protection, short-circuit protection, overload protection, starting override, USB power input, charge indicator, and LED light. IPR2020-00994, Ex. 1018, Ex. H. The '015 Patent, however, fails to name one or more Carku persons who are the proper inventors of the '015 Patent. One or more claims of the '015 Patent are invalid for improper inventorship.

8. One or more claims of the '015 Patent are invalid for failure to satisfy the requirements of 35 U.S.C. §102, including but not limited to that the claimed invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the supposed invention by the applicants; that the claimed invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent; that the claimed invention was described in an application for patent, published under section 122(b) by another filed in the United States before the invention by the applicant for patent; that the claimed invention was described in a patent granted on an application for patent by another field in the United States before the invention by the applicant for patent; or that before the applicant's invention of the claimed invention, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.

9. One or more claims of the '015 Patent lack written description support from earlier priority applications, and therefore, are not entitled to a priority date earlier than the actual filing date of the application leading to the '015 Patent.

10. One or more claims of the '015 Patent are invalid under 35 U.S.C. §§102 and/or 103. Pursuant to 19 C.F.R. § 210.13(b)(3), Exhibit B contains a list of prior art relevant to the '015 Patent. The Carku Respondents also hereby incorporate any prior art identified in any other Response to the Complaint filed in this investigation as if cited in Exhibit B. It would have been obvious to one of ordinary skill in the art to combine any reference listed therein, as these references identify and address the same set of technical issues and suggest similar solutions to those issues. Additionally, any alleged differences between the asserted claims of the '015 Patent and any of the prior art are trivial, and, when combined with the knowledge of one of ordinary skill in the art at the relevant time, each such claim is obvious. The Carku Respondents investigation into the prior art is ongoing and the Carku Respondents reserve the right to supplement and amend their invalidity contentions as additional prior art is identified and as additional information is learned during discovery.

11. One or more claims of the '015 Patent are invalid for failure to comply with the requirements of 35 U.S.C. §112, including, but not limited to, lack of written description, failure to particularly point out and distinctly claim the alleged invention, failure to enable any person of skill in the art to make and use the alleged invention, and/or failure to inform, with reasonable particularity, to those skilled in the art about the scope of the supposed invention.

12. One or more claims of the '015 patent are invalid under the test for obvious type double patenting, as stated in *Abbvie Inc. v. Mathilda & Terence Kennedy Inst. of Rheumatology Trust*, 764 F.3d 1366, 1374 (Fed. Cir. 2014).

13. One or more claims of the '015 patent are invalid because the purported inventors listed on the face of the '015 patent did not themselves invent the subject matter of the '015 patent. The Carku Respondents hereby incorporate by reference Carku's affirmative defense concerning this ground of invalidity as if fully set forth herein.

2. The '024 Patent

14. All asserted claims of the '024 Patent are invalid for failure to meet one or more of the requirements set forth in Title 35 of the United States Code, including Sections 101, 102, 103, 112, and/or any other statutory provisions.

15. One or more claims of the '024 Patent are invalid for failure to satisfy the requirements of 35 U.S.C. § 101. In particular, one or more claims of the '024 Patent do not relate to a new and useful process, machine, manufacture, or composition of nature, or any new and useful improvement thereof.

16. One or more claims of the '024 Patent are invalid for improper inventorship. *See Trovan, Ltd. v. Sokymat SA, Irori*, 299 F.3d 1292, 1301 (Fed. Cir. 2002) ("A patent is invalid if more or less than the true inventors are named."). As described in IPR2020-00994, Ex. 1018 and in detail below in support of the Carku Respondents' Sixth Affirmative Defense, NOCO, and at least Jonathan Nook, and Derek Underhill viewed a sample of Carku's intelligent jumper cables and other jump starter products prior to the filing date or priority date of the '024 Patent. Carku's intelligent jumper cables, products, and related information that were viewed by at least Jonathan Nook and Derek Underhill included features such as reverse polarity protection, reverse charge protection, short-circuit protection, overload protection, starting override, USB power input, charge indicator, and LED light. IPR2020-00994, Ex. 1018, Ex. H. The '024 Patent,

however, fails to name one or more Carku persons who are the proper inventors of the '024 Patent. One or more claims of the '024 Patent are invalid for improper inventorship.

17. One or more claims of the '024 Patent are invalid for failure to satisfy the requirements of 35 U.S.C. §102, including but not limited to that the claimed invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the supposed invention by the applicants; that the claimed invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent; that the claimed invention was described in an application for patent, published under section 122(b) by another filed in the United States before the invention by the applicant for patent; that the claimed invention was described in a patent granted on an application for patent by another field in the United States before the invention by the applicant for patent; or that before the applicant's invention of the claimed invention, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.

18. One or more claims of the '024 Patent lack written description support from earlier priority applications, and therefore, are not entitled to a priority date earlier than the actual filing date of the application leading to the '024 Patent.

19. One or more claims of the '024 Patent are invalid under 35 U.S.C. §§102 and/or 103. Pursuant to 19 C.F.R. § 210.13(b)(3), Exhibit B contains a list of prior art relevant to the '024 Patent. It would have been obvious to one of ordinary skill in the art to combine any reference listed therein, as these references identify and address the same set of technical issues and suggest similar solutions to those issues. Additionally, any alleged differences between the asserted claims of the '024 Patent and any of the prior art are trivial, and, when combined with

the knowledge of one of ordinary skill in the art at the relevant time, each such claim is obvious. The Carku Respondents investigation into the prior art is ongoing and the Carku Respondents reserve the right to supplement and amend their invalidity contentions as additional prior art is identified and as additional information is learned during discovery.

20. One or more claims of the '024 Patent are invalid for failure to comply with the requirements of 35 U.S.C. §112, including, but not limited to, lack of written description, failure to particularly point out and distinctly claim the alleged invention, failure to enable any person of skill in the art to make and use the alleged invention, and/or failure to inform, with reasonable particularity, to those skilled in the art about the scope of the supposed invention.

Third Affirmative Defense - Failure to State a Claim

21. NOCO's claim of patent infringement fails to state a claim on which relief may be granted.

Fourth Affirmative Defense - Prosecution History Estoppel

22. NOCO is estopped from construing the claims of the Asserted Patents to cover or include, either literally or by application of the doctrine of equivalents, methods used or devices manufactured, used, imported, sold, or offered for sale by the Carku Respondents because of admissions, amendments, and statements to the USPTO during prosecution of the applications leading to the issuance of the Asserted Patents, the disclosure or language in the specification of the Asserted Patents, the limitations in the claims of the Asserted Patents, or *inter partes* review of the Asserted Patents (*e.g.*, IPR2020-00994).

Fifth Affirmative Defense - Equitable Defenses

23. Some or all of NOCO's claims for relief are barred, in whole or in part, by the doctrines of waiver, mitigation, acquiescence, equitable estoppel, implied license, patent misuse, unclean hands, and/or other equitable remedies.

Sixth Affirmative Defense - Unenforceability

24. The Asserted Patents are invalid and unenforceable because the applicants for the Asserted Patents committed inequitable conduct during their prosecution at the USPTO.

25. The Asserted Patents are unenforceable because the named inventors are not the true inventors of the Asserted Patents. *See, e.g.*, *Certain EPROM, EEPROM, Flash Memory, and Flash Microcontroller Semiconductor Devices and Prods. Containing Same*, Inv. No. 337-TA-395, Comm'n Op. at 9-10 (July 9, 1998); *Certain Liquid Crystal Display Devices and Prods. Containing Same*, Inv. No. 337-TA-395, Initial Determination at 73 (Jan. 26, 2009).

26. Under 37 C.F.R. § 1.56, each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Patent Office. An individual's duty of candor includes a duty to disclose "all information known to that individual to be material to patentability" to the Patent Office.

27. On July 8, 2014, NOCO filed Application No. 14/325,938. This application ultimately issued as the '015 Patent. The '938 Application claims priority back to Application No. PCT/US2014/045434, which was filed on July 3, 2014.

28. The '938 Application names Jonathan Lewis Nook, William Knight Nook, James Richard Stanfield, and Derek Michael Underhill as inventors.

29. As part of the '938 Application, each named inventor submitted a 37 C.F.R. § 1.63 Declaration claiming that they were original inventors of the claimed invention in the application. *See* Appendix A-1 to the Complaint.

30. On August 31, 2017, NOCO filed Application No. 15/691,884. This application ultimately issued as the '024 Patent. The '884 Application claims priority back to Application No. PCT/US2014/045434, which was filed on July 3, 2014. The '015 Patent is also included in the priority claim of the '024 Patent.

31. The '884 Application also names Jonathan Lewis Nook, William Knight Nook, James Richard Stanfield, and Derek Michael Underhill as inventors.

32. As part of the '884 Application, each named inventor resubmitted the 37 C.F.R. § 1.63 Declaration that, on information and belief, were originally submitted as part of the '938 Application claiming that they were original inventors of the claimed invention in the application. *See* Appendix B-1 to the Complaint.

33. Part of each named inventor's oath was acknowledging their duty to submit material prior art to the Patent Office under Rule 1.56.

34. From April 15, 2014 to May 5, 2014, Carku offered for sale, demonstrated, and used its Epower-20 and Epower-21 jump starter products at the 2014 Canton Fair in Guangzhou, China. *See* IPR2020-00994, Ex. 1018 (Declaration of Yingchun Wan (Wanny)) ¶ 2. At Carku's booth for the 2014 Canton Fair, Carku made product brochures describing its Epower-20 and Epower-21 jump starter products. Wan Decl. ¶ 3, Ex. D. These brochures were available to all attendees of the 2014 Canton Fair and Carku did not place any restrictions on the dissemination of these brochures. *Id.* Carku encouraged potential buyers and others who visited its booth to take a brochure and take photographs of Carku's Epower-20 and Epower-21 products. *Id.* Attendees of the 2014 Canton Fair were also able to photocopy brochures in case extra copies were needed aside from those available at Carku's booth. *Id.* Carku's Epower-21 product

brochure includes information concerning its intelligent jumper cable, which is an accessory provided with Carku's Epower-21. *Id.*

35. Carku also disseminated brochures and other catalog information for its Epower-20B and Epower-21 to its distributors, including those in Austria, Japan, Switzerland, and Ukraine. *Id.* ¶ 4. Carku did not place any restrictions on further dissemination of these brochures by Carku's distributors. Instead, Carku's global marketing strategy includes encouragement for Carku's distributors to copy and forward its product brochures, including the Epower-20 and Epower-21 brochures to clients, customers, industry professionals, and the general public for promotion and marketing persons. *Id.* Carku also encouraged its distributors to disseminate product information concerning its intelligent jumper cables. On information and belief, Carku's distributors forwarded information concerning Carku's Epower-20B and Epower-21 products, including descriptions of its intelligent jumper cables. *Id.* ¶¶2-4, Exs. F-I.

36. Carku also sent product brochures for at least the Epower-20B and Epower-21, as well as catalog information to NOCO between December 2013 and May 2014. *Id.* ¶ 4. In one instance, Carku sent an Epower-20B brochure to Jonathan Nook of NOCO on March 5, 2014, who is one of the named inventors of the Asserted Patents. *Id.* ¶¶ 4, 6, Ex. E.

37. In December 2013, Carku and NOCO engaged in correspondence, part of which concerned Carku's Epower jump starter products and its intelligent jumper cables. *Id.* ¶ 6. Around December 21, 2013, Jonathan Nook of NOCO, one of the named inventors of the Asserted Patents, contacted Carku to request pricing quotations and samples of Carku's jump starter products. In response to NOCO's solicitation, Carku sent NOCO a product catalog to NOCO, which included technical specifications for its jump starter products including the E-Power-Elite, E-Power-Standard, E-Power-02, E-Scorpion, 12/24V Jump Starter, E-Power-05, E-

Power-10, and Easy Jump. *Id.* ¶ 6, Ex. J. These products include features also, on information and belief, included in NOCO's alleged domestic industry products, such as a USB ports and an LED flashlight. *Id.* For example, the E-power-10 included a Micro-USB power input port. After NOCO paid for two samples of Carku's Epower-01-elite jump starter product, Carku also sent two samples of its Epower-01-elite products to NOCO's R&D division in Peoria, Arizona, a residential address of the home of Richard Stanfield, one of the named inventors of the Asserted Patents. *Id.* ¶ 6, Exs. K-L. On information and belief, NOCO currently maintains a research and development division in Arizona.

38. On January 9, 2014, Carku shared two testing reports for its Epower products and smart starter clamp with Jonathan Nook. *Id.* ¶ 6, Ex. M. Jonathan Nook requested more detailed engineering information of Carku's jump starter products for their technical review. *Id.* Ex. M.

39. At the request of Jonathan Nook, Carku engineers and other employees met with NOCO employees at Carku's headquarters in Shenzhen, China on January 16, 2014. Jonathan Nook requested that Carku be prepared to discuss technical information regarding its lithium jump starter products, among other topics. *Id.* Ex. M. Jonathan Nook and Derek Underhill, two of the named inventors of the Asserted Patents, both attended this meeting at Carku's headquarters. *Id.* ¶ 6. During this meeting, Carku representatives demonstrated the functionality of Carku's Epower jump starter and Carku's smart cable products. On January 17, 2014, Jonathan Nook expressed interest in Carku's intelligent jumper cables and the smart circuits contained therein. *Id.* Jonathan Nook requested that Carku send additional samples of these products, which were demonstrated at the January 16, 2014 meeting, to NOCO, so that their engineers could "qualify" the devices. *Id.* ¶ 6, Ex. N. NOCO expressed particular interest in the smart circuitry inside Carku's intelligent jumper cable. *Id.* ("We want the smart cable, but we

want the smart circuitry inside the housing."). Before these additional products were sent to NOCO, Carku required that NOCO and Carku enter into an agreement to protect Carku's interests in its proprietary technology. *Id.* NOCO, however, did not sign the agreement with Carku and ceased correspondence with Carku around February 7, 2014. *Id.*

40. Carku's intelligent jumper cable demonstrated to Jonathan Nook and Derek Underhill, and included as an accessory for at least Carku's Epower-21 product, included at least the following features: "1. Reverse Polarity Protection: No short-circuit damage is possible even when the clamps are connected incorrectly between positive (+) and negative (-) terminals. 2. Reverse Charge Protection: No reverse charge back to our products after the vehicle starts. 3. Short-Circuit Protection: No short circuit occurs in the product when the two Clamps are connected. 4. Overload Protection: Stop the product from over discharging, protecting the battery when it reaches a low level. 5. Starting override: While the vehicle battery is completely dead or no battery is present, Push "Test" button to force- start the vehicle." *Id.* Ex. H.

41. On information and belief, at least Jonathan Nook and Derek Underhill were aware of the technical features and functionality of at least Carku's Epower-01-elite, Epower-20B, Epower-21, E-Power-Elite, E-Power-Standard, E-Power-02, E-Scorpion, 12/24V Jump Starter, E-Power-05, E-Power-10, Easy Jump, intelligent jump starter cable products.

42. On information and belief, the technology incorporated into at least the Carku's Epower-01-elite, Epower-10, Epower-20B, Epower-21, and intelligent jump starter cable products was incorporated into products sold by the Carku Respondents that NOCO now accuses of infringing the Asserted Patents. To the extent NOCO alleges that products containing features in the Epower-01-elite, Epower-20B, Epower-21, E-Power-Elite, E-Power-Standard, E-Power-02, E-Scorpion, 12/24V Jump Starter, E-Power-05, E-Power-10, Easy Jump or intelligent jump

starter cable products infringe the Asserted Patents, these products invalidate the Asserted Patents.

43. On information and belief, at least Jonathan Nook and Derek Underhill were aware of the materiality of at least Carku's Epower-01-elite, Epower-20B, Epower-21, intelligent jump starter cable, E-Power-Elite, E-Power-Standard, E-Power-02, E-Scorpion, 12/24V Jump Starter, E-Power-05, E-Power-10, and Easy Jump products, including Carku's product brochures and other catalog documentation concerning these products. *Compare* IPR2020-00994, Ex. 1018 Ex. H, *with* Complaint ¶¶ 151, 159.

44. Yet, NOCO, and at least Jonathan Nook, and Derek Underhill failed to disclose these materials to the Patent Office while it was considering the '938 Application and '884 Application. These materials were not duplicative of any other prior art that was placed before the patent office while considering the '938 Application and '884 Application.

45. By withholding these materials, NOCO, and at least Jonathan Nook, and Derek Underhill deprived the Patent Office examiner of the chance to consider them.

46. Such a deliberate, material withholding violated Rule 1.56's duty of candor.

47. Accordingly, the Asserted Patents are unenforceable as a result of Jonathan Nook's, Derek Underhill's, and NOCO's inequitable conduct.

Seventh Affirmative Defense - Public Interest

48. The relief sought by NOCO would be contrary to the public interest. NOCO's demands for relief are barred under 19 U.S.C. § 1337(d)(1) because of the detrimental effect such relief would have upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers.

Eighth Affirmative Defense - No Domestic Industry

49. Although the Carku Respondents do not bear the burden of proof on this issue, NOCO cannot prove the existence of a domestic industry, or that such a domestic industry is in the process of being established, in connection with the Asserted Patents, as required by Section 337(a)(2) and defined by Section 337(a)(3). Specifically, NOCO cannot establish that it (or its purported licensees) have made a "significant investment" in plant, equipment, labor, or capital relating to articles protected by at least one claim of each of the Asserted Patents. Furthermore, NOCO cannot establish a "substantial investment" in research and development, design, engineering, testing, customer support, or other qualifying activities relating to each of the Asserted Patents, sufficient to satisfy the economic prong of the domestic industry requirement. Finally, NOCO cannot satisfy the technical prong of the domestic industry requirement in this case.

Ninth Affirmative Defense - Substantial Non-infringing Uses

50. Any and all of the Carku Respondents' Accused Products accused of infringement have substantial uses that do not infringe and do not contribute to the alleged infringement of any asserted claim of the Asserted Patents.

Tenth Affirmative Defense - No Import Violation

51. NOCO has failed and will not be able to demonstrate that the Carku Respondents have imported, sold for importation, or sold after importation in the United States any product that infringes any of the asserted claims of the Asserted Patents at the time of importation under any infringement theory.

Eleventh Affirmative Defense - No Unfair Act

52. The Carku Respondents have committed no unfair act. The Epower-146, Epower-172, Epower-155, and RP-PI-01 (1000A) products manufactured by Carku are accused of trademark infringement but the packaging of these products does not use the Asserted Trademarks. Carku denies that the Asserted Trademarks are valid or that the Epower-146, Epower-172, Epower-155, and RP-PI-01 (1000A) infringe the Asserted Trademarks, but to the extent it is found that these products infringe the Asserted Trademarks, the evidence cited in the Complaint does not show any purported use of the Asserted Trademarks by Carku or that Carku is in control any instrumentality referencing or using the allegedly infringing trademarks. NOCO fails to establish that Carku designs the advertising or other media that uses the allegedly infringing trademarks versus a downstream customer or distributor of Carku that allegedly uses the allegedly infringing trademarks absent any direction or control from Carku. Carku, therefore, has not committed an unfair act.

Twelfth Affirmative Defense - Issue Preclusion, Collateral Estoppel, Res Judicata

53. The '024 Patent is not patentably distinct from the '015 Patent. In IPR2020-00944, the PTAB has instituted review of the '015 Patent and will issue a final determination. Any findings by the PTAB that may invalidate one or more claims of the '015 Patent constitute issue preclusion, collateral estoppel, or res judicata precluding this action.

54. One or more claims of the '024 Patent may also be invalidated if the PTAB invalidates one or more claims of the '015 Patent pursuant to at least the principals of collateral estoppel as described, *inter alia*, in *Ohio Willow Wood Co. v. Alps S., LLC*, 735 F.3d 1333 (Fed. Cir. 2013) and similar cases.

PRAYER FOR RELIEF

Wherefore, the Carku Respondents respectfully request that the Commission:

a) determine that no domestic industry exists for the asserted claims of the Asserted Patents;

b) determine that the Carku Respondents have not infringed the asserted claims of the Asserted Patents;

c) determine that the asserted claims of the Asserted Patents are invalid;

d) determine that the Asserted Patents are unenforceable;

e) determine that the Carku Respondents have not violated Section 337 of the Tariff Act of 1930, as amended; and

f) deny all of NOCO's requests for exclusion and cease and desist orders, both general and against the Carku Respondents' products.

Date: April 22, 2021

Respectfully submitted,

/s/ Kevin Patariu

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Counsel for Respondents Shenzhen Carku Technology Co., Ltd., 70mai Co., Ltd., Antigravity Batteries LLC, Gooloo Technologies LLC, Great Neck Saw Manufacturers, Inc., Horizon Tool, Inc., Matco Tools Corporation, Nekteck, Inc., Paris Corporation, PowerMax Battery (U.S.A.), Inc., and Shenzhen Gooloo E-Commerce Co., Ltd.

VERIFICATION OF RESPONDENT ANTIGRAVITY BATTERIES LLC IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Scott Schafer, President of Respondent Antigravity Batteries LLC, in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Antigravity Batteries LLC's responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Antigravity Batteries LLC's responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 22nd date of April 2021, at Gardena, California

Scott Schafer

Scott Schafer
President
Antigravity Batteries LLC

VERIFICATION OF RESPONDENT GREAT NECK SAW MANUFACTURERS, INC. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Robert Jacoff, Senior Vice President, Marketing & Sales of Respondent Great Neck Saw Manufacturers, Inc., in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Great Neck Saw Manufacturers, Inc.'s responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Great Neck Saw Manufacturers, Inc.'s responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

   a. are not being made for any improper purpose;

   b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

   c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

   d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 19 date of April 2021, at MINEOLA, NEW YORK

Robert Jacoff,
Senior Vice President, Marketing & Sales
Great Neck Saw Manufacturers, Inc.

VERIFICATION OF RESPONDENT HORIZON TOOL, INC. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Sean Kenny, President of Respondent Horizon Tool, Inc., in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Horizon Tool, Inc.'s responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Horizon Tool, Inc.'s responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

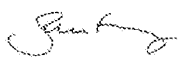
b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 19th date of April 2021, at Horizon Tool, Inc., 7918 industrial Village Road, Greensboro, NC 27409



Sean Kenny
President
Horizon Tool, Inc.

VERIFICATION OF RESPONDENT MATCO TOOLS CORPORATION IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Eric. D. Hagen, Vice-President of Finance of Respondent Matco Tools Corporation, in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Matco Tools Corporation's responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Matco Tools Corporation's responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 19 date of April 2021, at Stow, Ohio

Eric. D. Hagen
Vice-President of Finance
Matco Tools Corporation

VERIFICATION OF RESPONDENT PARIS CORPORATION IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Berdj Mazmanian, Senior Product Manager of Respondent Paris Corporation, in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Paris Corporation's responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Paris Corporation's responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

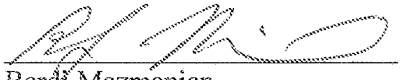
b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 20 date of April 2021, at Westampton, New Jersey



Berdj Mazmanian
Senior Product Manager
Paris Corporation

VERIFICATION OF RESPONDENT POWERMAX BATTERY (U.S.A.), INC. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Neville Lin, President of Respondent PowerMax Battery (U.S.A.), Inc., in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent PowerMax Battery (U.S.A.), Inc.'s responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of PowerMax Battery (U.S.A.), Inc.'s responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 20th date of April 2021, at Ontario, CA USA

Neville Lin
President
PowerMax Battery (U.S.A.), Inc.

VERIFICATION OF RESPONDENT 70MAI CO., LTD. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Yajie Tang, Chief Executive Officer of Respondent 70mai Co., Ltd., in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent 70mai Co., Ltd.'s responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of 70mai Co., Ltd.'s responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 22nd date of April 2021, at Shanghai, China.

Yajie Tang,
Chief Executive Officer
70mai Co., Ltd.

VERIFICATION OF RESPONDENT GOOLOO TECHNOLOGIES LLC IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Zhendong ZHOU, President and Chief Executive Officer of Respondent Gooloo Technologies LLC, in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Gooloo Technologies LLC's responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Gooloo Technologies LLC's responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

   a. are not being made for any improper purpose;

   b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

   c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

   d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 21st date of April 2021, at SHEN ZHEN CHINA

Zhendong ZHOU
President and Chief Executive Officer
Gooloo Technologies LLC

VERIFICATION OF RESPONDENT SHENZHEN GOOLOO E-COMMERCE CO., LTD. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Zhendong ZHOU, President and Chief Executive Officer of Respondent Shenzhen Gooloo E-Commerce Co., Ltd., in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Shenzhen Gooloo E-Commerce Co., Ltd.'s responses contained within the Clarks Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Shenzhen Gooloo E-Commerce Co., Ltd.'s responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 21st day of April 2021, at Shenzhen, China.

Zhendong ZHOU
President and Chief Executive Officer
Shenzhen Gooloo E-Commerce Co., Ltd.

DELTRAN EX1002
IPR2024-01219

VERIFICATION OF RESPONDENT SHENZHEN CARKU TECHNOLOGY CO., LTD. IN SUPPORT OF RESPONSE TO THE AMENDED COMPLAINT AND NOTICE OF INVESTIGATION

I, Zhang Zhifeng, General Manager of Respondent Shenzhen Carku Technology Co., Ltd., in accordance with the provisions of Commission Rule 210.13(b), declare that:

1. I am duly authorized to execute this verification.

2. I have read Respondent Shenzhen Carku Technology Co., Ltd.'s responses contained within the Carku Respondents' Response to the Amended Complaint and Notice of Investigation ("Response") and am familiar with the contents of Shenzhen Carku Technology Co., Ltd.'s responses.

3. To the best of my knowledge, information, and belief founded after reasonable inquiry, the foregoing Response and statements made therein:

a. are not being made for any improper purpose;

b. are well grounded in fact and are warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law;

c. have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

d. to the extent they deny factual contentions, are warranted on the evidence or are reasonably based on a lack of information and belief.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 19 date of April 2021, at Shenzhen, China.

Zhang Zhifeng
General Manager
Shenzhen Carku Technology Co., Ltd.

EXHIBIT B

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Clark S. Cheney
Administrative Law Judge

In the Matter of **CERTAIN PORTABLE BATTERY JUMP STARTERS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1256**

EXHIBIT B

Prior Art Identification Pursuant to 19 C.F.R. § 210.13(b)(3)

One or more claims of the Asserted Patents are invalid under 35 U.S.C. §§ 102, 103 based on prior art including, but not limited to, the following: U.S. Pat. No. 6,426,606; U.S. Pat. No. 9,506,446; WO 2010/129723; U.S. Pat. App. Pub. No. 2004/0130298; USB Battery Charging 1.2 Compliance Plan, Rev. 1.0 (Oct. 12, 2011); U.S. Pat. No. 5,319,298; U.S. Pat. No. 6,424,158; U.S. Pat. No. 8,172,603; U.S. Pat. No. 9,954,391; U.S. Pat. App. Pub. No. 2013/0154543; U.S. Pat. App. Pub. No. 2013/0241488; CN203504235; CN 202696190; U.S. Pat. No. 5,650,974; U.S. Pat. No. 6,362,599; U.S. Pat. No. 7,345,450; U.S. Pat. No. 8,076,900; U.S. Pat. App. Pub. No. 2002/0041174; U.S. Pat. No. 8,199,024; U.S. Pat. App. Pub. No. 2005/0110467; U.S. Pat. App. Pub. No. 2004/0066168; U.S. Pat. App. Pub. No. 2010/0301800; U.S. Pat. No. 4,740,740; U.S. Pat. No. 7,514,900; U.S. Pat. No. 7,791,319; U.S. Pat. No. 7,847,520; U.S. Pat. No. 8,030,900; U.S. Pat. No. 7,868,582; U.S. Pat. No. 8,686,688; U.S. Pat. No. 8,786,247; U.S. Pat. No. 9,525,297; U.S. Pat. No. 10,328,806; U.S. Pat. App. Pub. No. 2012/0299533; U.S. Pat. No. 5,795,182; U.S. Pat. No. 5,189,359; U.S. Pat. No. 5,635,817; U.S. Pat. No. 5,793,185; U.S. Pat. No. 4,972,135; DE 29507501 U1; U.S. Pat. No. 4,910,628; DE 202013102599 U1; EP 2472698 A2; DE 202009016260 U1; U.S. Pat. App. Pub. No.

2003/0141845; U.S. Pat. No. 6,262,492; U.S. Pat. No. 5,820,407; U.S. Pat. No. 6,632,103; U.S. Pat. No. 6,212,054; U.S. Pat. No. 6,803,743; U.S. Pat. No. 7,148,580; WO 2013/137873; U.S. Pat. App. Pub. No. 2009/0218988; U.S. Pat. App. Pub. No. 2010/0283623; U.S. Pat. App. Pub. No. 2011/0140651; U.S. Pat. App. Pub. No. 2014/0159509; WO 2012/074548; WO 2004/036714; U.S. Pat. App. Pub. No. 2005/0082833; CN 108884801; WO 2017/139524; AU 2016269555; AU 2015258229; AU 2019201081; CA 2916782; AU 2019201559; CA 2957431; CA 3005971; CN 107852004; JP 2018-536789; DE 102014114997 A1; GB 2527858; EP 3407405; DE 112016002206; EP 3286429; GB 2557733; JP 2018-534892; GB 2562950; U.S. Pat. No. 3,933,140; U.S. Pat. No. 4,041,445; U.S. Pat. No. 4,885,524; U.S. Pat. No. 4,931,731; U.S. Pat. No. 5,083,076; U.S. Pat. No. 5,111,130; U.S. Pat. No. 5,486,434; U.S. Pat. No. 6,147,471; U.S. Pat. No. 5,635,818; U.S. Pat. No. 5,921,809; U.S. Pat. No. 5,953,681; U.S. Pat. No. 6,130,519; U.S. Pat. No. 6,140,796; U.S. Pat. No. 6,054,779; U.S. Pat. No. 5,965,998; U.S. Pat. No. 6,822,425; U.S. Pat. No. 6,262,559; U.S. Pat. No. 6,386,907; U.S. Pat. No. 6,856,764; U.S. Pat. No. 6,648,701; U.S. Pat. No. 9,718,419; U.S. Pat. No. 7,301,303; U.S. Pat. No. 7,749,031; U.S. 8,376,775; U.S. Pat. No. 8,493,021; U.S. Pat. No. 9,007,023; U.S. Pat. No. 9,263,907; U.S. Pat. No. 9,041,244; U.S. Pat. No. 9,770,992; U.S. Pat. No. 10,328,808; U.S. Pat. App. Pub. No. 2009/0236859; U.S. Pat. App. Pub. No. 2007/0278990; U.S. Pat. App. Pub. No. 2002/0076997; U.S. Pat. App. Pub. No. 2005/0252573; U.S. Pat. App. Pub. No. 2002/0121877; U.S. Pat. App. Pub. No. 2005/0040788; U.S. Pat. App. Pub. No. 2007/0285049; U.S. Pat. App. Pub. No. 2015/0137740; U.S. Pat. App. Pub. No. 2009/0253312; U.S. Pat. App. Pub. No. 2011/0068734; U.S. Pat. App. Pub. No. 2012/0091944; U.S. Pat. App. Pub. No. 2012/0319487; U.S. Pat. App. Pub. No. 2012/0169116; U.S. Pat. App. Pub. No. 2013/0314041; U.S. Pat. App. Pub. No. 2019/0308518; U.S. Pat. App. Pub. No. 2018/0215274; U.S. Pat. App. Pub. No.

DELTRAN EX1002
IPR2024-01219

2018/0269703; U.S. Pat. App. Pub. No. 2016/0001666; U.S. Pat. App. Pub. No. 2018/0111491; U.S. Pat. App. Pub. No. 2018/0342891; U.S. Pat. App. Pub. No. 2018/0345803; U.S. D689,020; U.S. D649,116; U.S. D625,265; U.S. D746,774; U.S. D726,121; U.S. D726,109; U.S. D735,665; U.S. D726,114; WO 2016/003471; Launch X431BST-460[1]; Carku E-Power-20B; Carku E-Power-21; Fairchild MC78XX/LM78XX/MC78XXA 3-Terminal 1A Positive Voltage Regulator; AFT Inc. PRO-PAK I/II/III/IV Battery Chargers, NOCO GEN1/GEN2/GEN3/GEN4 Battery Chargers; Carku EPOWER-Elite; Carku EPOWER-Standard; Carku EPOWER-3; Carku EPOWER-05; Carku EPOWER-10; Cark Electronic Scorpion; Carku 12V/24V Jump Starter; Carku E-Power-20; E-Power-02; Carku Easy Jump; Carku Intelligent Jumper Cable; Carku Product Catalog (IPR2020-00994, Ex. 1018 at Exhibit J); Xysemi XR3403; Texas Instruments LM2621; Carku 2014 Canton Fair Brochure; Carku Epower-20B product brochure (IPR2020-00994, Ex. 1018 at Exhibit E); Carku Epower-21 product brochure (IPR2020-00994, Ex. 1018 at Exhibit G); Carku Epower-20B catalog information; Carku Epower-21 catalog information; Carku Epower-21 quotation sheet (IPR2020-00994, Ex. 1018 at Exhibit F); Carku intelligent jumper cable brochure (IPR2020-00994, Ex. 1018 at Exhibit I); Carku Epower-01; Carku Epower-01-elite.

[1] For any product prior art identified, Respondent also incorporates any associated product, user, service, or other manual, datashees, or other product documentation as if cited specifically herein.

DELTRAN EX1002
IPR2024-01219

CERTIFICATE OF SERVICE

I, Yu-Ing Huang, hereby certify that on this 22nd day of April 2021 copies of foregoing document were filed and served upon the following parties as indicated:

The Honorable Lisa R. Barton Secretary **U.S. International Trade Commission** 500 E Street, S.W. Washington, DC 20436	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☒ Via Electronic Filing
The Honorable Clark S. Cheney Administrative Law Judge **U.S. International Trade Commission** 500 E Street, S.W. Washington, DC 20436	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☒ Via Electronic Mail Cheney337@usitc.gov
Todd P. Taylor Office of Unfair Import Investigation **U.S. International Trade Commission** 500 E Street, S.W. Washington, D.C. 20436	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☒ Via Electronic Mail Todd.Taylor@usitc.gov

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DELTRAN EX1002
IPR2024-01219

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/s/ Yu-Ing Huang
Yu-Ing Huang

DELTRAN EX1002
IPR2024-01219

Espacenet

CN204516832U The multi-functional sampling end minor structure of group battery

Applicants: CONTEMPORARY AMPEREX TECHNOLOGY LTD

Inventors: CHEN YONG,GE JINBO,WANG DERONG,ZHAO BIN

Classifications:

IPC ***H01M2/30;***

CPC Y02E60/10 (EP);

Priorities: CN201520093747U 2015-02-10

Application: CN204516832U·2015-02-10

Publication: CN204516832U·2015-07-29

Published as: CN204516832U

The multi-functional sampling end minor structure of group battery

Abstract

The utility model belongs to the technical field of the battery pack, in particular to the multi-functional sampling end minor structure of battery pack, including the insert in the electrode manner piece insert soon linkage segment, parcel temperature sensor probe the temperature sampling section and with the voltage sample section of voltage sample conductor compression jointing, the voltage sample section through the temperature sampling section with insert the linkage segment soon and be connected. It is integrated structural to the one terminal with battery pack temperature sampling and voltage sample through above-mentioned structure, can only realize temperature sampling or voltage sample as required, also can realize sampling simultaneously. The utility model discloses when realizing battery voltage and temperature sampling, both simplified technology, reduced manufacturing cost again, be suitable for batch production.

DELTRAN EX1002
IPR2024-01219

(19)中华人民共和国国家知识产权局

(12)实用新型专利

(10)授权公告号 CN 204516832 U
(45)授权公告日 2015.07.29

(21)申请号 201520093747.6

(22)申请日 2015.02.10

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代理人 罗伟平

(51)Int.Cl.
H01M 2/30(2006.01)

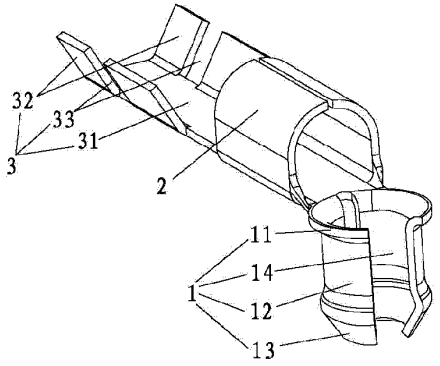
权利要求书1页 说明书3页 附图2页

(54)实用新型名称

电池组的多功能采样端子结构

(57)摘要

本实用新型属于电池组技术领域，特别涉及电池组的多功能采样端子结构，包括插设于电极连接片的快插连接段、包裹温度传感器探头的温度采样段及与电压采样导线压接的电压采样段，电压采样段通过温度采样段与快插连接段连接。通过上述结构将电池组温度采样和电压采样集成到一个端子结构上，可以根据需要只实现温度采样或者电压采样，也可以实现同时采样。本实用新型在实现电池组电压和温度采样的同时，既简化了工艺，又降低了生产成本，适合于批量生产。



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1. 电池组的多功能采样端子结构，其特征在于：包括插设于电极连接片的快插连接段、包裹温度传感器探头的温度采样段及与电压采样导线压接的电压采样段，所述电压采样段通过所述温度采样段与所述快插连接段连接。

2. 根据权利要求 1 所述的电池组的多功能采样端子结构，其特征在于：所述快插连接段包括连接头部、连接中部和连接尾部，所述连接头部通过所述连接中部与所述连接尾部连接为一体。

3. 根据权利要求 2 所述的电池组的多功能采样端子结构，其特征在于：所述快插连接段还包括开槽，所述连接头部、所述连接中部和所述连接尾部通过所述开槽形成“C”形或“U”形结构的弹簧体。

4. 根据权利要求 3 所述的电池组的多功能采样端子结构，其特征在于：当所述连接头部、所述连接中部和所述连接尾部为圆形结构时，所述连接头部和所述连接尾部的最大直径均大于所述连接中部的直径。

5. 根据权利要求 1 所述的电池组的多功能采样端子结构，其特征在于：所述温度采样段设置为“U”形、“C”形或“O”形结构。

6. 根据权利要求 1 所述的电池组的多功能采样端子结构，其特征在于：所述电压采样段包括搁置板及设置于所述搁置板两侧的侧板，所述侧板与所述搁置板形成为“V”形、“U”形或“C”形结构。

7. 根据权利要求 6 所述的电池组的多功能采样端子结构，其特征在于：所述侧板设置为两组，每组的数量为两个，且每组的两个所述侧板均沿所述搁置板对称设置。

8. 根据权利要求 7 所述的电池组的多功能采样端子结构，其特征在于：两组所述侧板之间设置有间隙。

DELTRAN EX1002
IPR2024-01219

电池组的多功能采样端子结构

技术领域

[0001] 本实用新型属于电池组技术领域，特别涉及电池组的多功能采样端子结构。

技术背景

[0002] 在当前全球能源日益紧张及环境日益恶化的巨大挑战下，发展电动汽车、实现汽车能源动力系统的零排放和推动电动汽车的普及在国际上已经形成了广泛共识，在这样的背景下，动力电池有了越来越广泛的应用。在将动力电池用作电动汽车的供能元件时，整车控制系统必须监控电池的电压，温度等参数，所以电池组采样的设计是电池包结构设计中基础且重要的一环，其电池组采样设计和工艺的可靠性将会对电动汽车的安全性产生重要影响。

[0003] 现有技术中，电池组的电压采样结构和温度采样结构是各自分开实现的。如图 1 所示，导线 1’剥皮后，通过超声波将导线 1’的裸铜线芯 2’焊接到电极连接片 3’上，从而形成电压采样结构；将温度传感器探头 4’通过涂胶固定在一种金属端子 5’里面，然后金属端子 5’通过超声波焊接到电极连接片 3’，从而形成温度采样结构。上述结构的实现需要经过多道工序，不利于简化工艺（在现有技术中，实现电压采样需运用导线裁剪工艺、导线整形工艺和导线超声波焊接工艺；实现温度采样需运用胶水粘接工艺和超声波焊接工艺。），而且生产成本较高、不利于批量生产。

实用新型内容

[0004] 本实用新型的目的在于：针对现有技术的不足，而提供电池组的多功能采样端子结构，该结构将电池组温度采样和电压采样集成到一起，在实现电池组电压和温度采样的同时，既简化了工艺，又降低了生产成本，适合于批量生产。

[0005] 为实现上述目的，本实用新型采用如下技术方案：电池组的多功能采样端子结构，包括插设于电极连接片的快插连接段、包裹温度传感器探头的温度采样段及与电压采样导线压接的电压采样段，所述电压采样段通过所述温度采样段与所述快插连接段连接。

[0006] 作为本实用新型电池组多功能采样端子结构的一种改进，所述快插连接段包括连接头部、连接中部和连接尾部，所述连接头部通过所述连接中部与所述连接尾部连接为一体。

[0007] 作为本实用新型电池组多功能采样端子结构的一种改进，所述快插连接段还包括开槽，所述连接头部、所述连接中部和所述连接尾部通过所述开槽形成一“C”形或“U”形结构的弹簧体。

[0008] 作为本实用新型电池组多功能采样端子结构的一种改进，当所述连接头部、所述连接中部和所述连接尾部为圆形结构时，所述连接头部和所述连接尾部的最大直径均大于所述连接中部的直径。

[0009] 作为本实用新型电池组多功能采样端子结构的一种改进，所述温度采样段设置为“U”形、“C”形或“O”形结构。

DELTRAN EX1002
IPR2024-01219

[0010] 作为本实用新型电池组多功能采样端子结构的一种改进，所述电压采样段包括搁置板及设置于所述搁置板两侧的侧板，所述侧板与所述搁置板形成为“V”形、“U”形或“C”形结构。

[0011] 作为本实用新型电池组多功能采样端子结构的一种改进，所述侧板设置为两组，每组的数量为两个，且每组的两个所述侧板均沿所述搁置板对称设置。

[0012] 作为本实用新型电池组多功能采样端子结构的一种改进，两组所述侧板之间设置有间隙。

[0013] 本实用新型的有益效果在于：本实用新型提供的端子结构包括插设于电极连接片的快插连接段、包裹温度传感器探头的温度采样段及与电压采样导线压接的电压采样段，电压采样段通过温度采样段与快插连接段连接。通过上述结构将电池组温度采样和电压采样集成到一个端子结构上，可以根据需要只实现温度采样或者电压采样，也可以实现同时采样。本实用新型在实现电池组电压和温度采样的同时，既简化了工艺(仅应用了胶水粘接工艺、导线裁剪工艺和导线压接工艺)，又降低了生产成本，适合于批量生产。

附图说明

[0014] 图 1 为现有技术的结构示意图。

[0015] 其中：1’- 导线，2’- 裸铜线芯，3’- 电极连接片，4’- 温度传感器探头，5’- 金属端子。

[0016] 图 2 为本实用新型的结构示意图。

[0017] 图 3 为本实用新型与电极连接片连接的结构示意图。

[0018] 其中：1- 快插连接段，

[0019] 11- 连接头部，12- 连接中部，13- 连接尾部，14- 开槽；

[0020] 2- 温度采样段；

[0021] 3- 电压采样段，

[0022] 31- 搁置板，32- 侧板，33- 间隙；

[0023] 4- 电极连接片；

[0024] 5- 温度传感器探头；

[0025] 6- 电压采样导线。

具体实施方式

[0026] 下面结合具体实施方式和说明书附图，对本实用新型作进一步详细的描述，但本实用新型的实施方式不限于此。

[0027] 如图 1~3 所示，电池组的多功能采样端子结构，包括插设于电极连接片 4 的快插连接段 1、包裹温度传感器探头 5 的温度采样段 2 及与电压采样导线 6 压接的电压采样段 3，电压采样段 3 通过温度采样段 2 与快插连接段 1 连接。快插连接段 1 为端子结构与电极连接片 4 的接触结合部分，通过快插连接段 1 传递采样信号给温度采样段 2 和电压采样段 3 进而完成采样；温度采样段 2 为包裹温度传感器探头 5 的部分，而且在温度传感器探头 5 和温度采样段 2 之间涂有导热胶，导热胶的胶水固化后既能达到强度的要求，也能满足导热要求，从而保证了温度采样的及时性；电压采样段 3 与电压采样导线 6 进行压接，实现了可

DELTRAN EX1002
IPR2024-01219

靠的电连接，既工艺简单，又保证了电压采样的有效性。快插连接段1、温度采样段2和电压采样段3的材质为铜镍硅合金或铍铜合金，因为这样的材质在温度和电压采样时传导性更好，可以有效地快速地对温度和电压进行采样。

[0028] 优选地，快插连接段1包括连接头部11、连接中部12和连接尾部13，连接头部11通过连接中部12与连接尾部13连接为一体。快插连接段1还包括开槽14，连接头部11、连接中部12和连接尾部13通过开槽14形成一“C”形或“U”形结构的弹簧体，其中开槽14是为实现快插连接段1伸缩功能而设置的。电极连接片4与上述弹簧体结合时，通过弹簧体产生的反弹力和电极连接片4的圆孔实现紧密配合，从而将快插连接段1固定在电极连接片4的圆孔内，该弹簧体为一中空结构，弹簧体过盈配合安装有TPA材质的弹性柱塞。该弹性柱塞具有的弹性保持能力可以进一步保证快插连接段1与电极连接片4可靠接触。当连接头部11、连接中部12和连接尾部13为圆形结构时，连接头部11和连接尾部13的最大直径均大于连接中部12的直径，使得快插连接段1与电极连接片4不会发生相对移动，实现可靠配合。

[0029] 优选地，温度采样段2设置为“U”形、“C”形或“O”形结构，以满足温度采样段2能包裹温度传感器探头5为标准，具体结构可根据温度传感器探头5的形状而确定。

[0030] 优选地，电压采样段3包括搁置板31及设置于搁置板31两侧的侧板32，侧板32与搁置板31形成为“V”形、“U”形或“C”形结构，这样的结构是为容纳电压采样导线6而设置的，侧板32与搁置板31还可以形成其他结构，这里不作具体限定。侧板32设置为两组，每组的数量为两个，且每组的两个侧板32均沿搁置板31对称设置，两组侧板32之间设置有间隙33，两组侧板32一前一后排列。其中前一组与电压采样导线6的导体压接实现电连接，后一组与电压采样导线6的绝缘线皮压接固定连接。

[0031] 需要说明的是：本实用新型的端子结构与电极连接片也可以通过焊接连接为一体，不一定是弹性接触实现连接。本实用新型可以应用在镍氢电池和镍镉电池中，同时也适用于具有电池的电动车、混合电动车和储能等项目中。

[0032] 根据上述说明书的揭示和教导，本实用新型所属领域的技术人员还能够对上述实施方式进行变更和修改。因此，本实用新型并不局限于上述的具体实施方式，凡是本领域技术人员在本实用新型的基础上所作出的任何显而易见的改进、替换或变型均属于本实用新型的保护范围。此外，尽管本说明书中使用了一些特定的术语，但这些术语只是为了方便说明，并不对本实用新型构成任何限制。

DELTRAN EX1002
IPR2024-01219

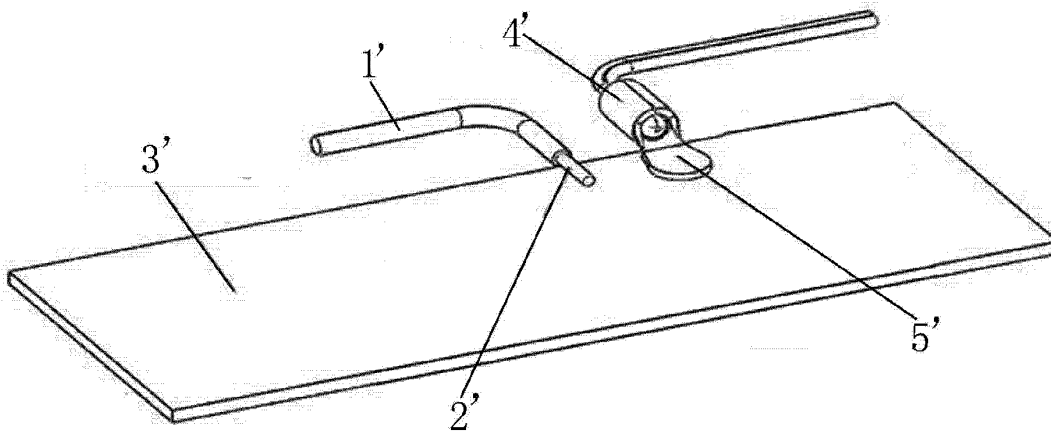


图 1

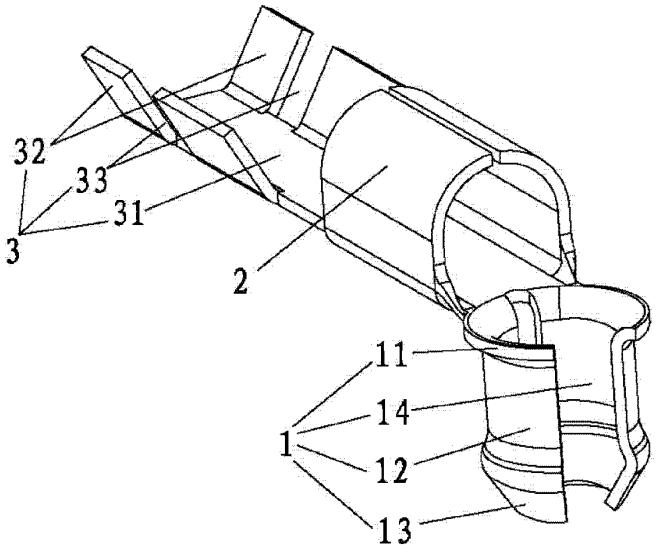


图 2

DELTRAN EX1002
IPR2024-01219

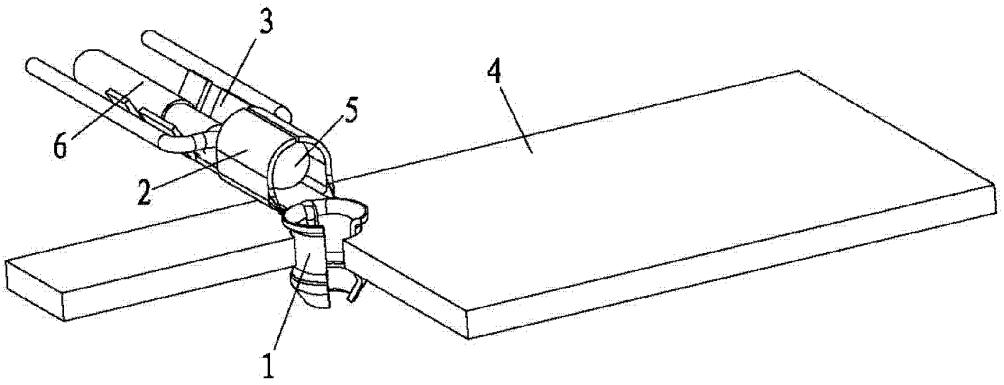


图 3

DELTRAN EX1002
IPR2024-01219

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(54) Connecting contact leads to lithium-based electrodes

(57) There is disclosed a method of connecting a lithium electrode to a contact lead in a rechargeable battery. The electrode comprises a sheet or foil of lithium or lithium alloy with a tab protruding from an edge of the sheet or foil. The contact lead comprises an electrically conductive lead with an end portion made of a second metal that does not alloy with lithium and has a plurality of through holes. The end portion of the contact lead and the tab of the electrode are positioned so that there is substantial overlap between the end portion and the tab. The metal of the tab is then caused, for example by pressing and welding, to penetrate through the through holes of the end portion so as to join the electrode to the contact lead. A combination electrode/contact lead assembly made by this method is also disclosed.

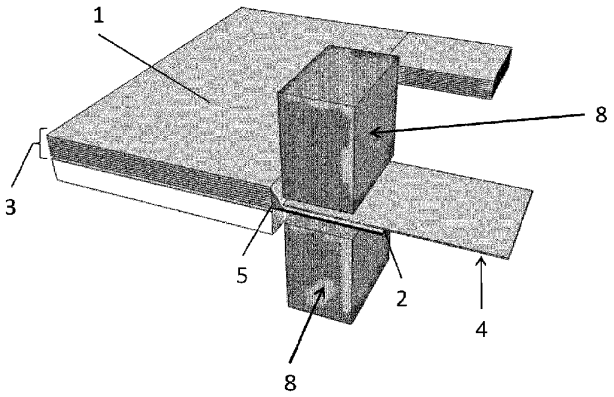


Figure 3

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EP 2 605 313 A1

DELTRAN EX1002
IPR2024-01219

Description

[0001] The present invention relates to the connection of a lithium or lithium alloy foil electrode or electrodes to a contact lead, so as to promote good electrical and mechanical contact therebetween.

BACKGROUND

[0002] Primary and rechargeable batteries using metallic lithium as the active material for the negative electrode are known to have the highest energy per unit weight and per unit volume.

[0003] For the purposes of the present application, the following definitions are to be considered:

[0004] A negative electrode, or anode, is a lithium or lithium alloy foil component having a negative potential. A negative electrode typically features a current collector and a contact tab.

[0005] A current collector is an electrically conductive metallic foil used to provide a path for electrons from the external electrical circuit to the electrochemically active portion of the battery. A current collector will typically feature a contact tab.

[0006] A contact tab is a metal foil portion of the current collector, which does not take part in the electrochemical process. It may extend from an edge of the main body of the current collector and is used to form the mechanical base for a weld to a contact lead.

[0007] A contact lead is a piece of electrically conductive metallic material used to form an electrical contact from the contact tab through a hermetically sealed battery container to the external electrical circuit. It is typically welded (in cells where metallic lithium is not used) or mechanically connected to the contact tab.

[0008] The contact lead must be connected or joined to the lithium in such a manner that a low resistance electrical connection is formed. Further, the connection or join must be mechanically strong enough to last for the expected life of the battery.

[0009] The current collectors in lithium primary batteries are typically composed of a metallic conductor other than lithium. The contact lead may be exposed to the electrolyte in an electrochemically active zone of the battery. This is not generally a problem in primary batteries; however it may cause problems in rechargeable (or secondary) batteries. In secondary batteries, lithium must be electrochemically deposited when the battery is recharged. In order to provide good reproducibility of performance, when the battery is repeatedly recharged, an excess of lithium is used so that lithium is only ever deposited onto lithium. If the contact lead or current collector is left exposed, then lithium will be plated onto a non-lithium substrate. This greatly increases the probability of unpredictable lithium deposition and hence poor cycling performance. This typically takes the form of active dendrite formation resulting in the quick degradation of the rechargeable lithium system. Examples of such failure mechanisms are described in US5368958, the full disclosure of which is incorporated into the present application by reference.

[0010] In a secondary battery with a lithium-based anode, the lithium is typically connected to the external circuit by one of two methods. Either a contact lead similar in design to that described for primary lithium batteries is used; as in US7335440, the full disclosure of which is incorporated into the present application by reference. US7335440 discloses the provision of a current collector in the form of a flat, solid piece of titanium, nickel, copper or an alloy of nickel or copper. The current collector is provided with a contact tab. A relatively long strip of alkali metal foil, having a width similar to the height of the current collector, is placed under the current collector and the two are pressed together. It is to be noted that, following assembly of the battery, the current collector (which is not made of an alkali metal) is immersed in electrolyte. Moreover, US7335440 states that this arrangement has problems in coiled, anode-limited cells of the type disclosed therein since there is a potential for a short circuit to be formed between the cathode material and the anode current collector when the thin layer of lithium has substantially depleted into the cathode in the outermost winding.

[0011] A variation of this method uses the metallic cell casing for the dual purpose of collecting current from the lithium, as in US7108942, the full disclosure of which is incorporated into the present application by reference. Additionally, the reverse face of the lithium electrode may be pressed or rolled against a thin metal current collector, as in US5368958, the full disclosure of which is incorporated into the present application by reference. The current collector can then be welded to a metal contact lead. However, if the current collector becomes exposed to the electrolyte, there is a risk that lithium will be plated onto the non-lithium current collector with the possible formation of dendrites that may short-circuit the battery. The metal current collector also adds unnecessary mass to the battery and reduces its specific energy.

[0012] In all of the examples described above, the contact of metallic lithium with the current collector is purely mechanical, which may be acceptable for primary batteries. However, for lithium metal rechargeable batteries such mechanical contact is not reliable. Indeed due to the reactive character of metallic lithium, corrosion layers may readily form on the interface of the mechanical connection between the lithium and the current collector. This may result in lower battery reliability as well as faster degradation in the capacity and cycle life of rechargeable lithium metal batteries.

DELTRAN EX1002
IPR2024-01219

BRIEF SUMMARY OF THE DISCLOSURE

[0013] Viewed from a first aspect, there is provided a method of connecting at least one electrode to a contact lead, wherein the electrode comprises a sheet or foil of a first metal with a tab protruding from an edge of the sheet or foil, and wherein the contact lead comprises an electrically conductive lead with an end portion made of a second metal that does not alloy with the first metal and having a plurality of through holes, the method comprising the steps of:

i) positioning the end portion of the contact lead and the tab of the at least one electrode so that there is substantial overlap between the end portion and the tab;

ii) causing the metal of the tab to penetrate through the through holes of the end portion so as to join the at least one electrode to the contact lead.

[0014] In step ii), the metal of the tab may be caused to penetrate through the through holes by pressing and welding, for example by way of ultrasonic welding, thermal contact welding, laser welding or induction welding. Advantageously, the welding is effected in such a way so as not to cause significant thermal deformation or changes in the main laminar sheet or foil of the at least one electrode, but to concentrate the applied energy in the locality of the tab.

[0015] The end portion of the contact lead may be substantially flat or planar, or may take other shapes or configurations depending, for example, on the shape or configuration of any welding equipment that is used.

[0016] In some embodiments, there may be provided a plurality of electrodes, each comprising a sheet or foil of the first metal with a tab protruding from each sheet in substantially the same location, so that the tabs of the stack of electrodes are substantially aligned when the electrodes are aligned with each other and arranged as an electrode stack.

[0017] In these embodiments, the perforated end portion of the contact lead may be placed on top of the tabs of the electrode stack, underneath the tabs of the electrode stack, or at an intermediate position between the top and the bottom (i.e. with at least one tab above and at least one tab below). The tabs and the perforated end portion are then pressed together and the first metal (of the tabs) is caused to penetrate through the holes in the perforated planar end portion (made of the second metal) of the contact lead. Alternatively, the tabs of the electrode stack may be pressed together before the perforated end portion is placed on top of or underneath the compressed tabs and the penetration of step ii) is performed.

[0018] In embodiments where there is provided a stack of electrodes, the pressing and welding step causes the tabs to join together physically as well as to penetrate into the through holes of the contact lead.

[0019] Particularly preferred metals for the first metal are lithium and lithium alloys, since these tend to be useful as anode materials in secondary batteries, and are also soft and malleable, which allows a good connection to be made with the perforated end portion of the contact lead when the pressing and welding step is performed.

[0020] The end portion of the contact lead may be perforated, punched or have a mesh-like or reticulated form. What is important is that when the first metal of the tabs is sufficiently malleable that it can pass through the through holes so as to cause the second metal of the end portion to become embedded in what is preferably a single phase of the first metal. This forms an intimate contact between the first and second metals, and thus between the contact lead and the electrodes.

[0021] The greater the openness or surface area of the end portion of the contact lead, the better the electrical (and physical) connection between the contact lead and the electrodes. The openness of the end portion may be defined as the ratio of open area to the full surface area of the end portion. The openness of the end portion of the contact lead may be in the range of 5% to 95%.

[0022] The electrically conductive lead of the contact lead may itself be generally planar, for example in the form of a ribbon, although other profiles may be useful. The electrically conductive lead may be made of the same metal as the second metal forming the end portion, or of a different metal.

[0023] In this way, it is possible for form a reliable connection with a contact lead made of a metal other than the metal of the electrode. It will be understood that the contact lead, which will generally be exposed outside the casing of the battery, must be made of a metal that has good electrical conductivity but is not highly reactive when exposed to air or moisture. Suitable metals include nickel, copper, stainless steel or various alloys.

[0024] Moreover, the metal of the contact lead, since it is connected only to the protruding tabs of the electrodes, is not directly exposed to electrolyte when the battery is assembled.

[0025] A further advantage is that a good connection can be made to the at least one electrode without the electrode as a whole needing to be formed or disposed on a current collector made of a metal other than the first metal. In other words, the main part of the electrode that is exposed to the electrolyte consists solely of the first metal (e.g. lithium or a lithium alloy), with no need for a copper or nickel or other current collector that would add unnecessary weight and act as a substrate for the formation of dendrites during cycling.

[0026] Moreover, it is important that the second metal (of the contact lead) is selected so that it does not form an alloy

DELTRAN EX1002
IPR2024-01219

with the first metal (of the electrode). This is in order to avoid reduction of the amount of the first metal that is available to the electrochemical system of the battery. For example, lithium will form an alloy with aluminium, but not with nickel or copper.

[0027] In certain embodiments, the electrode is configured as an anode, or negative electrode, for a battery. However, it will be appreciated that the method is applicable also to cathodes, or positive electrodes, where these are made of a metal that is suitable for pressing and welding to a perforated second metal as described.

[0028] Viewed from a second aspect, there is provided, in combination, at least one electrode for a battery and a contact lead, wherein the electrode comprises a sheet or foil of a first metal with a tab protruding from an edge of the sheet or foil, and wherein the contact lead comprises an electrically conductive lead with an end portion made of a second metal that does not alloy with the first metal and having a plurality of through holes, wherein the first metal of the tab has been pressed and welded so as to penetrate through the through holes of the second metal end portion.

[0029] Embodiments of the present invention seek to provide a negative electrode (anode) eliminating the need for the current collector, and a method of forming a reliable physical contact between different pieces of metallic lithium and the contact lead, thereby to promote good electrical contact between metallic lithium and the material of the contact lead.

[0030] In preferred embodiments, an excess of metallic lithium is used such that at the end of the battery life there is a substantial amount of lithium metal which serves as the current collector for the negative electrode. The use of lithium as the current collector eliminates mechanical contact between metal lithium and another current collector material.

[0031] In some embodiments, there may be provided a plurality of electrodes, each comprising a sheet or foil of the first metal with a tab protruding from each sheet in substantially the same location, so that the tabs of the stack of electrodes are substantially aligned when the electrodes are aligned with each other and arranged as an electrode stack.

[0032] The lithium metal of the negative electrode in the region of the tabs may form a single phase connection from lithium electrode to lithium electrode in the electrode stack. Such connection is achieved by using pressing and welding as hereinbefore described.

[0033] The contact lead, or at least the end portion thereof, may be thin (for example, with a thickness of 5 to 50μm), or may be thick (for example, with a thickness of 50 to 10,000μm).

[0034] The contact lead may be substantially linear, or may have a 'T'-shaped or 'L'-shaped configuration.

[0035] The end portion of the contact lead may be an integral part of the contact lead (in other words, formed from the same material as the rest of the contact lead and integral therewith), or may be a separate metal component, not necessarily of the same material as the rest of the contact lead, and welded thereto (for example by ultrasonic welding, thermal contact welding, laser welding, induction welding or other types of welding).

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] Embodiments of the invention are further described hereinafter with reference to the accompanying drawings, in which:

FIGURES 1a to 1c shows a battery stack with anodes, cathodes and tabs, and three alternative positionings for a contact lead;

FIGURES 2a to 2e shows possible designs for the contact lead; and

FIGURE 3 shows the contact lead being ultrasonically welded to the tabs.

DETAILED DESCRIPTION

[0037] A battery can be formed by an alternating stack of numerous cathodes and anodes. Each of these layers is divided by a separator. An ionic pathway is maintained by the presence, between each electrode, of an electrolyte. Each electrode 1 features a tab 2 protruding from its electrochemically active area and beyond the edge of the separator. These tabs 2 provide the first surface through which the stack 3 of lithium anodes will be welded to each other and joined to a contact lead 4. The tabs 2 are first folded and/or formed by pressing. A contact lead 4 is then positioned at the top **(Figure 1a)** or bottom **(Figure 1b)** of the stack 5 of tabs 2, or it may be positioned between any two lithium tabs 2 **(Figure 1c)**.

[0038] The contact leads 4 may take a number of forms **(Figures 2a to 2e)**. The body 6 is composed of a conductive metal ribbon, typically nickel, copper, stainless steel or some composite conductor. The end portion 7 (the area to be welded) is typically perforated, meshed or punched. The end portion 7 may be an integral part of the metal ribbon 6, or it may be a separate piece welded to the ribbon 6. Where the end portion 7 is a separate piece welded to the ribbon 6, it may be made of a different metal to that of the ribbon 6. The contact may be linear, "T" or "L" shaped. The perforations may be rhombic, circular, square, rounded, polygonal or any other suitable shape.

DELTRAN EX1002
IPR2024-01219

[0039] The tabs 2 and the contact lead 4 are then positioned between the two weld fixtures 8 of an ultrasonic welder **(Figure 3)**. The ultrasonic welder then simultaneously applies pressure and an ultrasonic wave to the weld area. This causes the numerous lithium layers 2 to fuse together to form a lithium-lithium weld. Further, the softened lithium percolates through the perforated or meshed area 7 of the contact lead 4. The contact lead 4 is hence joined to the lithium 2 as the mesh 7 is intimately surrounded by lithium. The high surface area contact between the mesh 7 of the contact lead 4 and the lithium electrode 1 produces a low resistance and a mechanically strong electrical contact. When the ultrasonic wave ceases and the pressure is released, the contact lead 4 will be joined to the lithium anodes 1.

EXAMPLE 1

[0040] A linear nickel contact lead, composed of 50μm thick nickel ribbon, was used. The endmost 5mm of the contact lead was expanded to form a mesh. A battery with 60 lithium anodes, each of 78μm thickness, was assembled. A stack of lithium contact tabs protruded from the battery. The lithium contact tabs were formed and trimmed to produce a flat welding area and to ensure that each of the tabs, regardless of its position, in the stack used the minimum quantity of lithium. The formed stack of lithium tabs was then positioned between the welding fixtures of an ultrasonic welder. The contact lead was then positioned on top of the stack of lithium tabs, such that the meshed region overlapped with the flat lithium welding zone. The welding conditions listed in **Table 1** were then entered into an AmTech 900B 40kHz ultrasonic welder. A single weld was then performed. Each of the 60 lithium layers were welded firmly to each other. A strong join was produced between the lithium and the contact lead. This join had been created by the softened lithium penetrating through the mesh of the contact lead.

Table 1 - The welder setting used in Example 1.

Energy / J	Amplitude / μm	Trigger Pressure / Psi	Pressure / Psi
180	5	20	20

EXAMPLE 2

[0041] A "T" shaped contact lead was made by welding a piece of nickel ribbon (50μm thick) to a piece of copper mesh. The mesh opening was approximately 200x700μm, with a bar width of 100μm. The mesh was thrice as long as the nickel ribbon was wide. The mesh was 5mm wide; the same as the welding zone. The mesh was positioned centrally to form the cross of the "T" and welded into position by an ultrasonic welder using the conditions given in **Table 2, weld A.** The contact lead was positioned between the welding fixtures of an ultrasonic welder such that the meshed region fell into the welding zone.

[0042] A battery with 20 lithium anodes, each of 78μm thickness, was assembled. A stack of lithium contact tabs protruded from the battery. The stack of lithium contact tabs was formed and trimmed to produce a flat welding area and to ensure that each of the contact tabs, regardless of its position, in the stack used the minimum quantity of lithium.

[0043] The stack of lithium contact tabs was then positioned on top of the contact lead, between the welding fixtures of an ultrasonic welder. The copper mesh "arms" of the "T" shaped contact lead were then folded around the stack of lithium contact tabs. The welding conditions listed in **Table 2, weld B** were then entered into an AmTech 900B 40kHz ultrasonic welder. A single weld was then performed. Each of the 20 lithium layers were welded firmly to each other. A strong join was produced between the lithium and the contact lead. This join had been created by the softened lithium penetrating through the mesh of the contact lead.

Table 2 - The welder settings used in Example 2

Weld	Energy / J	Amplitude / μm	Trigger Pressure / Psi	Pressure / Psi
A	70	80	80	5
B	10	5	20	20

EXAMPLE 3

[0044] An "L" shaped contact lead was manufactured by photochemical etching from a sheet of 100μm thick stainless steel. The upright section of the "L" is continuous steel foil. The base of the "L" was etched with a mesh pattern. The mesh opening was 500x500μm and the bar width was 100μm. The base of the "L" was twice the width of the upright section. The width of the base section was 5mm, the same as the weld zone.

DELTRAN EX1002
IPR2024-01219

[0045] A battery with 20 lithium anodes, each of 78μm thickness, was assembled. A stack of lithium contact tabs protruded from the battery. The contact lead was positioned between the top face to the lowermost lithium contact tab and the bottom face of the remainder of the stack. The remainder of the stack of lithium contact tabs was pushed down onto the meshed region of the contact lead. The protruding meshed section of the contact lead was folded over the stack of contact tabs. The contact assembly was positioned between the welding fixtures of an ultrasonic welder such that the meshed regions fell into the welding zone.

[0046] The welding conditions listed in **Table 3** were then entered into an AmTech 900B 40kHz ultrasonic welder. A single weld was then performed. Each of the 20 lithium layers were welded firmly to each other. A strong join was produced between the lithium and the contact lead. This join had been created by the softened lithium penetrating through the mesh of the contact lead.

Table 3 - The welder settings used in Example 3

Energy / J	Amplitude / μm	Trigger Pressure / Psi	Pressure / Psi
40	5	20	20

[0047] Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of them mean "including but not limited to", and they are not intended to (and do not) exclude other moieties, additives, components, integers or steps. Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0048] Features, integers, characteristics, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive. The invention is not restricted to the details of any foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0049] The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

Claims

1. A method of connecting at least one electrode to a contact lead, wherein the electrode comprises a sheet or foil of a first metal with a tab protruding from an edge of the sheet or foil, and wherein the contact lead comprises an electrically conductive lead with an end portion made of a second metal that does not alloy with the first metal and having a plurality of through holes, the method comprising the steps of:

   i) positioning the end portion of the contact lead and the tab of the at least one electrode so that there is substantial overlap between the end portion and the tab;
   ii) causing the metal of the tab to penetrate through the through holes of the end portion so as to join the at least one electrode to the contact lead.

2. A method according to claim 1, wherein, in step ii), the metal of the tab is caused to penetrate through the through holes by pressing and welding.

3. A method according to claim 2, wherein the welding is ultrasonic welding.

4. A method according to claim 2, wherein the welding is thermal contact welding, laser welding or induction welding.

5. A method according to any one of claims 2 to 4, wherein the welding does not cause significant thermal deformation or changes in the laminar sheet or foil of the at least one electrode, but concentrates the applied energy in the locality of the tab.

DELTRAN EX1002
IPR2024-01219

6. A method according to any one of the preceding claims, wherein there is provided a plurality of electrodes, each comprising a sheet or foil of the first metal with a tab protruding from each sheet in substantially the same location, so that the tabs of the stack of electrodes are substantially aligned when the electrodes are aligned with each other and arranged as an electrode stack.

7. A method according to claim 6, wherein the perforated end portion of the contact lead is placed on top of the tabs of the electrode stack in step i).

8. A method according to claim 6, wherein the perforated end portion of the contact lead is placed underneath the tabs of the electrode stack in step i).

9. A method according to claim 6, wherein the perforated end portion of the contact lead is placed at an intermediate position between the top and the bottom of the electrode stack in step i).

10. A method according to any one of claims 7 to 9, wherein the tabs and the perforated end portion are then pressed together and the first metal is caused to penetrate through the holes in the perforated end portion of the contact lead.

11. A method according to claim 7 or 8, wherein the tabs of the electrode stack are pressed together before the perforated end portion is placed on top of or underneath the compressed tabs and the penetration of step ii) is performed.

12. A method according to any preceding claim, wherein the end portion of the contact lead is an integral part of the contact lead.

13. A method according to any one of claims 1 to 11, wherein the end portion of the contact lead is a separate metal component that is welded to the contact lead.

14. A method according to any preceding claim, wherein the first metal is lithium or a lithium alloy.

15. A method according to any preceding claim, wherein the second metal is selected from a group comprising: nickel, copper, a nickel or copper alloy that does not alloy with lithium, and stainless steel.

16. In combination, at least one electrode for a battery and a contact lead, wherein the electrode comprises a sheet or foil of a first metal with a tab protruding from an edge of the sheet or foil, and wherein the contact lead comprises an electrically conductive lead with an end portion made of a second metal that does not alloy with the first metal and having a plurality of through holes, wherein the first metal of the tab has been pressed and/or welded so as to penetrate through the through holes of the second metal end portion.

DELTRAN EX1002
IPR2024-01219

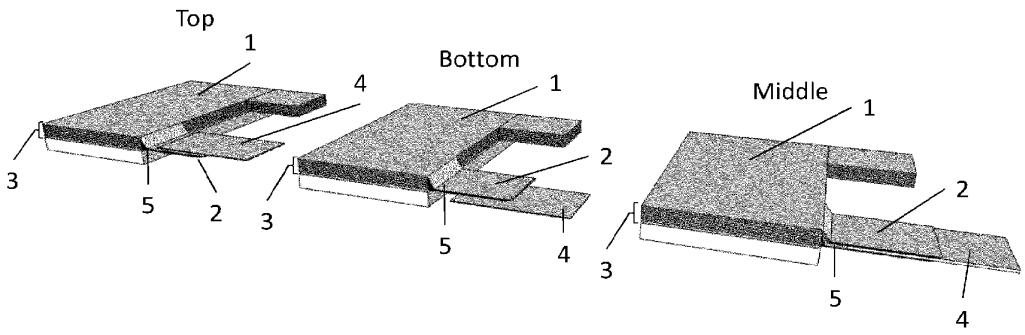


Fig 1a Fig 1b Fig 1c

Figure 1

DELTRAN EX1002
IPR2024-01219

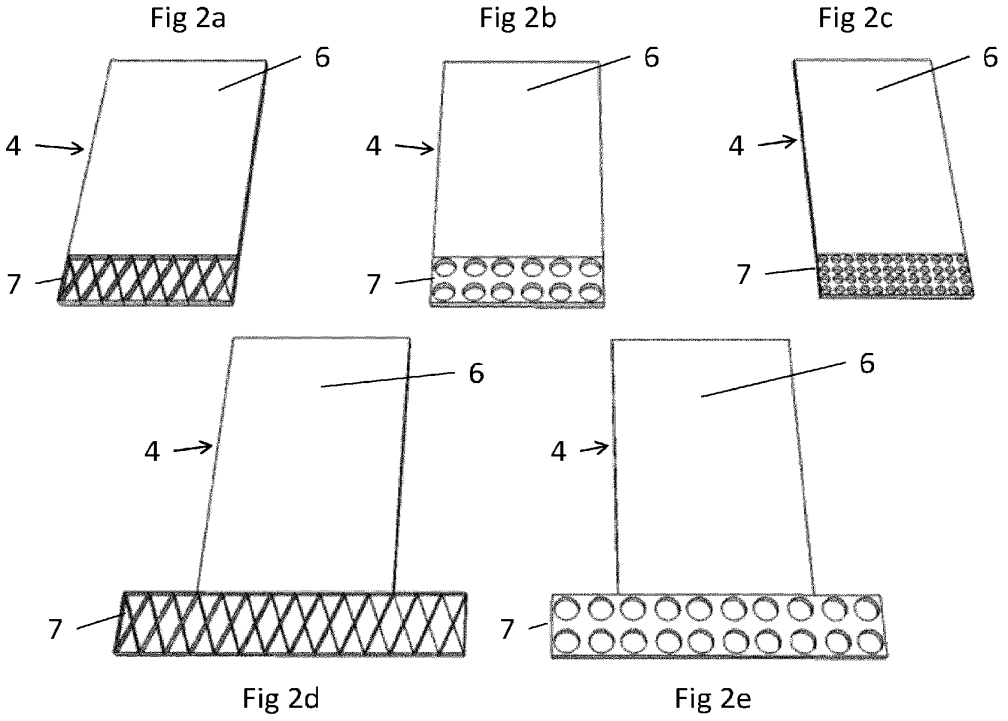


Figure 2

DELTRAN EX1002
IPR2024-01219

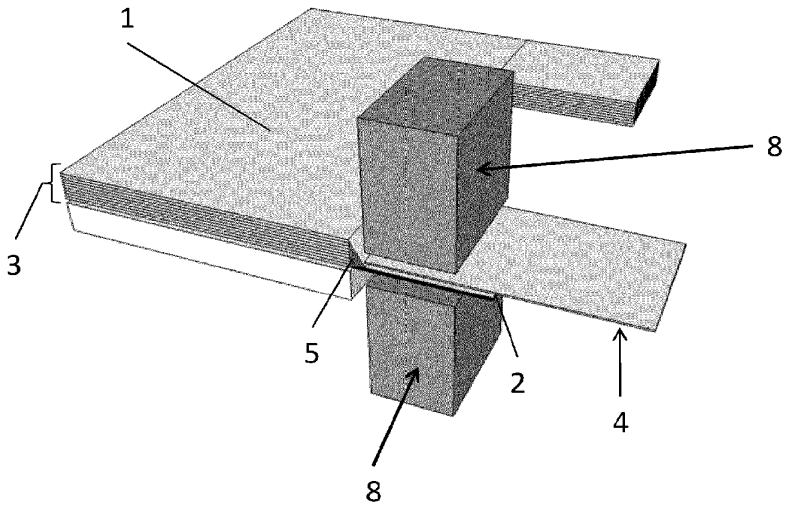


Figure 3

DELTRAN EX1002
IPR2024-01219

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 11 19 3678

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 7 335 440 B2 (AAMODT PAUL B [US] ET AL) 26 February 2008 (2008-02-26) * column 4, line 52 - column 5, line 2; figure 1C * * column 5, line 53 - line 57 *	1-12, 14-16	INV. H01M2/26 H01M2/30
Y	GB 2 200 068 A (SYLVA IND LIMITED) 27 July 1988 (1988-07-27) * page 2, line 17 - line 15 * * page 3, paragraph 2 * * page 3, line 24 - line 28 * * page 6, line 14 - line 16 * * page 7, line 16 *	1-12, 14-16	
A	EP 0 924 783 A1 (JAPAN STORAGE BATTERY CO LTD [JP]; GS MELCOTEC CO LTD [JP]) 23 June 1999 (1999-06-23) * paragraph [0025]; figures 1A,1B * * paragraph [0034] * * paragraph [0042] *	1-4,6-12	
A	EP 2 026 402 A1 (NISSAN MOTOR [JP]) 18 February 2009 (2009-02-18) * paragraph [0010] - paragraph [0011] * * paragraph [0014] * * paragraph [0018] * * paragraph [0035] * * paragraph [0047]; figure 4 * * paragraph [0076] - paragraph [0077]; figure 10 *	1-12, 14-16	TECHNICAL FIELDS SEARCHED (IPC) H01M
A	JP 2011 108469 A (TOYOTA MOTOR CORP) 2 June 2011 (2011-06-02) * paragraph [0016] * * paragraph [0025] *	1-12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 May 2012	Engert, Andrea

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

3

EPO FORM 1503 03.82 (P04C01)

DELTRAN EX1002
IPR2024-01219

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 19 3678

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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03-05-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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GB 2200068 A	27-07-1988	NONE	
EP 0924783 A1	23-06-1999	CN 1224250 A	28-07-1999
		DE 69813164 D1	15-05-2003
		DE 69813164 T2	23-10-2003
		EP 0924783 A1	23-06-1999
		US 6241790 B1	05-06-2001
EP 2026402 A1	18-02-2009	EP 2026402 A1	18-02-2009
		US 2009017376 A1	15-01-2009
JP 2011108469 A	02-06-2011	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

DELTRAN EX1002
IPR2024-01219

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5368958 A **[0009] [0011]**
- US 7335440 B **[0010]**
- US 7108942 B **[0011]**

DELTRAN EX1002
IPR2024-01219

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Paper 9
Entered: July 11, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DONGGUAN JUXING POWER CO. LTD.,
Petitioner,

v.

THE NOCO COMPANY,
Patent Owner.

Case IPR2018-00503
Patent 9,007,015 B1

Before JAMESON LEE, RAE LYNN P. GUEST, and CHRISTOPHER C. KENNEDY, *Administrative Patent Judges*.

KENNEDY, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

On January 15, 2018, Petitioner Dongguan Juxing Power Co. filed a Petition for *inter partes* review of claims 1–21 and 23 of U.S. Patent No. 9,007,015 B1 (Ex. 1001). Paper 2 ("Pet."). On May 7, 2018, Patent Owner The NOCO Company filed a Preliminary Response. Paper 8 ("Prelim. Resp.").

Inter partes review may not be instituted unless "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Upon consideration of the Petition and the Preliminary Response, and for reasons set forth below, we deny the Petition.

A. RELATED MATTERS

Petitioner identifies the following related matters:

Noco Co. v. Shenzhen ChangXinYang Tech. Co., No. 1:17-cv-00209-CAB (N.D. Ohio);

Noco Co. v. Shenzhen Valuelink E-Commerce Co., No.1:17-cv-02210-CAB (N.D. Ohio);

Noco Co. v. Shenzhen Dika Na'er E-Commerce Co., No. 1:17-cv-02282-CAB (N.D. Ohio).

Pet. 4. Petitioner states that "Petitioner manufactures at least some of the accused products sold by" the defendants in the cases listed above. *Id.*

B. THE '015 PATENT

The '015 patent is titled "Portable Vehicle Battery Jump Start Apparatus with Safety Protection." Ex. 1001, [54]. The subject matter of the challenged claims of the '015 patent relates generally to a vehicle jump-

starting apparatus that includes, *inter alia*, an internal power supply such as a battery, an output port having positive and negative polarity outputs, sensors to detect the presence and the polarity of a vehicle battery, and a microcontroller configured to receive signals from the sensors and control the flow of power from the internal power supply to the vehicle. *E.g.*, *id.*, claim 1.

Figure 1 of the '015 patent is reproduced below.

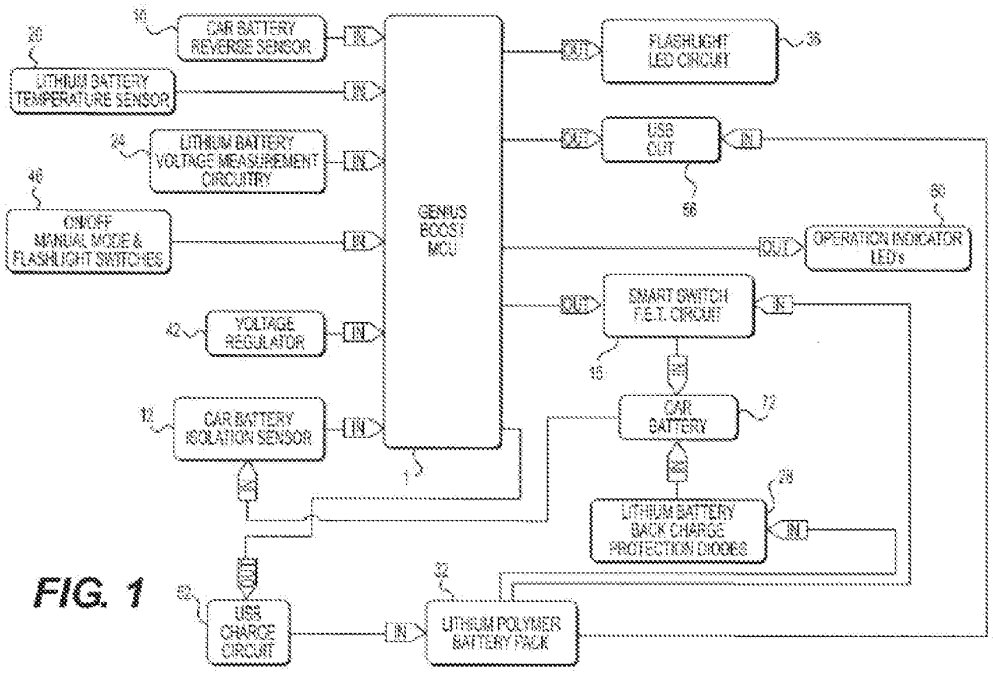


FIG. 1

Id., Fig. 1. Figure 1 depicts "a functional block diagram of a handheld vehicle battery boost apparatus." *Id.* at 3:50–52. The apparatus includes, *inter alia*, lithium polymer battery pack 32, car battery isolation sensor 12, car battery reverse [polarity] sensor 10, smart switch FET circuit 15, and programmable microcontroller unit (MCU) 1. *Id.*, cols. 3–4. Reverse polarity sensor 10 "monitors the polarity of the vehicle battery 72 when the handheld battery booster device is connected to the vehicle's electric

system." *Id.* at 4:20–22. Car battery isolation sensor 12 "detects whether or not a vehicle battery 72 is connected to the booster device." *Id.* at 4:26–28. Smart switch FET circuit 15 "electrically switches the handheld battery booster lithium battery to the vehicle's electric system only when the vehicle battery is determined by the MCU 1 to be present (in response to a detection signal provided by isolation sensor 12) and connected with the correct polarity (in response to a detection signal provided by reverse sensor 10)." *Id.* at 4:32–38.

Figure 2A-4 of the '015 patent, reproduced below, discloses preferred embodiments of the vehicle isolation sensor 12 and the reverse polarity sensor 10.

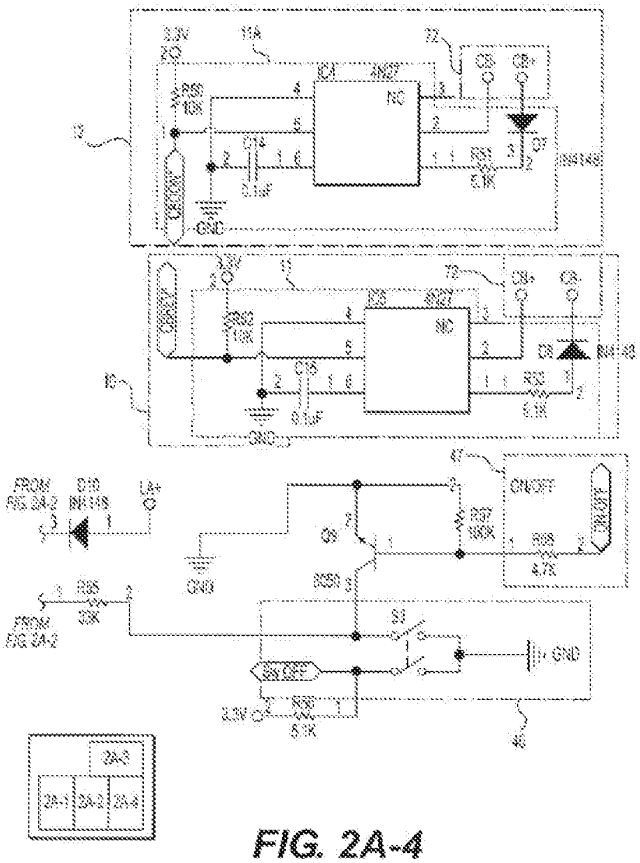


FIG. 2A-4

Id., Fig. 2A-4. Figure 2A-4, above, is a schematic circuit diagram depicting elements of an exemplary embodiment of a handheld vehicle battery boost apparatus. *E.g.*, *id.* at 3:53–55. Element 12 of Fig. 2A-4 is a preferred embodiment of the vehicle isolation sensor and comprises optocoupler LED 11A that, "if the battery 72 is connected to the terminals of the booster device with the correct polarity," will conduct current, "and is therefore turned on, . . . indicating the presence of a battery across the jumper output terminals of the handheld booster device." *Id.* at 5:26–36. Element 10 of Fig. 2A-4 is a preferred embodiment of the reverse polarity sensor and comprises optocoupler LED 11 that, "if the battery 72 is connected to the terminals of the booster device with the correct polarity," will not conduct current, "and is therefore turned off." *Id.* at 5:17–26.

The '015 patent explains:

> If the car battery 72 is connected to the handheld booster device with reverse polarity, the optocoupler LED 11 of the reverse sensor 10 will conduct current, providing a "0" or low signal to microcontroller unit 1. Further, if no battery is connected to the handheld booster device, the optocoupler LED 11A of the isolation sensor 12 will not conduct current, and is therefore turned off, providing a "1" or high output signal to the MCU, indicating the absence of any battery connected to the handheld booster device. Using these specific inputs, the microcontroller software of MCU 1 can determine when it is safe to turn on the smart switch FET 15, thereby connecting the lithium battery pack to the jumper terminals of the booster device. Consequently, if the car battery 72 either is not connected to the booster device at all, or is connected with reverse polarity, the MCU 1 can keep the smart switch FET 15 from being turned on, thus prevent[ing] sparking/short circuiting of the lithium battery pack.

Id. at 5:37–54.

Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 005

DELTRAN EX1002
IPR2024-01219

C. ILLUSTRATIVE CLAIM

Claim 1, reproduced below with bracketed letters added consistent with the labeling in the claim charts of the Petition, is the sole independent claim and is illustrative of the challenged claims (paragraph break added at limitation [g]).

1. Apparatus for jump starting a vehicle engine, comprising:

[a] an internal power supply;

[b] an output port having positive and negative polarity outputs;

[c] a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;

[d] a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;

[e] a power switch connected between said internal power supply and said output port; and

[f] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,

[g] such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said

vehicle battery with said positive and negative polarity outputs.

D. PRIOR ART RELIED UPON

Petitioner relies on the following references, as well as the Declaration of Walter van Schalkwijk, Ph.D. (Corrected Ex. 1003, hereafter referred to as Ex. 1003):

Reference	Title or Patent/Publication No.	Date	Exhibit
Krieger	US 2004/0130298 A1	July 8, 2004	1004
Xinfang	US 9,506,446 B2	Filed Oct. 31, 2013	1005
Purkey	US 6,426,606 B1	July 30, 2002	1006
Baxter	WO 2010/129723 A2	Nov. 11, 2010	1007

E. ASSERTED GROUNDS OF UNPATENTABILITY

Petitioner contends that the challenged claims are unpatentable based on the following grounds:

Reference(s)	Basis	Claims Challenged
Krieger and Xinfang	§ 103	1–6, 8–15, 17, 18, 21, and 23
Purkey and Xinfang	§ 103	1–3, 8–15, 17–21, and 23
Purkey, Xinfang, and Baxter	§ 103	7 and 16

II. DISCUSSION

A. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner's declarant, Dr. Schalkwijk, contends that a person of ordinary skill in the art at the time of the invention would have had "a

minimum of a bachelor's degree in electrical engineering ('EE') or its equivalent and 2 years of experience in EE with some experience in design of battery charging systems." Ex. 1003 ¶ 20. Dr. Schalkwijk states that, "[i]n lieu of a degree, a POSITA could be one whose equivalent accumulated knowledge and experience in the field of EE and specifically battery charging system design makes him or her a POSITA." *Id.* He also states that additional education could substitute for professional experience and vice versa. *Id.*

Patent Owner does not address or dispute Petitioner's proposed description. We adopt Petitioner's uncontested proposal. *See id.* Additionally, we note that this level of ordinary skill in the art is supported by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

B. CLAIM CONSTRUCTION

The parties agree that express construction is not required for any claim term. Pet. 8; Prelim. Resp. 6. We agree with the parties that, in this case, we need not expressly construe any term to reach a decision on institution. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (claim terms need only be construed "to the extent necessary to resolve the controversy").

C. PRINCIPLES OF LAW

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person of

ordinary skill in the art at the time the invention was made. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). Obviousness is resolved based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To establish obviousness, a petitioner must "demonstrate both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (internal quotation marks omitted); *see also KSR*, 550 U.S. at 418. The "factual inquiry" into the reasons for "combin[ing] references must be thorough and searching, and the need for specificity pervades . . . ." *In re NuVasive, Inc.*, 842 F.3d 1376, 1381–82 (Fed. Cir. 2016) (internal quotation marks omitted). A petitioner cannot satisfy this burden by "employ[ing] mere conclusory statements" and "must instead articulate specific reasoning, based on evidence of record" to support an obviousness determination. *Magnum Oil*, 829 F.3d at 1380.

D. Obviousness over Krieger and Xinfang

Petitioner asserts that claims 1–6, 8–15, 17, 18, 21, and 23 would have been obvious in view of Krieger and Xinfang. Pet. 10–24.

Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 009

DELTRAN EX1002
IPR2024-01219

1. Krieger

Krieger, titled "Microprocessor Controlled Booster Apparatus with Polarity Protection," generally concerns "a polarity protection circuit for a battery booster device." Ex. 1004 at [54], Abstract. Krieger teaches that its polarity protection circuit "is electrically connected to the battery to be charged (depleted battery) and to a boosting battery or other power source." *Id.* ¶ 10. The polarity protection circuit of Krieger "prevents current flow between the batteries unless proper polarity is achieved." *Id.* According to Krieger, "[t]he switch 12 is activated by a polarity sensing circuit 16 to allow current flow from the boosting battery 2 to the depleted battery 11. . . . When a proper polarity connection is signaled, the switch 12 completes the boosting circuit and permits current flow to the depleted battery 11." *Id.* ¶ 31.

Krieger teaches embodiments in which "the battery booster device may also comprise a microprocessor," which "can be used as part of a polarity protection circuit" and "may also perform additional detection and control functions." *Id.* ¶ 12. Krieger explains that, "[b]y way of a feedback circuit or other means, the microprocessor 60 can monitor the voltage and/or current being supplied to the depleted battery 11 from the booster battery 2, the voltage and/or current of the battery 11 and can detect short circuits or other faults." *Id.* ¶ 44. "A resistive divider may be used to provide the voltage and current measurements to the microprocessor's A/D input." *Id.* In some embodiments, the microprocessor is used to control a switch that prevents or allows current flow between batteries. *Id.* ¶ 45.

Krieger further teaches that "[m]icroprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected." Krieger describes the battery detection process as follows:

> [T]he microprocessor 60 deactivates the switch 12 into a non-conducting state. Via the feedback circuit or other means, the microprocessor detects whether clamps 8, 10 are connected to a battery. If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting state. If a battery is present, the jump starting process continues. The check is preferably performed about once a second and takes less than a few thousandths of a second to complete. As such, the check is transparent to the operation of the jump starter. A comparator or operational amplif[i]er can also be used to perform this check.

Id. ¶ 48.

2. Xinfang

Xinfang, titled "Mobile Power Bank," generally concerns an apparatus comprising a battery that is used to provide power to, among other things, jump start a vehicle. Ex. 1005 at [54], Abstract, 1:45–49. Xinfang teaches that its apparatus may comprise an ignition output port and a "vehicle ignition cable having a first end coupleable to the ignition output port and a second end coupleable to terminals of a vehicle battery." *Id.* at 2:40–43. Xinfang teaches that "the mobile power bank system 10 of the present invention is portable enough to be easily carried by a user." *Id.* at 9:1–3.

3. Analysis

a. Claim 1

Limitations [f] and [g] of claim 1 are reproduced below, with certain portions emphasized:

[f] a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch,

[g] such that said power switch is turned on to cause said internal power supply to be connected to said output port *in response to signals* from said sensors *indicating the presence of a vehicle battery* at said output port *and proper polarity connection* of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when *signals* from said sensors indicate *either the absence of a vehicle battery* at said output port *or improper polarity connection* of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

Limitation [g] requires that the "power switch is turned on . . . in response to signals . . . indicating the presence of a vehicle battery . . . and proper polarity connection." Consistent with Patent Owner's arguments, *see* Prelim. Resp. 17–20, the claim requires the microcontroller to process two distinct signals before providing an output signal to turn the power switch on: (1) a signal indicating the presence of a vehicle battery, and (2) a signal indicating a proper polarity connection. The switch is not turned on if either (1) a signal indicates the absence of a battery, or (2) a signal indicates improper polarity. Patent Owner reasonably describes this as a "redundancy feature through which . . . the power switch will not be turned on" unless

distinct signals indicate the presence of a battery and a proper polarity connection of the battery. Prelim. Resp. 4.

Petitioner's analysis of limitation [g] appears on pages 17–18 of the Petition. *See* Pet. 17–18. Petitioner states that Krieger discloses a feedback circuit or other means to detect the presence of a battery. *Id.* (citing Ex. 1004 ¶ 48). Petitioner states that Krieger discloses a polarity sensing circuit that provides a signal indicating the state of the connection. *Id.* (citing Ex. 1004 ¶ 31). And Petitioner states that Krieger discloses a microprocessor that provides output signals to activate or deactivate switch 12. *Id.* (citing Ex. 1004 ¶ 45, which discusses activating switch 12 "when a correct polarity connection . . . is made" and "a first signal of a first voltage" and "a second signal of a second voltage"). Petitioner does not rely on Xinfang in support of its analysis of limitation [g]. *Id.*

Although Dr. Schalkwijk's Declaration is not cited in the Petition itself, Dr. Schalkwijk describes limitation [g] as "verbose claim language [that] merely describes the standard operation of the power switch. In essence, the power switch is only turned on when proper connection is made . . . ." Ex. 1003 ¶ 68. As set forth above, however, the requirements of limitation [g] are more specific than that.

Petitioner's analysis does not specifically acknowledge or address the requirement of limitation [g] discussed above; i.e., that the power switch be activated or deactivated in response to two distinct signals. The Petition does not persuasively identify a disclosure in Krieger indicating that Krieger's apparatus is configured to function in that manner. Krieger describes activation of its apparatus based on a signal from the polarity sensing circuit alone. *E.g.*, Krieger at Abstract ("The polarity protection

circuit prevents current flow . . . .), ¶ 10 (similar), ¶ 11 (similar), ¶ 13 ("a polarity sensing circuit coupled to the boosting battery for providing an enable signal when a correct polarity connection is made . . ."), ¶ 14 (similar), ¶ 29 (similar), ¶ 31 ("The switch 12 is activated by a polarity sensing circuit 16 . . . ."), ¶ 45 ("Opto-isolator 16 is coupled to clamps 8, 10 via resistor 62 such that LED 26 is forward biased when a correct polarity connection between the boosting battery 2 and the depleted battery 11 is made.").

Krieger separately describes a "feedback circuit or other means" by which the microprocessor can detect whether the clamps "are connected to a battery." Ex. 1004 ¶ 48. Krieger's discussion of that feature, however, indicates that battery detection occurs only after the switch has initially been activated. *Id.* ("To perform the detection, the microprocessor 60 *deactivates* the switch 12 into a non-conducting state." / "If a battery is present, the jump starting process *continues*." (emphasis added)). The relevant disclosures of Krieger indicate that, once the battery detection process has started, the switch is activated or deactivated in response only to the presence or absence of a battery; any role played by a polarity sensing circuit at that point is not disclosed or suggested. *E.g.*, *id.* ("If no battery is present, the switch 12 is placed in a non-conducting state . . . . If a battery is present, the jump starting process continues.").

The Petition fails to show that Krieger's apparatus is configured in a way that would fall within the scope of limitation [g] of claim 1, because the Petition does not identify a scenario under which Krieger's switch would be activated or deactivated in response to both a signal concerning polarity and a signal concerning battery presence. The Petition does not meaningfully

acknowledge or address the specific requirements of limitation [g] discussed above, and the Petition fails to provide an explanation as to whether or why a person of ordinary skill in the art would have had reason to modify Krieger's apparatus so that it does meet the requirements of limitation [g]. We decline to supply the missing analysis in the first instance ourselves.

On this record, we are not persuaded that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail with respect to claim 1.[1]

b. Dependent Claims

The remaining challenged claims depend, directly or indirectly, from claim 1. The Petitioner's analysis of those claims does not remedy the issue

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[1] In addition to the foregoing analysis, we observe that the obviousness rationale presented in the Petition appears to be different from the rationale presented in Dr. Schalkwijk's Declaration. The Petition relies on Krieger as the primary reference and asserts that a person of ordinary skill would have incorporated features (such as an output port) from Xinfang into Krieger to "make the portable jump starter in Krieger more compact, easier to carry, and user friendly." Pet. 12. Dr. Schalkwijk's Declaration, however, proposes the incorporation of "Krieger's safety protection circuitry into Xinfang's more compact and easier to carry design." Ex. 1003 ¶¶ 51, 52. Thus, the Petition appears to suggest the incorporation of features from Xinfang into the apparatus of Krieger to make the apparatus of Krieger more compact, whereas the Declaration appears to suggest the incorporation of features from Krieger into the apparatus of Xinfang to enhance the safety of Xinfang's apparatus. *Compare* Pet. 12, *with* Ex. 1003 ¶¶ 51, 52. We decline to incorporate into the Petition the different rationale set forth only in the Declaration. *Cf.* 37 C.F.R. § 42.6(a)(3).

Although not an independent basis to deny the Petition in this case, the apparent differences in the rationales set forth by the Petition and the Declaration detract from the clarity and persuasiveness of Petitioner's arguments.

identified above. Accordingly, for the reasons stated above, the information presented in the Petition fails to establish a reasonable likelihood that Petitioner would prevail with respect to claims 2–6, 8–15, 17, 18, 21, and 23. We offer the following additional observations concerning the Petitioner's analysis of certain dependent claims.

Claim 5. Claim 5 depends from claim 1 and recites, "wherein said vehicle isolation sensor and reverse polarity sensor comprise optically coupled isolator phototransistors." The analysis in the Petition identifies a disclosure in the prior art corresponding only to the polarity sensor; the Petition says nothing about a vehicle isolation sensor comprising an optically coupled isolator phototransistor. *See* Pet. 19. Nor does the Petition offer a reason that a vehicle isolation sensor comprising an optically coupled isolator phototransistor would have been obvious in view of the prior art's disclosure of a polarity sensor comprising an optically coupled isolator phototransistor, or otherwise explain why the disclosure relating to the polarity sensor alone falls within the scope of claim 5, which references both the vehicle isolation sensor and the polarity sensor. *Id.*

Claim 11. Claim 11 depends from claim 1 and requires "a USB charging port configured to provide charging power from an external power source to said internal power supply." The entirety of the Petition's analysis of this claim is the following quotation from Xinfang: "Optionally, the charging port, the at least one Universal Serial Bus interface, Light Emitting Diode indicator module, and ignition output port are sequentially arranged on a side of the housing." Pet. 21 (quoting Ex. 1005 at 2:22–25). That disclosure, by its plain language, concerns the arrangement of various aspects of Xinfang's apparatus in Xinfang's housing and says nothing about

Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 0016

DELTRAN EX1002
IPR2024-01219

a USB port to which an external power source may be connected to charge the internal power supply of the apparatus. With respect to claim 10, the Petition identifies a disclosure in Xinfang concerning the use of a USB port to provides power from the internal power supply of the apparatus to an external device, *e.g.*, Ex. 1005 at 4:59–62 ("The USB output module 36 is connectable via a USB cable to support USB charging of electronic devices where the battery module 16 provides power to the electronic devices."), but the Petition does not identify a disclosure in Xinfang that corresponds to the requirements of claim 11. Nor does the Petition attempt to explain why the limitations of claim 11 would have been obvious in view of the portions of Xinfang relied upon by Petitioner in Petitioner's analysis of claim 10. *See* Pet. 21.

Claims 10–15. The Petition offers no meaningful analysis of a reason to combine concerning at least claims 10–15. Claim 10, for example, depends from claim 1 and requires "a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device." The Petition identifies a disclosure in Xinfang corresponding to the additional limitation of claim 10. Pet. 21. However, the Petition's discussion of claim 10 is silent with regards to a reason that a person of ordinary skill would have combined Xinfang with Krieger to achieve the subject matter of claim 10. *Id.* The only discussion in either the Petition or Dr. Schalkwijk's Declaration that is apparently directed to the issue is ¶ 84 of the Declaration. The Petition itself, however, does not cite or otherwise reference that paragraph of the Declaration. Even if it did, ¶ 84 states only that "USB charging has been common since as early as 2007," and cites a document regarding USB standards. Ex. 1003 ¶ 84 (citing Ex. 1010). A

bald statement that an individual feature of the challenged claim is common or known in the art, even if true, provides no explanation of why a person of ordinary skill would have combined that feature with a reference from which the feature is lacking.

The Petition's analysis of reason to combine with respect to claims 11–15 is similarly insufficient. *See* Pet. 21–22.

Thus, in addition to failing to establish a reasonable likelihood of prevailing for the reasons set forth above with respect to limitation [g] of claim 1 (from which all challenged claims depend), the Petition separately and independently fails to set forth a reasonable likelihood of prevailing with respect to claims 5 and 10–15.

E. Obviousness over Purkey and Xinfang

Petitioner asserts that claims 1–3, 8–15, 17–21, and 23 would have been obvious in view of Purkey and Xinfang. Pet. 25–38.

1. Purkey

Purkey, titled "Apparatus for Providing Supplemental Power to an Electrical System and Related Methods," is particularly concerned with "provid[ing] rapid-delivery of high amounts of power." Ex. 1006 at [54], Abstract. "The power is supplied by a power source having the combination of a high-density capacitor and battery." *Id.* at Abstract. "The power delivery is controlled to avoid such standard problems as reverse or same polarity connections and overvoltage." *Id.* "Control is effected by a combination voltage sensing circuit and isolation circuit to prevent current between the power source and the electrical system unless prescribed conditions are satisfied." *Id.*

Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 0018

DELTRAN EX1002
IPR2024-01219

Purkey describes the use of its apparatus to provide power to large, commercial vehicles. *E.g.*, *id.* at Abstract ("The significant power levels are sufficient, for example, to turn the starter of a heavy-duty commercial transport vehicle stranded by a disabled battery."). Although Purkey describes its apparatus as "portable," the "claimed invention" is described as being sufficiently large that a vehicle or cart is used to transport the apparatus, and Figure 1 depicts the use of a cart to transport the portable power booster 10. *Id.* at 5:10–15, 8:61–65 (describing Figure 1).

Purkey describes the use of "a combination voltage detecting or sensing circuit working jointly with an isolation circuit that prevents delivery of power from the invention's power source unless the proper voltage determinations are made." *Id.* at 5:35–40. Purkey states, with little additional detail, that its apparatus has "a built-in reverse polarity protection. Relatedly, there is same polarity protection in the sense that an accidental connection of power source conductors to the same terminal of the electrical system battery causing a direct short will be 'sensed' before power delivery is initiated." *Id.* at 5:29–35, 6:21–30.

2. Analysis

a. Claim 1

The Petition fails to establish a reasonable likelihood of prevailing with respect to claim 1 for reasons similar to those discussed above regarding the proposed ground of unpatentability based on Krieger and Xinfang. As set forth above, limitations [f] and [g] of claim 1 require the microcontroller to process two distinct signals before providing an output signal to turn the power switch on: (1) a signal indicating the presence of a vehicle battery, and (2) a signal indicating a proper polarity connection. The

Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 0019

DELTRAN EX1002
IPR2024-01219

switch is not turned on if either (1) a signal indicates the absence of a battery, or (2) a signal indicates improper polarity.

With respect to limitation [g] of claim 1, the Petition simply refers back to its analysis of limitation [f]. *See* Pet. 31. But the only portion of Purkey cited in support of Petitioner's analysis of limitation [f] refers to voltage detecting circuitry "for sensing the initial and subsequent voltages," which are "conveyed to a microcontroller 35." *Id.* (quoting Ex. 1006 at 12:18–28). The cited portion of Purkey says nothing about a polarity sensor, much less a signal from a polarity sensor used in combination with a signal from the voltage detecting circuitry to activate Purkey's power switch. *Id.*; Ex. 1006 at 12:18–28. The Petition does not cite Xinfang in its analysis of limitation [f] or [g]. *See* Pet. 30–31.

Although not cited in the Petition, Dr. Schalkwijk's analysis is similarly unpersuasive. Dr. Schalkwijk describes limitation [g] of claim 1 as "verbose claim language that merely describes the standard operation of the power switch. In essence, the power switch is only turned on when proper connection is made, and not turned on when the connection with the vehicle battery is improper." Ex. 1003 ¶ 109. That analysis generalizes and oversimplifies the requirements of claim 1 and fails to identify a disclosure in Purkey that teaches or suggests the requirements of claim 1.

We recognize that Purkey states that its apparatus includes "built-in reverse polarity protection." *E.g.*, Ex. 1006 at 5:29–30. However, as explained above, the Petitioner fails to identify any disclosure in Purkey of distinct signals being sent and used by the apparatus of Purkey as required by claim 1. *See* Pet. 31; Ex. 1003 ¶ 109. By attempting to combine limitations [f] and [g], and by failing to identify any disclosure in Purkey

related to a polarity sensor in the Petition's analysis of limitations [f] and [g] (or explain how the cited disclosures concerning the voltage detecting circuitry fall within the scope of limitations [f] and [g]), *see* Pet. 30–31, the Petition leaves evident gaps concerning particular requirements of claim 1. We decline to fill those gaps in the first instance ourselves.

On this record, we are not persuaded that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail with respect to claim 1.[2]

b. Dependent Claims

The remaining challenged claims depend, directly or indirectly, from claim 1. The Petitioner's analysis of those claims does not remedy the issue identified above. Accordingly, for the reasons stated above, the information presented in the Petition fails to establish a reasonable likelihood that Petitioner would prevail with respect to claims 2, 3, 8–15, 17–21, and 23. We offer the following additional observations concerning the Petitioner's analysis of certain dependent claims.

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[2] As in the proposed ground based on Krieger and Xinfang, *see supra* footnote 1, the Petition proposes incorporating features of Xinfang into Purkey to "make the portable jump starter in Purkey more compact, easier to carry, and user friendly," while Dr. Schalkwijk's Declaration proposes "combin[ing] Purkey's safety circuitry into Xinfang's more compact and easier to carry design." *Compare* Pet. 26, *with* Ex. 1003 ¶ 98. We decline to incorporate into the Petition a different rationale set forth only in the Declaration. *Cf.* 37 C.F.R. § 42.6(a)(3). Again, although not an independent basis to deny the Petition in this case, the apparent differences in the rationales set forth by the Petition and the Declaration detract from the clarity and persuasiveness of Petitioner's arguments.

Claims 10–14. The Petition's discussion of a reason to combine with respect to claims 10–14 is inadequate for reasons similar to those discussed above with respect to the proposed ground based on Krieger and Xinfang. *See* Pet. 33–34. The Petition itself provides no meaningful discussion of a reason to combine the teachings of Purkey and Xinfang to achieve the subject matter of claims 10–14, and instead only identifies individual disclosures in Xinfang that allegedly correspond to the additional limitations of claims 10–14. *Id.*

Claim 11. The Petition's discussion of claim 11 is unpersuasive for reasons similar to those discussed above with respect to the proposed ground based on Krieger and Xinfang. *See* Pet. 33. Specifically, Petitioner's reliance on Xinfang as allegedly disclosing the additional limitation of claim 11 is unpersuasive for reasons discussed above.

Claim 17. Claim 17 depends from claim 1 and requires "a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity." The entirety of the Petition's analysis of claim 17 is the following quotation from Purkey:

> There is, thus, a built-in reverse polarity protection. Relatedly, there is same polarity protection in the sense that an accidental connection of power source conductors to the same terminal of the electrical system battery causing a direct short will be 'sensed' before power delivery is initiated, thereby reducing risk of damage to the invention and the electrical system.

Pet. 35 (quoting Ex. 1006 at 5:29–35).

On its face, that quotation says nothing about visual indicators associated with the built-in reverse polarity protection. The Petition does not attempt to fill that evident gap. *See* Pet. 35; Ex. 1003 ¶ 123.

Claim 18. Claim 18 depends from claim 1 and requires "separate visual indicators configured to display the power on status of the apparatus, and the jump start boost power status of power supplied to said output port." Petitioner's analysis again consists only of quotations from Purkey:

> As already noted, the processor 34 preferably further includes a timer 39 positioned to measure elapsed time t between discrete changes in the numerical indicator of electrical system or power source voltages and to measure elapsed time t, during which current is passed between the power source 20 and the electrical system.
>
> As further illustrated in FIG. 5, the microcontroller 35 is also electrically connected to status indicator circuitry 56. The status indicator circuitry 56 can provide numerical or other visual display indicators for indicating the condition of the electrical system at a given moment during the process of providing a power boost. For example, the status indicator can be composed of a set of light emitting diodes (LEDs) that indicate voltage conditions.

Pet. 35–36 (quoting Ex. 1006 at 10:42–47, 12:44–51).

Similar to Petitioner's analysis of claim 17, it is not immediately clear from the quotations that the numerical indicators described by Purkey correspond to, or otherwise render obvious, the claimed visual indicators configured to display "the power on status of the apparatus" or "the jump start boost power status of power supplied to said output port." The Petition does not provide any discussion or analysis tying the quoted portions of Purkey to the actual language of the claim.

Thus, in addition to failing to establish a reasonable likelihood of prevailing for the reasons set forth above with respect to limitation [g] of claim 1 (from which all challenged claims depend), the Petition separately

Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 0023

DELTRAN EX1002
IPR2024-01219

and independently fails to establish a reasonable likelihood of prevailing with respect to claims 10–14, 17, and 18.

F. OBVIOUSNESS OVER PURKEY, XINFANG, AND BAXTER

Petitioner asserts that claims 7 and 16 would have been obvious in view of Purkey, Xinfang, and Baxter. Pet. 38–42.

1. Baxter

Baxter, titled "Low-Voltage Connection with Safety Circuit and Method for Determining Proper Connection Polarity," discloses a "safety circuit for use in low-voltage systems," including systems comprising batteries, that "improves safety of and additional features to low-voltage connections." Ex. 1007 at Abstract. Baxter discloses "several non-limiting examples of situations where the circuitry may determine to interrupt power." *Id.* at 22:24–25. One such example is where "an undesirable temperature is detected, such as at a cell of the battery 160, at a terminal of the battery 160, at some point of the circuitry, or at some other point of the low-voltage system to which the battery 160 is connected." *Id.* at 22:26–28.

Baxter also describes the use of indicator lights to provide information to a user. For example, Baxter teaches, "if proper connection conditions are detected and it is determined that it is safe to make a connection, the logic circuit or micro controller 26 can activate a green LED as a signal of proper connection . . . . Alternatively, a red LED might be activated if an improper connection is detected . . . ." *Id.* at 10:24–31; *see also id.* at 12:18–29 (describing the use of green and red LEDs to indicate proper or improper connections).

2. Analysis

Claims 7 and 16 depend, directly or indirectly, from claim 1. The Petitioner's analysis of those claims does not remedy the issues identified above with respect to claim 1. Accordingly, for the reasons stated above, the information presented in the Petition fails to establish a reasonable likelihood that Petitioner would prevail with respect to claims 7 and 16.[3]

III. CONCLUSION

For the reasons set forth above, we determine that the Petition fails to demonstrate a reasonable likelihood of prevailing as to any challenged claim.

IV. ORDER

It is hereby:

ORDERED that the Petition is *denied*, and no trial is instituted.

[3] In Dr. Schalkwijk's discussion of claim 16, Dr. Schalkwijk includes the following quotation: "Similarly, the visual dial gauge 33 attached to the capacitor(s) bank 6 will start raising from zero percent of charge up to one-hundred percent of charge. At this point, the boost circuit 4 will stop charging, and the status led 32 will change color and indicate ready." Ex. 1003 ¶ 138. Dr. Schalkwijk cites Ex. 1007 (Baxter) at 5:5–9. The pincited lines of Baxter, however, do not include the quoted language, and we were unable to locate the quoted language in Baxter or elsewhere in the record.

IPR2018-00503
Patent 9,007,015 B1

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Ex. 1004
Shenzhen Carku Technology Co. Ltd.
Page 0026

DELTRAN EX1002
IPR2024-01219

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20202012232 20 Feb 2020

ABSTRACT

A handheld device for jump starting a vehicle engine includes a power supply such as a rechargeable lithium ion battery pack (32) and a microcontroller (1). The power supply is coupled to power output connectors of the device through a power switch circuit (15) actuated by the microcontroller. A first sensor (12) connected in circuit with positive and negative polarity outputs detects the presence of a vehicle battery (72) connected between the positive and negative polarity outputs. A second sensor (10) connected in circuit with the positive and negative polarity outputs detects the polarity of a vehicle battery connected between the positive and negative polarity outputs, such that the microcontroller will enable power to be delivered from the power supply to the output connectors only when a good battery is connected to the output connectors and only when the battery is connected with proper polarity of positive and negative terminals.

20202012223 20 Feb 2020

PORTABLE VEHICLE BATTERY JUMP START APPARATUS WITH SAFETY PROTECTION

FIELD OF THE INVENTION

[0001] The present invention relates generally to apparatus for jump-starting a vehicle having a depleted or discharged battery.

BACKGROUND TO THE INVENTION

[0002] Prior art devices are known for jump-starting a vehicle, which provide either a pair of electrical connector cables that connect a fully-charged battery of another vehicle to the engine start circuit of the dead battery vehicle, or portable booster devices which include a fully-charged battery which can be connected in circuit with the vehicle's engine starter through a pair of cables.

[0003] Problems with the prior art arose when either the jumper terminals or clamps of the cables were inadvertently brought into contact with each other while the other ends were connected to a charged battery, or when the positive and negative terminals were connected to the opposite polarity terminals in the vehicle to be jumped, thereby causing a short circuit resulting in sparking and potential damage to batteries and/or bodily injury.

[0004] Various attempts to eliminate these problems have been made in the prior art. U.S. Patent No. 6,212,054 issued April 3, 2001, discloses a battery booster pack that is polarity sensitive and can detect proper and improper connections before providing a path for electric current flow. The device uses a set of LEDs connected to optical couplers oriented by a control circuit. The control circuit controls a solenoid assembly controlling the path of power current. The control circuit causes power current to flow through the solenoid assembly only if the points of contact of booster cable clamp connections have been properly made.

20202012223 20 Feb 2020

[0005] U.S. Patent No. 6,632,103 issued October 14, 2003, discloses an adaptive booster cable connected with two pairs of clips, wherein the two pairs of clips are respectively attached to two batteries to transmit power from one battery to the other battery. The adaptive booster cable includes a polarity detecting unit connected to each clip, a switching unit and a current detecting unit both provided between the two pairs of clips. After the polarity of each clip is sensed by the polarity detecting unit, the switching unit generates a proper connection between the two batteries. Therefore, the positive and negative terminals of the two batteries are correctly connected based on the detected result of the polarity detecting unit.

[0006] U.S. Patent No. 8,493,021 issued July 23, 2013, discloses apparatus that monitors the voltage of the battery of a vehicle to be jump started and the current delivered by the jump starter batteries to determine if a proper connection has been established and to provide fault monitoring. Only if the proper polarity is detected can the system operate. The voltage is monitored to determine open circuit, disconnected conductive clamps, shunt cable fault, and solenoid fault conditions. The current through the shunt cable is monitored to determine if there is a battery explosion risk, and for excessive current conditions presenting an overheating condition, which may result in fire. The system includes an internal battery to provide the power to the battery of the vehicle to be jump started. Once the vehicle is started, the unit automatically electrically disconnects from the vehicle's battery.

[0007] U.S. Patent No. 5,189,359 issued February 23, 1993, discloses a jumper cable device having two bridge rectifiers for developing a reference voltage, a four-input decoder for determining which terminals are to be connected based on a comparison of the voltage at each of the four terminals to the reference voltage, and a pair of relays for effecting the correct connection depending on the determination of the decoder. No connection will be made unless only one terminal of each battery has a higher voltage than the reference voltage, indicating "positive" terminals, and one has a lower voltage than the reference voltage, indicating "negative" terminals, and that, therefore, the two

20 Feb 2020 202020122 3

high voltage terminals may be connected and the two lower voltage terminals may be connected. Current flows once the appropriate relay device is closed. The relay device is preferably a MOSFET combined with a series array of photodiodes that develop MOSFET gate-closing potential when the decoder output causes an LED to light.

[0008] U.S. Patent No. 5,795,182 issued August 18, 1998, discloses a polarity independent set of battery jumper cables for jumping a first battery to a second battery. The apparatus includes a relative polarity detector for detecting whether two batteries are configured cross or parallel. A three-position high current capacity crossbar pivot switch is responsive to the relative polarity detector for automatically connecting the plus terminals of the two batteries together and the minus terminals of the two batteries together regardless of whether the configuration detected is cross or parallel, and an undercurrent detector and a delay circuit for returning the device to its ready and unconnected state after the device has been disconnected from one of the batteries. The crossbar pivot switch includes two pairs of contacts, and a pivot arm that pivots about two separate points to ensure full electrical contact between the pairs of contacts. The invention can also be used to produce a battery charger that may be connected to a battery without regard to the polarity of the battery.

[0009] U.S. Patent No. 6,262,492 issued July 17, 2001, discloses a car battery jumper cable for accurately coupling an effective power source to a failed or not charged battery, which includes a relay switching circuit connected to the power source and the battery by two current conductor pairs. First and second voltage polarity recognition circuits are respectively connected to the power source and the battery by a respective voltage conductor pair to recognize the polarity of the power source and the battery. A logic recognition circuit produces a control signal subject to the polarity of the power source and the battery, and a driving circuit controlled by the control signal from the logic recognition circuit drives the relay switching circuit, enabling the two poles of the power source to be accurately coupled to the two poles of the battery.

20202012232 20 Feb 2020

[0010] U.S. Patent No. 5,635,817 issued June 3, 1997, discloses a vehicle battery charging device that includes a control housing having cables including a current limiting device to prevent exceeding of a predetermined maximum charging current of about 40 to 60 amps. The control housing includes a polarity detecting device to verify the correct polarity of the connection of the terminals of the two batteries and to electrically disconnect the two batteries if there is an incorrect polarity.

[0011] U.S. Patent No. 8,199,024 issued June 12, 2012, discloses a safety circuit in a low-voltage connecting system that leaves the two low-voltage systems disconnected until it determines that it is safe to make a connection. When the safety circuit determines that no unsafe conditions exist and that it is safe to connect the two low-voltage systems, the safety circuit may connect the two systems by way of a "soft start" that provides a connection between the two systems over a period of time that reduces or prevents inductive voltage spikes on one or more of the low-voltage systems. When one of the low-voltage systems has a completely-discharged battery incorporated into it, a method is used for detection of proper polarity of the connections between the low-voltage systems. The polarity of the discharged battery is determined by passing one or more test currents through it and determining whether a corresponding voltage rise is observed.

[0012] U.S. Patent No. 5,793,185 issued August 11, 1998, discloses a hand-held jump starter having control components and circuits to prevent overcharging and incorrect connection to batteries.

[0013] While the prior art attempted solutions to the abovementioned problems as discussed above, each of the prior art solutions suffers from other shortcomings, either in complexity, cost or potential for malfunction. Accordingly, there exists a need in the art for further improvements to vehicle jump start devices.

20202012223 20 Feb 2020

SUMMARY OF THE INVENTION

[0014] In accordance with an aspect of the invention, an apparatus is provided for jump starting a vehicle engine, comprising: an internal power supply; an output port having positive and negative polarity outputs; a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs; a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port; a power switch connected between said internal power supply and said output port; and a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch, such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

[0015] In accordance with an embodiment of the invention, the internal power supply is a rechargeable lithium ion battery pack.

[0016] A jumper cable device may also be provided, having a plug configured to plug into said output port; a pair of cables integrated with the plug at one respective end thereof; said pair of cables being configured to be separately connected to terminals of a battery at another respective end thereof.

2020201223 20 Feb 2020

[0017] Comprises/comprising and grammatical variations thereof when used in this specification are to be taken to specify the presence of stated features, integers, steps or components or groups thereof, but do not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Fig. 1 is a functional block diagram of a handheld vehicle battery boost apparatus in accordance with one aspect of the present invention;

[0019] Figs. 2A – 2C are schematic circuit diagrams of an example embodiment of a handheld vehicle battery boost apparatus in accordance with an aspect of the invention;

[0020] Fig. 3 is a perspective view of a handheld jump starter booster device in accordance with one example embodiment of the invention; and

[0021] Fig. 4 is a plan view of a jumper cable usable with the handheld jump starter booster device in accordance with another aspect of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] FIG. 1 is a functional block diagram of a handheld battery booster according to one aspect of the invention. At the heart of the handheld battery booster is a lithium polymer battery pack 32, which stores sufficient energy to jump start a vehicle engine served by a conventional 12 volt lead-acid or valve regulated lead-acid battery. In one example embodiment, a high-surge lithium polymer battery pack includes three 3.7V, 2666 mAh lithium polymer batteries in a 3S1P configuration. The resulting battery pack provides 11.1V, 2666Ah (8000Ah at 3.7V, 29.6Wh). Continuous discharge current is 25C (or 200 amps), and burst discharge current is 50C (or 400 amps). The maximum charging current of the battery pack is 8000mA (8 amps).

20202012232 20 Feb 2020

[0023] A programmable microcontroller unit (MCU) 1 receives various inputs and produces informational as well as control outputs. The programmable MCU 1 further provides flexibility to the system by allowing updates in functionality and system parameters, without requiring any change in hardware. According to one example embodiment, an 8 bit microcontroller with 2K x 15 bits of flash memory is used to control the system. One such microcontroller is the HT67F30, which is commercially available from Holtek Semiconductor Inc.

[0024] A car battery reverse sensor 10 monitors the polarity of the vehicle battery 72 when the handheld battery booster device is connected to the vehicle's electric system. As explained below, the booster device prevents the lithium battery pack from being connected to the vehicle battery 72 when the terminals of the battery 72 are connected to the wrong terminals of the booster device. A car battery isolation sensor 12 detects whether or not a vehicle battery 72 is connected to the booster device, and prevents the lithium battery pack from being connected to the output terminals of the booster device unless there is a good (e.g. chargeable) battery connected to the output terminals.

[0025] A smart switch FET circuit 15 electrically switches the handheld battery booster lithium battery to the vehicle's electric system only when the vehicle battery is determined by the MCU 1 to be present (in response to a detection signal provided by isolation sensor 12) and connected with the correct polarity (in response to a detection signal provided by reverse sensor 10). A lithium battery temperature sensor 20 monitors the temperature of the lithium battery pack 32 to detect overheating due to high ambient temperature conditions and overextended current draw during jump starting. A lithium battery voltage measurement circuit 24 monitors the voltage of the lithium battery pack 32 to prevent the voltage potential from rising too high during a charging operation and from dropping too low during a discharge operation.

[0026] Lithium battery back-charge protection diodes 28 prevent any charge current being delivered to the vehicle battery 72 from flowing back to the lithium battery pack 32 from the vehicle's electrical system. Flashlight LED circuit 36 is

20202012223 20 Feb 2020

provided to furnish a flashlight function for enhancing light under a vehicle's hood in dark conditions, as well as providing SOS and strobe lighting functions for safety purposes when a vehicle may be disabled in a potentially dangerous location. Voltage regulator 42 provides regulation of internal operating voltage for the microcontroller and sensors. On/Off manual mode and flashlight switches 46 allow the user to control power-on for the handheld battery booster device, to control manual override operation if the vehicle has no battery, and to control the flashlight function. The manual button functions only when the booster device is powered on. This button allows the user to jump-start vehicles that have either a missing battery, or the battery voltage is so low that automatic detection by the MCU is not possible. When the user presses and holds the manual override button for a predetermined period time (such as three seconds) to prevent inadvertent actuation of the manual mode, the internal lithium ion battery power is switched to the vehicle battery connect port. The only exception to the manual override is if the car battery is connected in reverse. If the car battery is connected in reverse, the internal lithium battery power shall never be switched to the vehicle battery connect port.

[0027] USB charge circuit 52 converts power from any USB charger power source, to charge voltage and current for charging the lithium battery pack 32. USB output 56 provides a USB portable charger for charging smartphones, tablets, and other rechargeable electronic devices. Operation indicator LEDs 60 provide visual indication of lithium battery capacity status as well as an indication of smart switch activation status (indicating that power is being provided to the vehicle's electrical system).

[0028] Detailed operation of the handheld booster device will now be described with reference to the schematic diagrams of Figs. 2A-2C. As shown in Fig. 2A, the microcontroller unit 1 is the center of all inputs and outputs. The reverse battery sensor 10 comprises an optically coupled isolator phototransistor (4N27) connected to the terminals of vehicle battery 72 at input pins 1 and 2 with a diode D8 in the lead conductor of pin 1 (associated with the negative terminal CB-), such that if the battery 72 is connected to the terminals of the booster

20202012223 20 Feb 2020

device with the correct polarity, the optocoupler LED 11 will not conduct current, and is therefore turned off, providing a "1" or high output signal to the MCU 1. The car battery isolation sensor 12 comprises an optically coupled isolator phototransistor (4N27) connected to the terminals of vehicle battery 72 at input pins 1 and 2 with a diode D7 in the lead conductor of pin 1 (associated with the positive terminal CB+), such that if the battery 72 is connected to the terminals of the booster device with the correct polarity, the optocoupler LED 11A will conduct current, and is therefore turned on, providing a "0" or low output signal to the MCU, indicating the presence of a battery across the jumper output terminals of the handheld booster device.

[0029] If the car battery 72 is connected to the handheld booster device with reverse polarity, the optocoupler LED 11 of the reverse sensor 10 will conduct current, providing a "0" or low signal to microcontroller unit 1. Further, if no battery is connected to the handheld booster device, the optocoupler LED 11A of the isolation sensor 12 will not conduct current, and is therefore turned off, providing a "1" or high output signal to the MCU, indicating the absence of any battery connected to the handheld booster device. Using these specific inputs, the microcontroller software of MCU 1 can determine when it is safe to turn on the smart switch FET 15, thereby connecting the lithium battery pack to the jumper terminals of the booster device. Consequently, if the car battery 72 either is not connected to the booster device at all, or is connected with reverse polarity, the MCU 1 can keep the smart switch FET 15 from being turned on, thus prevent sparking/short circuiting of the lithium battery pack.

[0030] As shown in Fig. 2B, the FET smart switch 15 is driven by an output of the microcontroller 1. The FET smart switch 15 includes three FETs (Q15, Q18, and Q19) in parallel, which spreads the distribution of power from the lithium battery pack over the FETs. When that microcontroller output is driven to a logic low, FETs 16 are all in a high resistance state, therefore not allowing current to flow from the internal lithium battery negative contact 17 to the car battery 72 negative contact. When the microcontroller output is driven to a logic high, the FETs 16 (Q15, Q18, and Q19) are in a low resistant state, allowing current to flow

20202012223 20 Feb 2020

freely from the internal lithium battery pack negative contact 17 (LB-) to the car battery 72 negative contact (CB-). In this way, the microcontroller software controls the connection of the internal lithium battery pack 32 to the vehicle battery 72 for jumpstarting the car engine.

[0031] Referring back to Fig. 2A, the internal lithium battery pack voltage can be accurately measured using circuit 24 and one of the analog-to-digital inputs of the microcontroller 1. Circuit 24 is designed to sense when the main 3.3V regulator 42 voltage is on, and to turn on transistor 23 when the voltage of regulator 42 is on. When transistor 23 is conducting, it turns on FET 22, thereby providing positive contact (LB+) of the internal lithium battery a conductive path to voltage divider 21 allowing a lower voltage range to be brought to the microcontroller to be read. Using this input, the microcontroller software can determine if the lithium battery voltage is too low during discharge operation or too high during charge operation, and take appropriate action to prevent damage to electronic components.

[0032] Still referring to Fig. 2A, the temperature of the internal lithium battery pack 32 can be accurately measured by two negative temperature coefficient (NTC) devices 20. These are devices that reduce their resistance when their temperature rises. The circuit is a voltage divider that brings the result to two analog-to-digital (A/D) inputs on the microcontroller 1. The microcontroller software can then determine when the internal lithium battery is too hot to allow jumpstarting, adding safety to the design.

[0033] The main voltage regulator circuit 42 is designed to convert internal lithium battery voltage to a regulated 3.3 volts that is utilized by the microcontroller 1 as well as by other components of the booster device for internal operating power. Three lithium battery back charge protection diodes 28 (see Fig. 2B) are in place to allow current to flow only from the internal lithium battery pack 32 to the car battery 72, and not from the car battery to the internal lithium battery. In this way, if the car electrical system is charging from its alternator, it

20202012223 20 Feb 2020

cannot back-charge (and thereby damage) the internal lithium battery, providing another level of safety.

[0034] The main power on switch 46 (Fig. 2A) is a combination that allows for double pole, double throw operation so that with one push, the product can be turned on if it is in the off state, or turned off if it is in the on state. This circuit also uses a microcontroller output 47 to “keep alive” the power when it is activated by the on switch. When the switch is pressed the microcontroller turns this output to a high logic level to keep power on when the switch is released. In this way, the microcontroller maintains control of when the power is turned off when the on/off switch is activated again or when the lithium battery voltage is getting too low. The microcontroller software also includes a timer that turns the power off after a predefined period of time, (such as, e.g. 8 hours) if not used.

[0035] The flashlight LED circuit 45 shown in Fig. 2B controls the operation of flashlight LEDs. Two outputs from the microcontroller 1 are dedicated to two separate LEDs. Thus, the LEDs can be independently software-controlled for strobe and SOS patterns, providing yet another safety feature to the booster device. LED indicators provide the feedback the operator needs to understand what is happening with the product. Four separate LEDs 61 (Fig. 2A) are controlled by corresponding individual outputs of microcontroller 1 to provide indication of the remaining capacity of the internal lithium battery. These LEDs are controlled in a “fuel gauge” type format with 25%, 50%, 75% and 100% (red, red, yellow, green) capacity indications. An LED indicator 63 (Fig. 2B) provides a visual warning to the user when the vehicle battery 72 has been connected in reverse polarity. "Boost" and on/off LEDs 62 provide visual indications when the booster device is provide jump-start power, and when the booster device is turned on, respectively.

[0036] A USB output 56 circuit (Fig. 2C) is included to provide a USB output for charging portable electronic devices such as smartphones from the internal lithium battery pack 32. Control circuit 57 from the microcontroller 1 allows the USB Out 56 to be turned on and off by software control to prevent the internal

20 Feb 2020 202201223

lithium battery getting too low in capacity. The USB output is brought to the outside of the device on a standard USB connector 58, which includes the standard voltage divider required for enabling charge to certain smartphones that require it.

[0037] The USB charge circuit 52 allows the internal lithium battery pack 32 to be charged using a standard USB charger. This charge input uses a standard micro-USB connector 48 allowing standard cables to be used. The 5V potential provided from standard USB chargers is up-converted to the 12.4VDC voltage required for charging the internal lithium battery pack using a DC-DC converter 49. The DC-DC converter 49 can be turned on and off via circuit 53 by an output from the microcontroller 1.

[0038] In this way, the microcontroller software can turn the charge off if the battery voltage is measured to be too high by the A/D input 22. Additional safety is provided for helping to eliminate overcharge to the internal lithium battery using a lithium battery charge controller 50 that provides charge balance to the internal lithium battery cells 51. This controller also provides safety redundancy for eliminating over discharge of the internal lithium battery.

[0039] Fig. 3 is a perspective view of a handheld device 300 in accordance with an exemplary embodiment of the invention. 301 is a power on switch. 302 shows the LED "fuel gauge" indicators 61. 303 shows a 12 volt output port connectable to a cable device 400, described further below. 304 shows a flashlight control switch for activating flashlight LEDs 45. 305 is a USB input port for charging the internal lithium battery, and 306 is a USB output port for providing charge from the lithium battery to other portable devices such as smartphones, tablets, music players, etc. 307 is a "boost on" indicator showing that power is being provided to the 12V output port. 308 is a "reverse" indicator showing that the vehicle battery is improperly connected with respect to polarity. 309 is a "power on" indicator showing that the device is powered up for operation.

20202012232 20 Feb 2020

[0040] Fig. 4 shows a jumper cable device 400 specifically designed for use with the handheld device 300. Device 400 has a plug 401 configured to plug into 12 volt output port 303 of the handheld device 300. A pair of cables 402a and 402b are integrated with the plug 401, and are respectively connected to battery terminal clamps 403a and 403b via ring terminals 404a and 404b. The port 303 and plug 401 may be dimensioned so that the plug 401 will only fit into the port 303 in a specific orientation, thus ensuring that clamp 403a will correspond to positive polarity, and clamp 403b will correspond to negative polarity, as indicated thereon. Additionally, the ring terminals 404a and 404b may be disconnected from the clamps and connected directly to the terminals of a vehicle battery. This feature may be useful, for example, to permanently attach the cables 302a-302b to the battery of a vehicle. In the event that the battery voltage becomes depleted, the handheld booster device 300 could be properly connected to the battery very simply by plugging in the plug 401 to the port 303.

[0041] The invention having been thus described, it will be apparent to those skilled in the art that the same may be varied in many ways without departing from the spirit or scope of the invention. Any and all such variations are intended to be encompassed within the scope of the following claims.

2020201223 20 Feb 2020

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Apparatus for jump starting a vehicle engine, comprising:

an internal power supply;

an output port having positive and negative polarity outputs;

a vehicle battery isolation sensor connected in circuit with said positive and negative polarity outputs, configured to detect presence of a vehicle battery connected between said positive and negative polarity outputs;

a reverse polarity sensor connected in circuit with said positive and negative polarity outputs, configured to detect polarity of a vehicle battery connected between said positive and negative polarity outputs and to provide an output signal indicating whether positive and negative terminals of said vehicle battery are properly connected with said positive and negative polarity outputs of said output port;

a power switch connected between said internal power supply and said output port; and

a microcontroller configured to receive input signals from said vehicle isolation sensor and said reverse polarity sensor, and to provide an output signal to said power switch, such that said power switch is turned on to cause said internal power supply to be connected to said output port in response to signals from said sensors indicating the presence of a vehicle battery at said output port and proper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs, and is not turned on when signals from said sensors indicate either the absence of a vehicle battery at said output port or improper polarity connection of positive and negative terminals of said vehicle battery with said positive and negative polarity outputs.

2. The apparatus of claim 1, wherein said internal power supply comprises a lithium ion battery.

3. The apparatus of claim 2, wherein said lithium ion battery comprises a battery pack of multiple lithium ion batteries.

2020201223 20 Feb 2020

4. The apparatus of claim 1, wherein said power switch comprises a plurality of FETs in parallel.

5. The apparatus of claim 1, wherein said vehicle isolation sensor and reverse polarity sensor comprise optically coupled isolator phototransistors.

6. The apparatus of claim 1, further comprising a plurality of power diodes coupled between said output port and said internal power supply to prevent back-charging of said internal power supply from an electrical system connected to said output port.

7. The apparatus of claim 1, further comprising a temperature sensor configured to detect temperature of said internal power supply and to provide a temperature signal to said microcontroller.

8. The apparatus of claim 1, further comprising a voltage measurement circuit configured to measure output voltage of said internal power supply and to provide a voltage measurement signal to said microcontroller.

9. The apparatus of claim 1, further comprising a voltage regulator configured to convert output voltage of said internal power supply to a voltage level appropriate to provide operating power to internal components of the apparatus.

10. The apparatus of claim 1, further comprising a USB output port configured to provide charging power from said internal power supply to a USB-chargeable device.

11. The apparatus of claim 1, further comprising a USB charging port configured to provide charging power from an external power source to said internal power supply.

20 Feb 2020 202020122 3

12. The apparatus of claim 1, further comprising a flashlight circuit configured to provide a source of light to a user.

13. The apparatus of claim 12, wherein said source of light is at least one LED.

14. The apparatus of claim 13, wherein said microcontroller is configured to control said at least one LED to provide a visual alarm indicating an emergency situation.

15. The apparatus of claim 1, further comprising a plurality of visual indicators configured to display remaining capacity status of said internal power supply.

16. The apparatus of claim 15, wherein said plurality of visual indicators comprises a plurality of LEDs providing output light of different colors.

17. The apparatus of claim 1, further comprising a visual indicator configured to warn a user when a vehicle battery is connected with reverse polarity.

18. The apparatus of claim 1, further comprising separate visual indicators configured to display the power on status of the apparatus, and the jump start boost power status of power supplied to said output port.

19. The apparatus of claim 1, further comprising a manual override switch configured to activate a manual override mode to enable a user to connect jump start power to said output port when said vehicle battery isolation sensor is unable to detect presence of a vehicle battery.

20. The apparatus of claim 19, wherein said microcontroller is configured to detect actuation of said manual override switch for at least a predetermined period of time before activation of said manual override mode.

2020201223 20 Feb 2020

21. The apparatus of claim 1, further comprising a jumper cable device including a plug configured to plug into said output port, a pair of cables integrated with the plug at one respective end thereof and being configured to be connected to terminals of a battery at another respective end thereof.

22. The apparatus of claim 21, wherein said jumper cable device further comprises a pair of ring terminals configured to respectively connect said pair of cables at said another end thereof with one of a battery terminal and a battery terminal clamp.

23. The apparatus of claim 21, wherein said output port and said plug are dimensioned so that the plug will fit into the output port only in one specific orientation.

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20202012223 20 Feb 2020

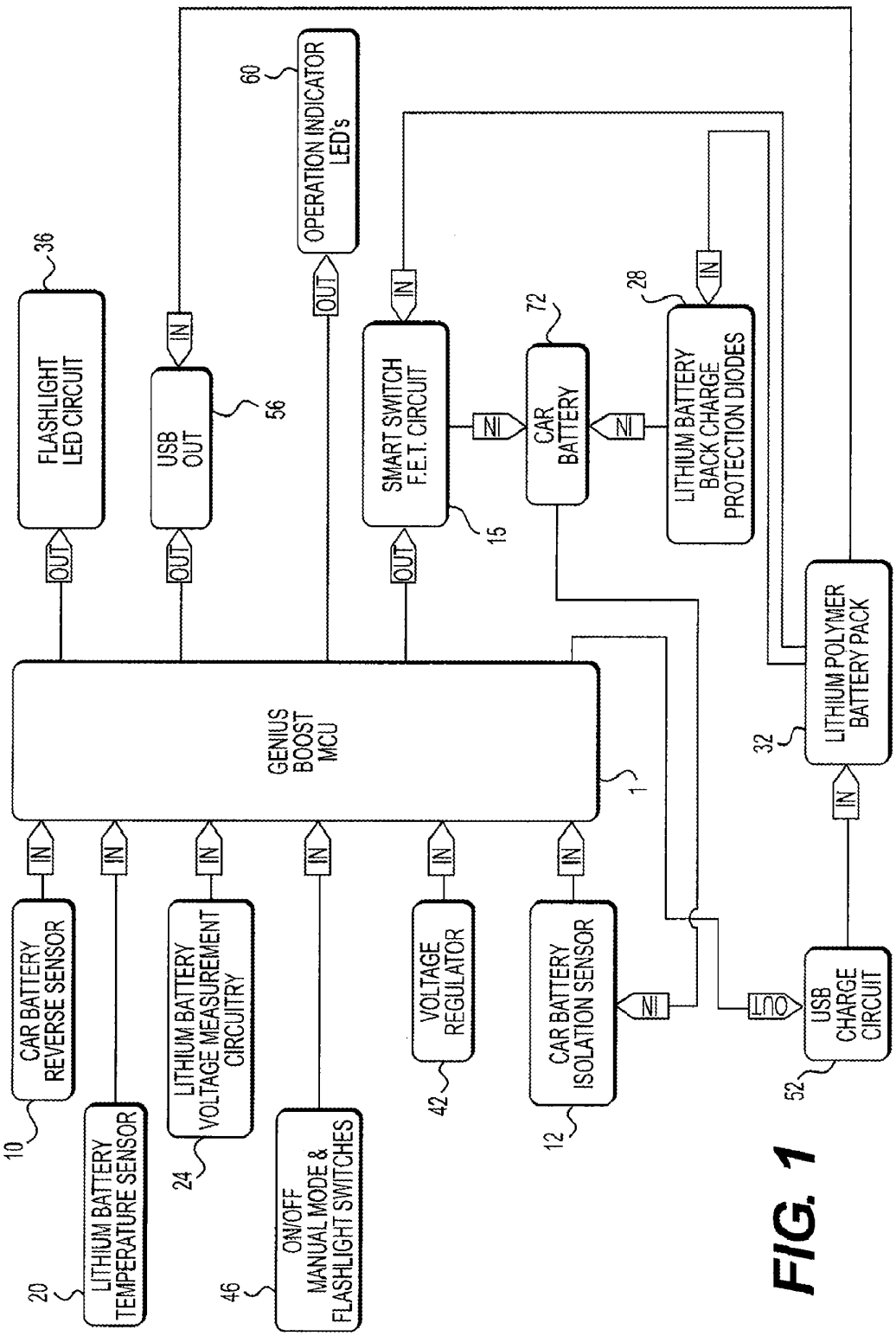


FIG. 1

20 Feb 2020 20202012223

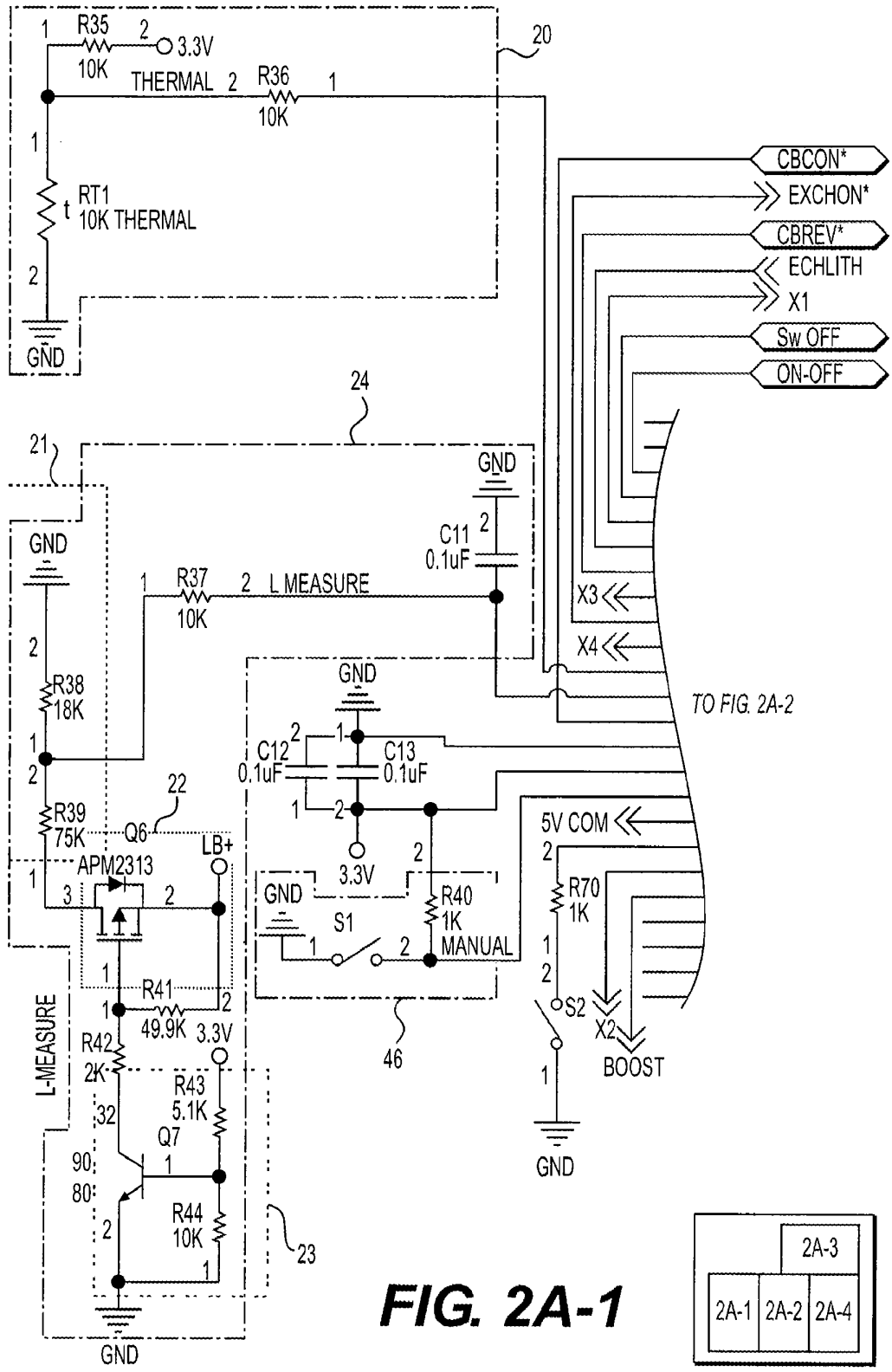
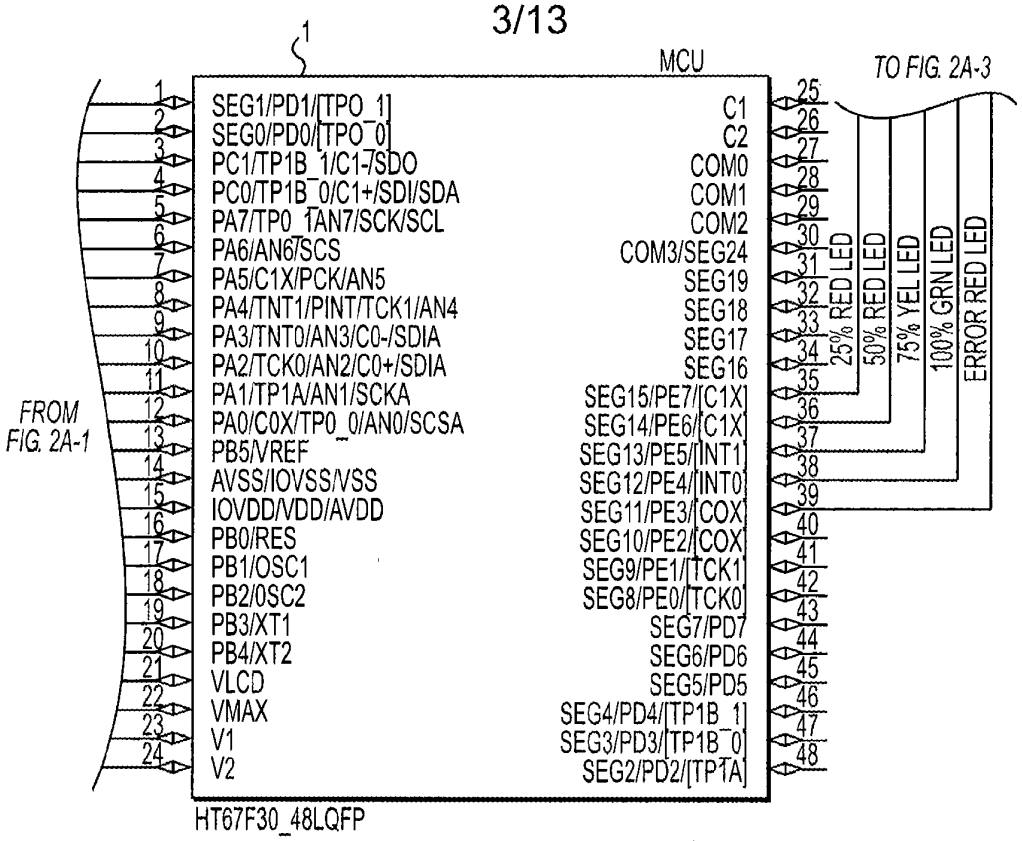


FIG. 2A-1

20202012223 20 Feb 2020



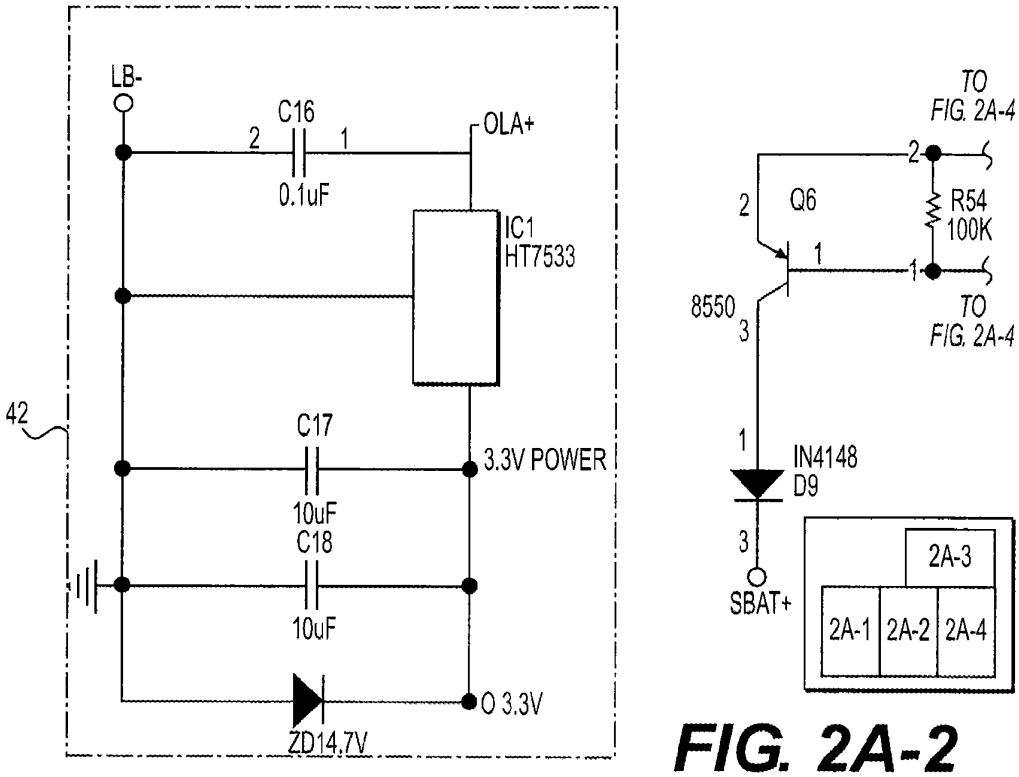


FIG. 2A-2

20202012223 20 Feb 2020

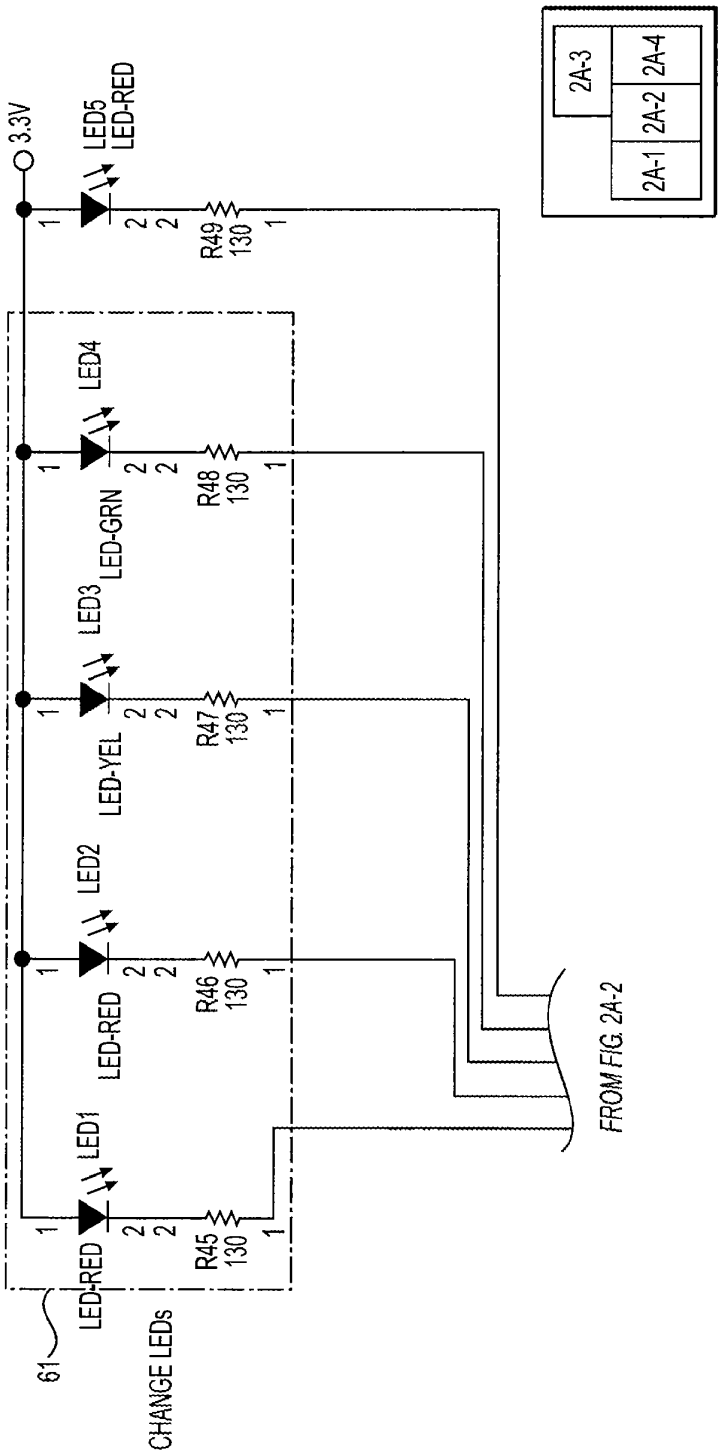


FIG. 2A-3

20202012223 20 Feb 2020

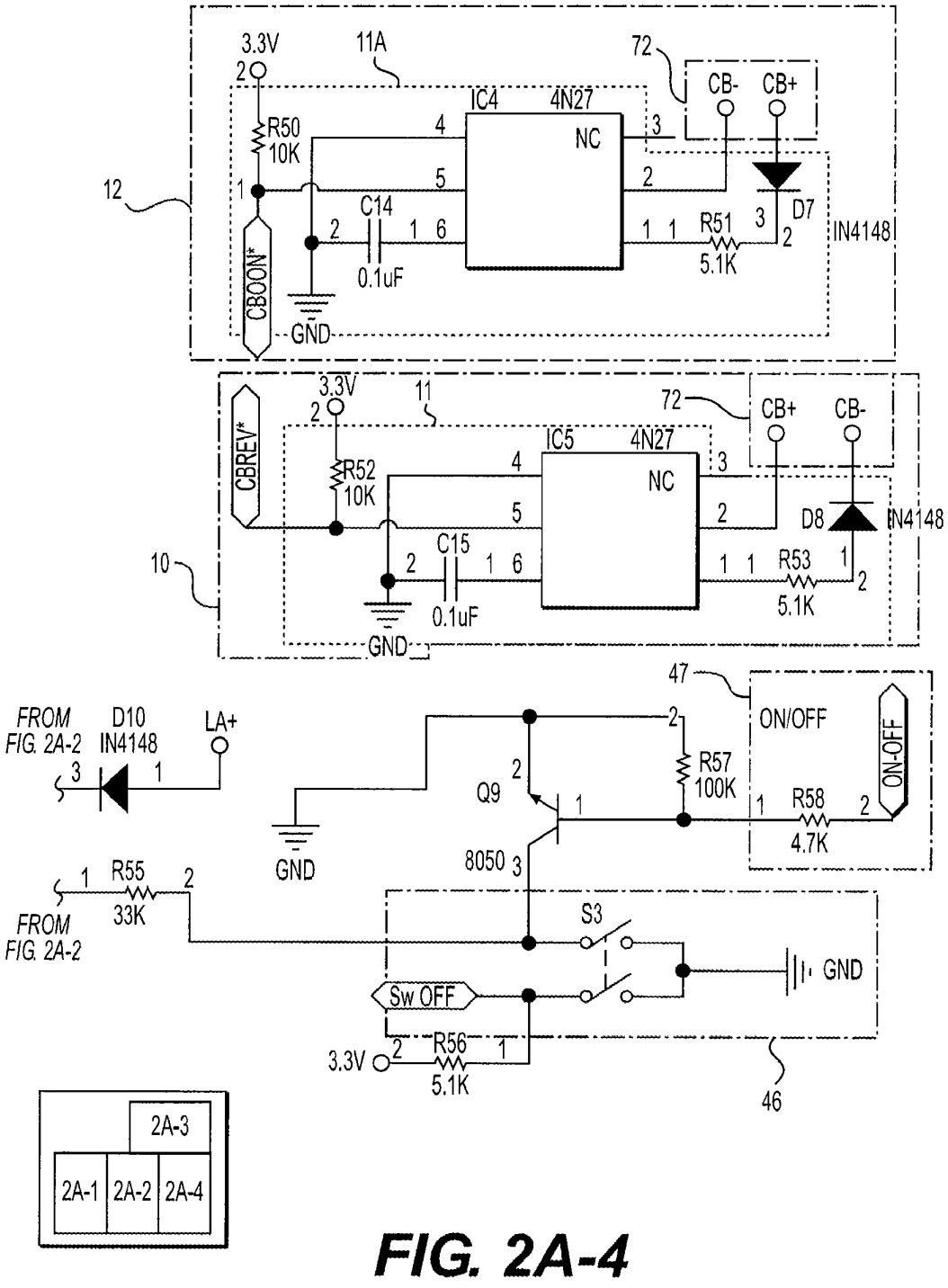


FIG. 2A-4

20202012223 20 Feb 2020

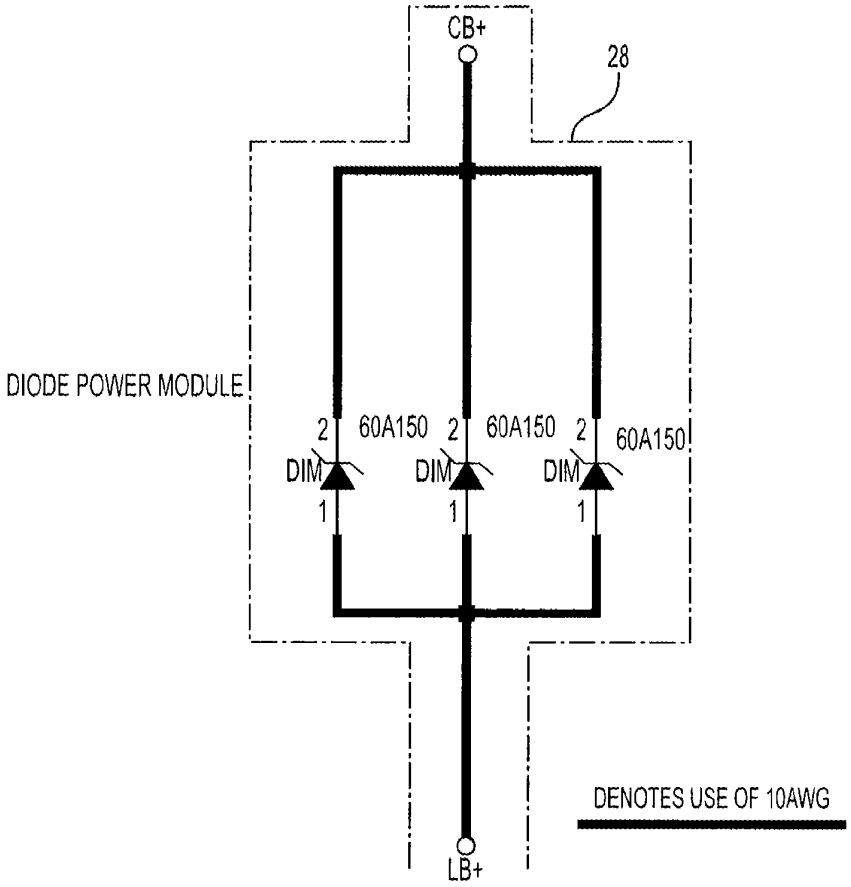
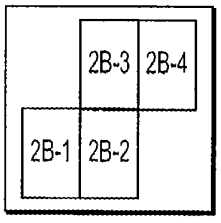


FIG. 2B-1



20202012223 20 Feb 2020

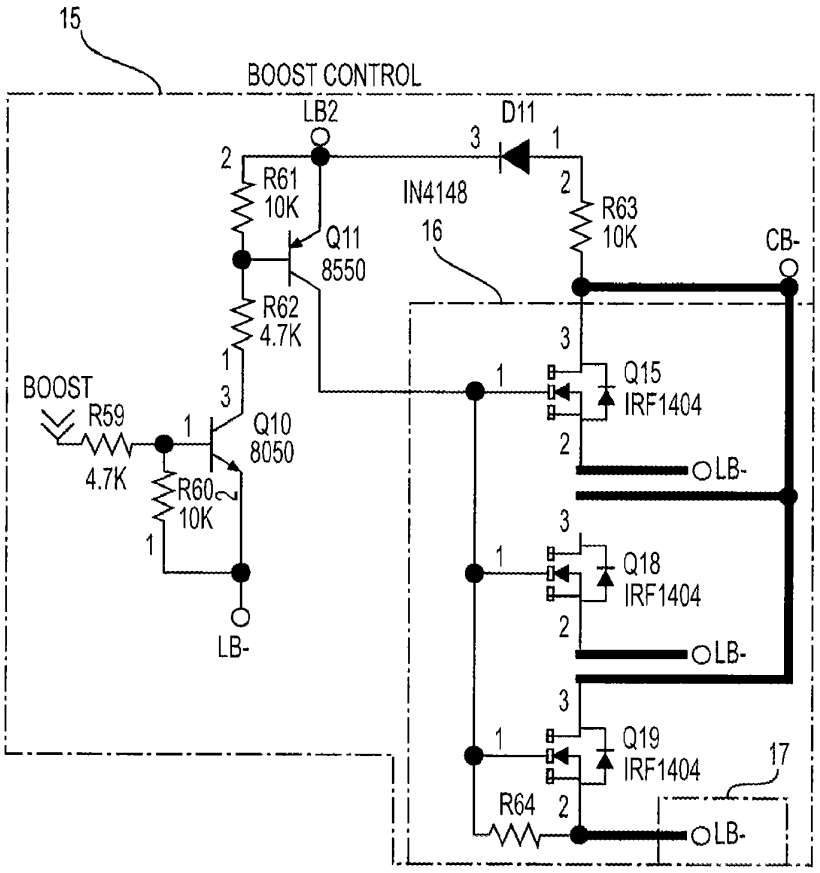
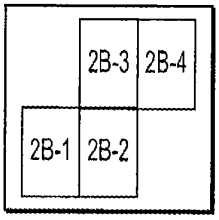


FIG. 2B-2



20202012223 20 Feb 2020

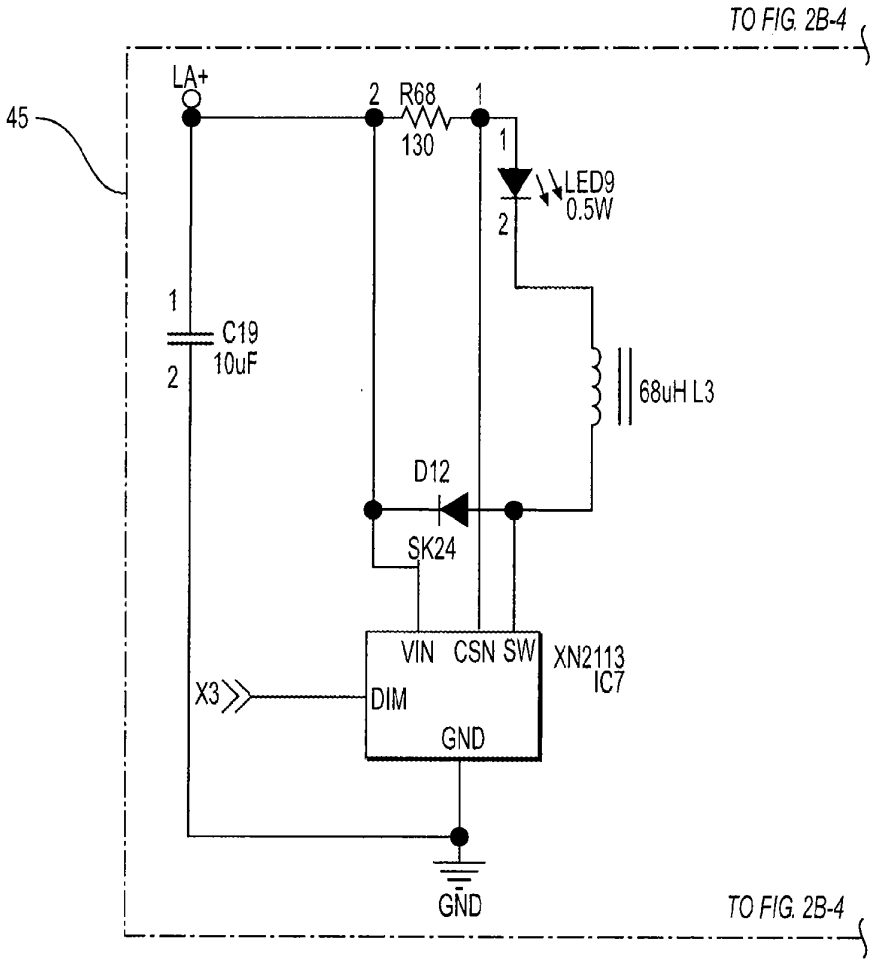
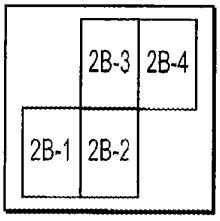


FIG. 2B-3



20202012223 20 Feb 2020

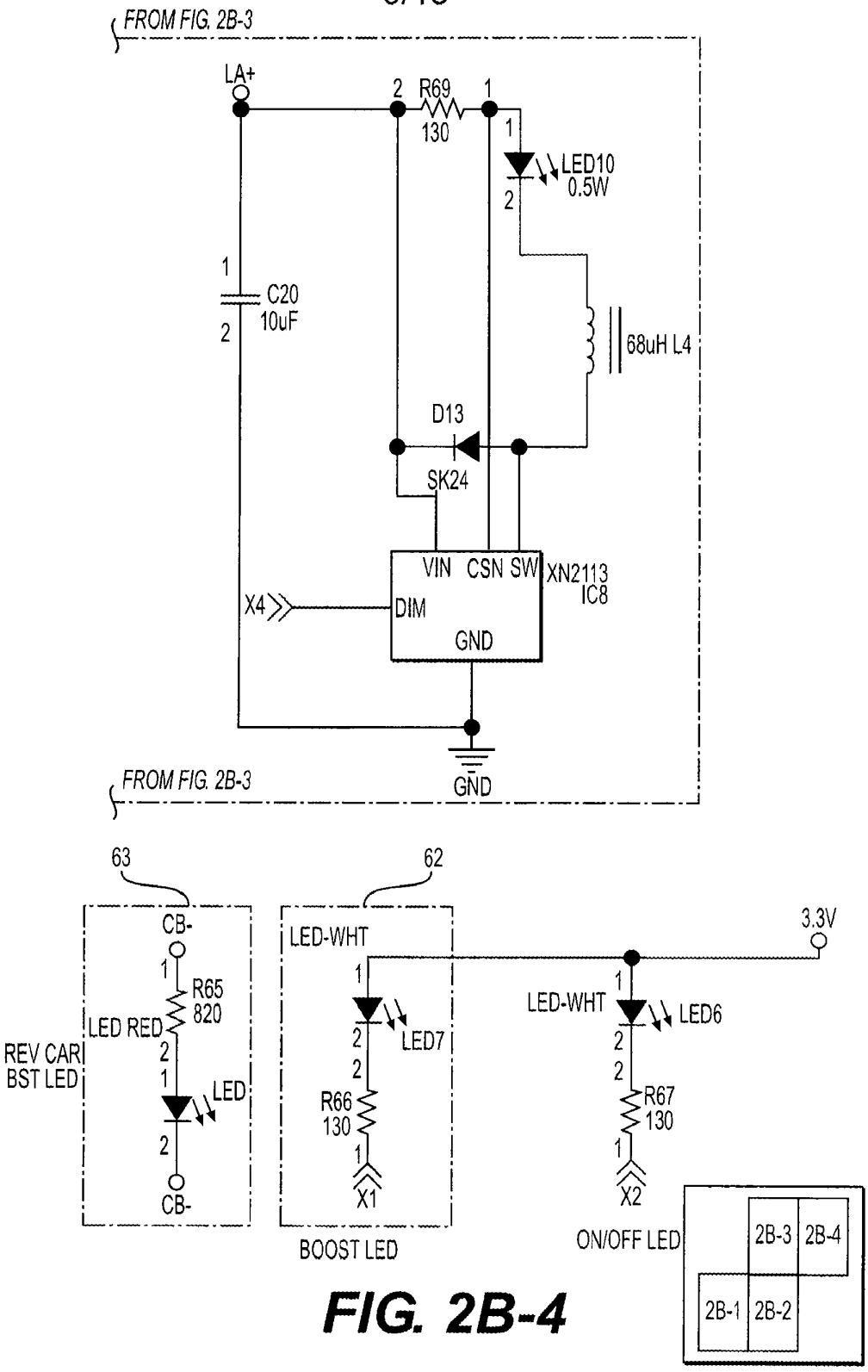


FIG. 2B-4

20202012223 20 Feb 2020

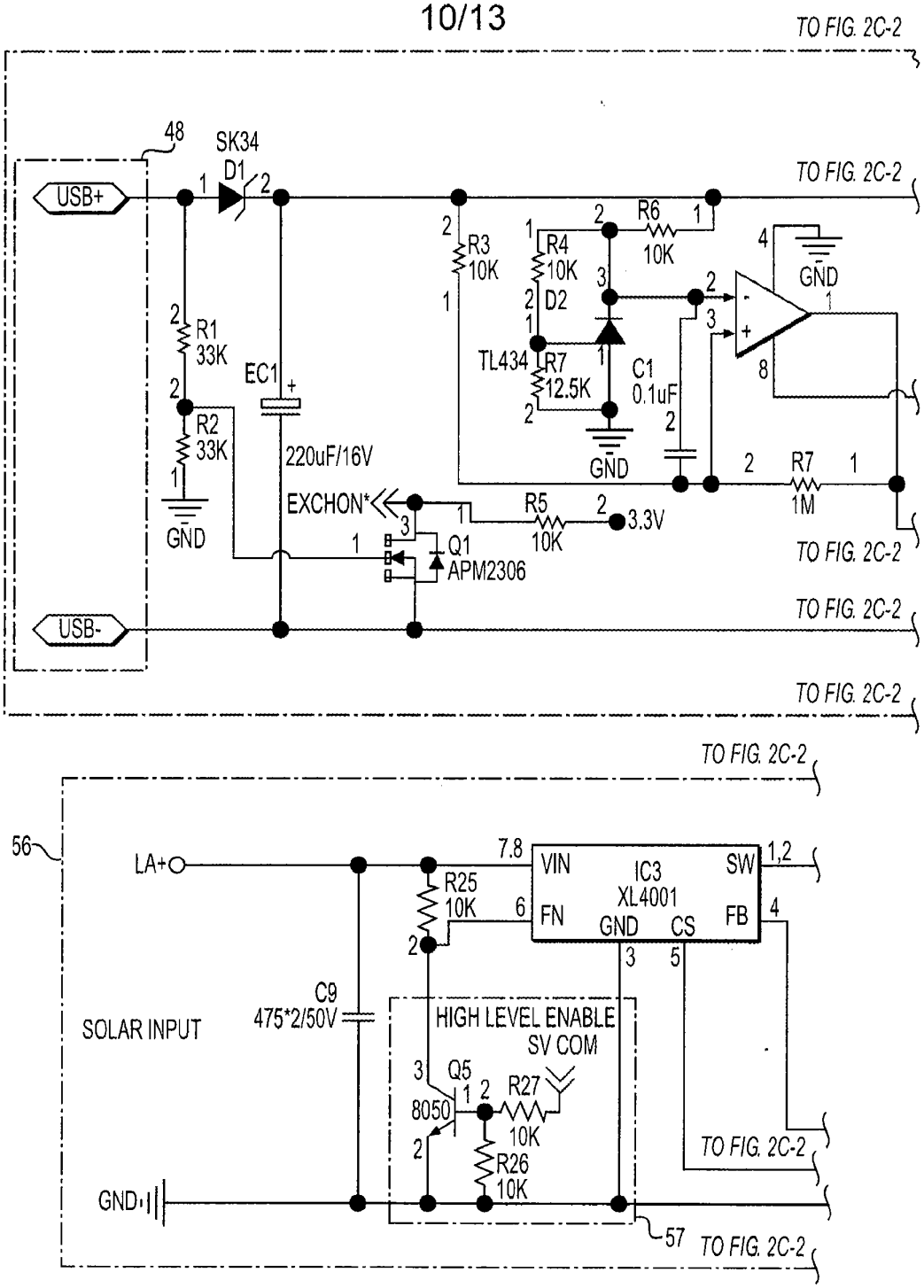
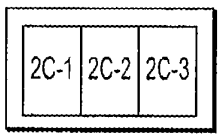


FIG. 2C-1



20202012223 20 Feb 2020

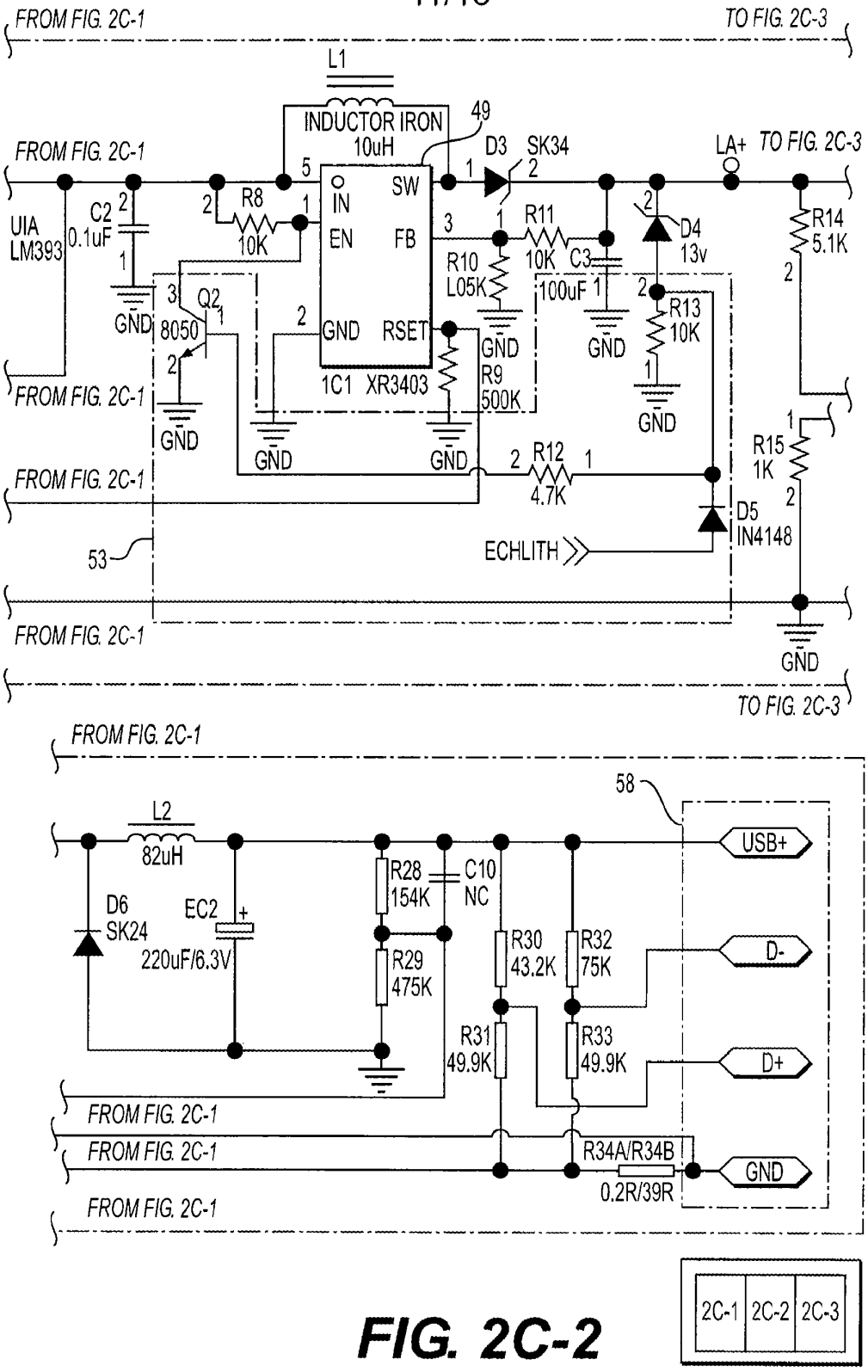
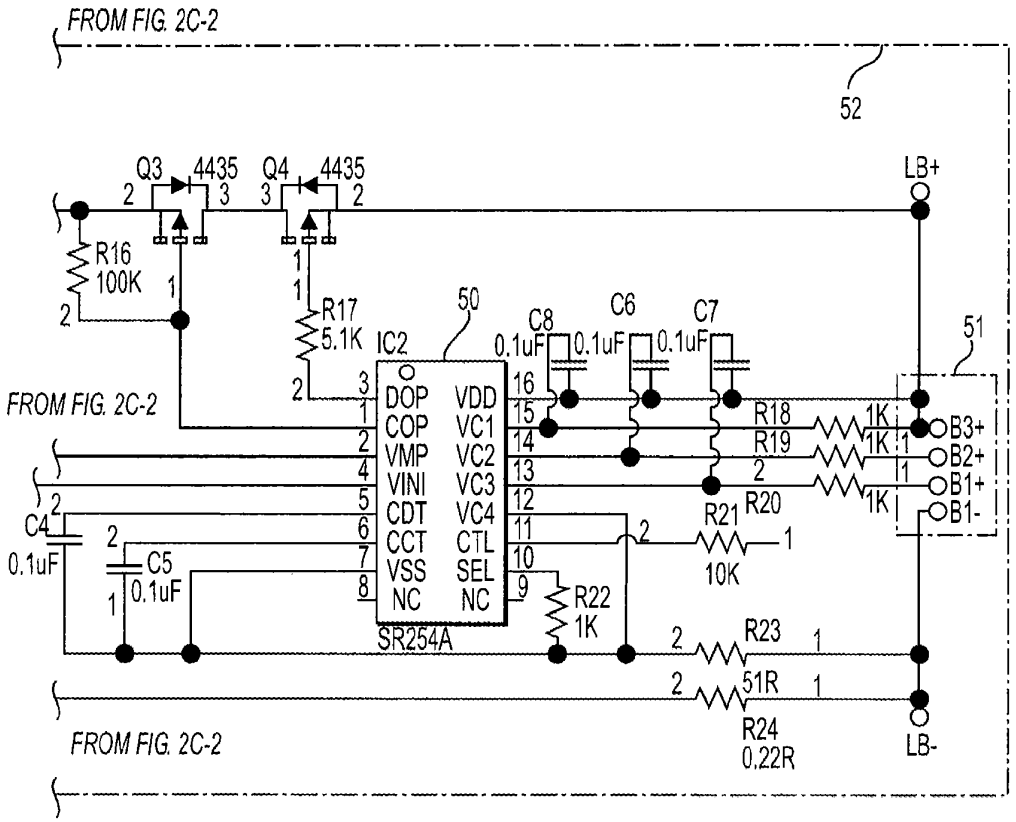


FIG. 2C-2

20202012223 20 Feb 2020

12/13



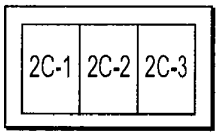


FIG. 2C-3

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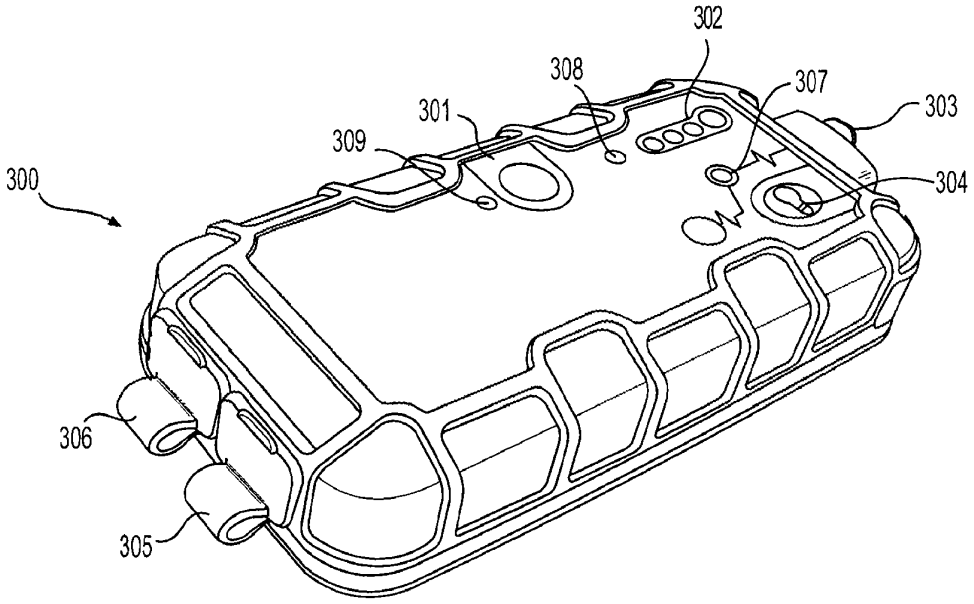


FIG. 3

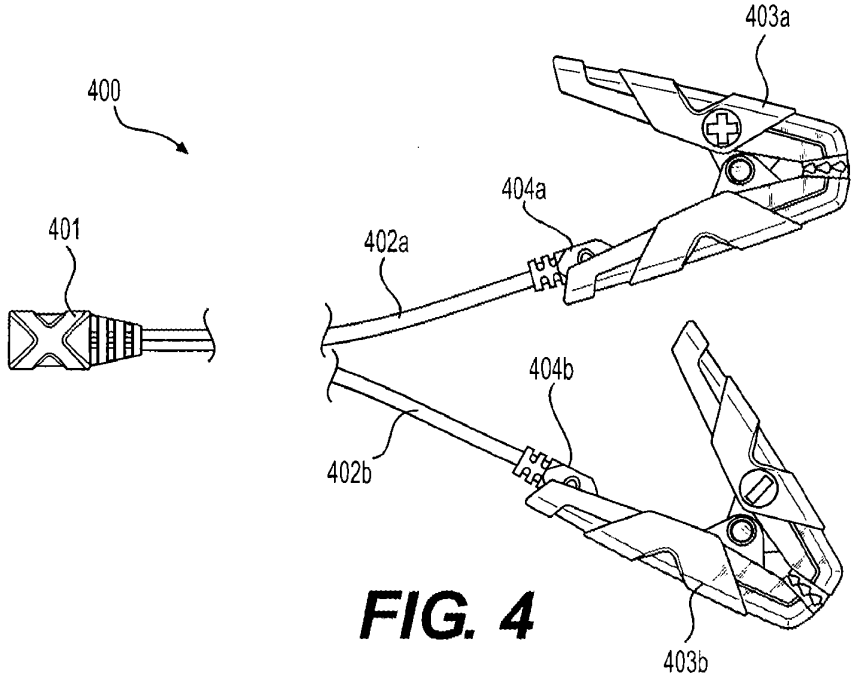


FIG. 4