

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DELTRAN USA LLC
Petitioner

v.

THE NOCO COMPANY
Patent Owner

Patent No. 11,667,203
Issue Date: June 6, 2023

Title: PORTABLE VEHICLE BATTERY JUMP START APPARATUS WITH
SAFETY PROTECTION

Inter Partes Review No. IPR2024-01219

PETITION FOR *INTER PARTES* REVIEW OF

U.S. PATENT NO. 11,667,203

UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42

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1032	Healey, James R., “Newest VW lacks USB, only iPhones welcome,” USA Today (July 8, 2014), accessed via https://www.usatoday.com/story/money/cars/2014/07/08/vw-gti-2015-usb-iphone/12378577/
1033	U.S. Patent No. 9,007,015 to Nook et al. (“the ’015 Patent”)
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1041	U.S. Patent No. 2007/0108940 to Sainomoto et al. (“Sainomoto”)
1042	Frontier Economics, The Development of the USB Standard, An Interoperability Case Study (available at https://www.frontier-economics.com/media/uful43pg/case-study-the-development-of-the-usb-standard-final.pdf), last visited July 11, 2024.
1043	Wikipedia.co, USB, (available at https://en.wikipedia.org/wiki/USB), last visited on July 11, 2024.
1044	www.diskmfr.com , USB versions differences and development history (available at https://www.diskmfr.com/usb-versions-differences-and-development-history/), last visited July 11, 2024.
1045	Wikipedia.com, Boost Converter (available at https://en.wikipedia.org/wiki/Boost_converter), last accessed July 11, 2024.
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1050	Len Sherman, “The Basics of USB Battery Charging: A Survival Guide,” Maxim Integrated (December 9, 2010)
1051	Comparison of invalidated '015 patent claims to '203 patent claims
1052	Wayback Machine Capture of www.bestbuy.com from June 3, 2012
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1056	Def. Deltona Transformer Corp.’s Stipulation Regarding Invalidity Contentions

LISTING OF CHALLENGED CLAIMS

U.S. Patent No. 11,667,203 (Claims 1-11)

Claim	Claim Language
1[PRE]	A jump starter apparatus for jump starting a vehicle battery, comprising:
1[A]	a power supply that includes one or more rechargeable batteries;
1[B]	a USB port configured to receive power from an external power source for charging the one or more batteries;
1[C]	a DC-DC converter coupled between the USB port and the one or more rechargeable batteries and configured to increase a voltage received from the external power source for charging the one or more rechargeable batteries;
1[D]	a vehicle battery isolation sensor configured to detect presence of the vehicle battery connected to the jump starter apparatus;
1[E]	a reverse polarity sensor, separate from the vehicle battery isolation sensor, configured to detect a proper polarity connection between the jump starter apparatus and the vehicle battery; and
1[F]	a power switch configured to electrically connect the power supply to the vehicle battery,
1[G]	wherein the power switch is controlled based on signals from the vehicle battery isolation sensor and the reverse polarity sensor such that the power supply is connected to the vehicle battery when both (i) the vehicle battery isolation sensor currently indicates that the vehicle battery is connected to the jump starter apparatus, and (ii) the reverse polarity sensor currently indicates that the jump starter and the vehicle battery are connected with the proper polarity connection.
2	The jump starter apparatus of claim 1, wherein the jump starter apparatus is a hand-held device.

Claim	Claim Language
3[A]	The jump starter apparatus of claim 1, further comprising: a positive battery terminal connector for electrically connecting the jump starter apparatus to a positive terminal of the vehicle battery; and
3[B]	a negative battery terminal connector for electrically connecting the jump starter apparatus to a negative terminal of the vehicle battery.
4	The jump starter apparatus of claim 1, further comprising: a controller that receives the signals from the vehicle battery isolation sensor and the reverse polarity sensor and controls the power switch.
5	The jump starter apparatus of claim 4, wherein the controller is configured to automatically cause the vehicle battery isolation sensor to detect presence of the vehicle battery and the reverse polarity sensor to detect polarity of the vehicle battery when the vehicle battery is electrically connected to the jump starter apparatus and the jump starter apparatus becomes operational.
6	The jump starter apparatus of claim 1, wherein the power switch is a FET switch.
7	The jump starter apparatus of claim 1, wherein the reverse polarity sensor comprises an optically coupled isolator phototransistor coupled to a vehicle battery terminal connector via a diode.
8	The jump starter apparatus of claim 1, wherein the vehicle battery isolation sensor comprises an optically coupled isolator phototransistor coupled to a vehicle battery terminal connector via a diode.
9	The jump starter apparatus of claim 1, further comprising: a battery charge controller configure [sic] to control charging of the one or more rechargeable batteries from the USB port.

Claim	Claim Language
10	The jump starter apparatus of claim 9, wherein the jump starter apparatus is further configured to provide power for charging an external device.
11	The jump starter apparatus of claim 10, further comprising: a USB output port for providing power from the rechargeable power supply for charging the external device.

I. INTRODUCTION

Deltran USA LLC (“Deltran” or “Petitioner”) respectfully requests the Board institute *inter partes* review of U.S. Patent No. 11,667,203 (“the ’203 patent”), which is assigned to The NOCO Company (“Patent Owner”).

The Board has already found that nearly all of the features of the challenged claims of the ’203 patent are disclosed in the prior art. The ’203 patent claims a battery powered vehicle jump starter including conventional safety features (ensuring proper connection), a USB input, and a DC-DC converter that increases the USB input voltage to charge the jump starter’s batteries. In an IPR challenge to the ’015 patent—parent to the ’203 patent—the Board invalidated these same safety features based on the prior art, including Richardson (cited herein). EX1034, 49-73. Indeed, the Federal Circuit affirmed the Board’s decision that Richardson *anticipated* the sole independent claim of the ’015 patent. *Id.*, 67; EX1035.

The only limitation in claim 1 of the ’203 patent not addressed by the Board is the DC-DC converter for increasing the USB input voltage to charge the jump starter’s batteries. During prosecution, the Examiner mistakenly believed that the claimed DC-DC converter was novel and allowed the claims after the limitation was added to the independent claims. However, this feature was known in the prior art.

Well before the ’203 patent, DC-DC converters were routinely used to boost 5V USB inputs to charge higher voltage devices. Moreover, using lower voltage

inputs to charge higher voltage batteries has been known for at least 40 years. EX1003, ¶¶36-42. Zhao and Paparrizos both teach battery charging systems utilizing DC-DC “step up” converter to increase a 5V USB input to charge a higher voltage battery. EX1006, 3:6-11; EX1009, 8:17-31.

Indeed, the Patent Owner has admitted that the inventors “did not invent the concept of boost converting [a USB] input voltage... nor were they the first ones to apply this concept to a USB input charger.” EX1047, 26. Patent Owner’s sole argument is that combining these known features would not have been obvious to a POSITA. *Id.* Beyond Patent Owner’s admissions, this petition independently demonstrates that the claimed features were known and obvious to combine. Indeed, the Board has already instituted review of U.S. Patent Nos. 11,584,243 and 11,447,023 which are related to the ’203 patent, share the same specification, and recite similar claims to the ’203 patent. *See* EX1054, EX1055.

As demonstrated herein, claim 1 is obvious in view of Richardson and Zhao and/or Yu and Paparrizos. The dependent claims only narrow claim 1 with conventional features known in the prior art. Institution of this petition is requested and a Final Written Decision invalidating the challenged claims is appropriate.

II. PETITION REQUIREMENTS

A. Grounds For Standing and Timeliness

Petitioner certifies that the '203 Patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR. 37 C.F.R. §42.104(a). The '203 Patent has an effective filing date of July 3, 2014, and issued on June 6, 2023. It is subject to the America Invents Act (“AIA”) and this Petition is filed more than 9 months from the issue date. §42.102(a)(1). This Petition is also filed within one year of Petitioner being served an allegation of infringement of the '203 Patent.

B. Payment of Fees

Pursuant to 37 C.F.R. §§42.103(a) and 42.15(a), the required fees are submitted herewith. If additional fees are required, the Office is authorized to charge Deposit Account 50-1943.

C. Identification of Challenge and Relief Requested

Pursuant to 37 C.F.R. §§42.22(a) and 42.104(b), Petitioner requests a final written decision that the Challenged Claims are unpatentable in view of the analysis below. §XI, *infra* (incorporated here)¹.

This Petition further relies upon the Declaration of Dr. Arthur MacCarley

¹ All further “*infra*” and “*supra*” citations also incorporate of the cross-cited sections.

(EX1003); and his curriculum vitae (EX1004), which is relevant to the skill, knowledge, and experience of a POSITA at the time of the alleged invention and how a POSITA would have understood and applied the prior art. EX1003, ¶¶1-17.

Petitioner requests cancellation of claims 1-11 on the following grounds:

Ground	Claims	Obviousness Combination under §103
G1	1, 3-5, 9	Richardson in view of Zhao
G2	2, 10, 11	G1 combination in further view of AAPA or Epower-20/Epower-21
G3	6-8	G1 combination in further view of Krieger
G4	1, 3-5, 9	Yu in view of Paparrizos
G5	2, 10, 11	G4 combination in further view of AAPA or Epower-20/Epower-21
G6	6-8	G4 combination in further view of Krieger

For each combination, Petitioner relies on the teachings, and not on a physical incorporation of elements. *See In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012); *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985). Richardson, Yu, Krieger, and Epower-20/Epower-21² are prior art under §102(a)(1) because each was published

² The Board previously found Epower-20 and Epower-21 to be prior art printed

prior to the Effective Filing Date. Zhao and Paparrizos are prior art under §102(a)(2) because each was filed prior to the effective filing date of the '203 patent and none of the exceptions of §102(b)(2) apply.

III. OVERVIEW OF THE '203 PATENT

A. Disclosure

The '203 patent is directed to a jump starter which can boost, charge, or “jump start” batteries such as the battery of a vehicle. *See* EX1001, Abstract, 1:7-9; EX1003, ¶¶45-54. The '203 patent is a continuation of U.S. Patent No. 9,007,015 (“the '015 patent”) which was filed on July 3, 2014, and shares a substantively identical specification. *Compare*, EX1001 *with* EX1033.

At the outset, the '203 patent admits that the following features of jump starters were known: a power supply (*e.g.*, a jump starter’s internal battery) (EX1001, 1:13-19); a circuit-controlled or microprocessor-controlled switch for connecting power from the jump starter’s battery to the vehicle battery (EX1001, 1:28-38, 2:37-41); performing safety checks via sensors or circuitry that determine whether a battery is present or absent and determine whether the cable clamps have been connected to the vehicle battery with proper polarity (EX1001, 1:28-38, 1:52-67, 1:28-3:14). EX1003, ¶47.

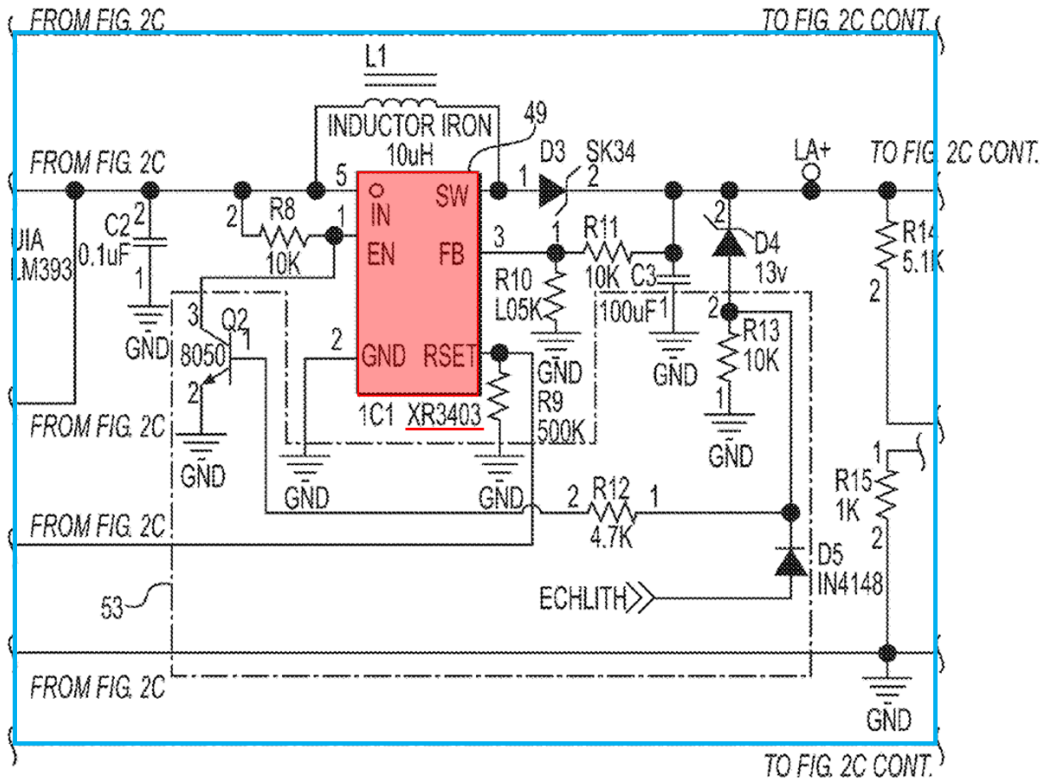
publications. EX1034, 97-99.

The specification focuses on safety features—a battery presence sensing circuit and a reverse polarity sensor—which allegedly improve on the “complexity, cost or potential for malfunction” in the prior art. EX1001, 15-20; EX1003, ¶48.

These safety features were recited in the sole independent claim of the ’015 patent and were invalidated by the Board (and affirmed by the Federal Circuit) in the ’015-IPR as being anticipated by Richardson. EX1033, 8:4-37 (claim 1); EX1034, 47-67. The Board also invalidated all the dependent claims of the ’015 patent, except claim 11 which required a USB charging port for charging the jump starter’s battery. As to claim 11, the Board only faulted the petition’s motivation “to incorporate a USB input charging port in[to] Richardson based on” secondary references as being merely “conclusory and not adequately supported by the evidence.” *Id.*, 92-93. The Board faulted the petitioner’s expert for failing to support the assertion that “a USB port is commonly used as a power input to devices.” *Id.*, 93. However, the Board ***did not*** conclude that claim 11 is patentable over all of the prior art or that a POSITA ***would not*** have been motivated to include a USB charging port based on other prior art references. EX1003, ¶49.

Claim 1 of the ’203 patent includes both a USB charging feature—a USB port and DC-DC converter to increase the USB voltage—and the same safety features invalidated by the Board with respect to the ’015 patent. EX1003, ¶50-51. Figure 2C shows a portion of **USB charge circuit 52** which includes a **DC-DC converter**

depicted in Figure 2C of the '203 patent. EX1001, FIG.2C; EX1003, ¶52.



“Xysemi XR3403”); EX1003, ¶52.

jump starter as a whole. This makes sense since the XR3403 data sheet explains

how to incorporate the DC-DC converter into another product and the inventors appeared to simply insert the XR3404 circuit into their alleged invention. EX1003, ¶53.

In sum, the '203 patent provides very little disclosure regarding the USB charging features. In total, there are only 6 sentences dedicated to the USB charging features. *See* EX1001, 5:32-34, 7:40-48. This makes sense since USB charging and DC-DC converters were well known in the art. EX1003, ¶54.

Indeed, in a Patent Owner Preliminary Response (“POPR”) for the related '023 patent, the Patent Owner has admitted that the '203 patent inventors “did not invent the concept of boost converting an input voltage being provided to an electronics device’s battery, nor were they the first ones to apply this concept to a USB input charger.” EX1047, 26.

B. Prosecution History

The '203 patent application was filed just two months prior to the filing of IPR2020-00944 (challenging the '015 patent). Patent Owner originally presented claims substantially similar to those of the '015 patent. *Compare* EX1002, 26-29 *with* EX1033, 8:4-10:22. Patent Owner submitted several unsuccessful amendments and arguments and filed multiple information disclosure statements with over 450 references, including *thousands* of pages of non-patent literature and foreign references. *See* EX1002, 88-96, 127-39, 2536-49, 4359-70, 5245-53, 6220-23,

6297-98. Indeed, although the entire prosecution history is over 6,000 pages long—at least 5,735 of those pages are references submitted by the patent owner, including at least 3,095 of litigation documents. EX1003, ¶¶55-57.

On January 18, 2023, the Patent Owner cancelled all claims and presented 13 new claims, also rejected by the Examiner. EX1002, 6135-43, 6152-64. Although the PO argued that the cited reference Butler (USP 10,087,904) was not prior art, the claims were only allowed after an Examiner's amendment to incorporate the DC-DC converter limitation into the independent claim. EX1002, 6208-14, 6229-49. The Examiner mistakenly believed that USB charging rechargeable batteries via a DC-DC boosting circuit was not known in the prior art. *See* EX1002, 6247 (emphasizing in the “Reasons for Allowance” that the rechargeable battery, USB port, and DC-DC converter as the allowable features of the claim.); EX1003, ¶¶58-60.

In the Notice of Allowance, the Examiner cited a reference which apparently taught the claimed USB port to charge the jump starter's battery. Yet, the Examiner did not perform any further searching related to the DC-DC converter which was ultimately added to the independent claim. Moreover, the Examiner did not find—nor did the Patent Owner submit for consideration—the Zhao and Paparrizos references relied upon in this Petition—both of which disclose the claimed DC-DC converter. *See generally* EX1002; *see also* §XI, *infra*.

IV. STATE OF THE ART

A. Battery Powered Jump Starters

As the '203 patent admits, jump starters with battery packs and safety features were known in the art. EX1001, 1:28-3:16. For example, the '203 patent admits the following devices, *inter alia*, were known: “a battery booster pack that is polarity sensitive and can detect proper and improper connections before providing a path for electric current flow” (EX1001, 1:28-32); “a polarity independent set of battery jumper cables for jumping a first battery to a second battery” (EX1001, 2:20-21); “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” (EX1001, 2:52-56); and “a hand-held jump starter having control components and circuits to prevent overcharging and incorrect connection to batteries.” (EX1001, 3:10-14). Further, Epower-20 and Epower-21 both teach battery powered jump starters. EX1003, ¶¶34-35

B. USB Charged Devices

Likewise, USB charged devices have been known in the art for decades. USB was first created in 1996 by a collaboration among major tech companies as a means for communication between computers and peripheral devices. EX1042, 1. In 2000, the introduction of USB 2.0 included the ability to support battery charging at 5V.

EX1044, 5. For example, Paparrizos teaches higher voltage batteries—like a car battery—using USB’s standard 5V input. EX1009, 8:22-28. This technology is unsurprisingly ubiquitous since a primary goal of USB technology is to standardize inputs for both data and power such that consumers could reduce the number of cables and power supplies needed to use or charge their devices. *See* EX1043, 1, 4. Indeed, USB technology was so widely adopted that by 2011—three-years prior to the ’203 patent’s earliest filing date— “over ***seven-billion*** USB-equipped devices were produced globally.” EX1042, 4; EX1003, ¶¶36-40.

C. DC-DC “Boost” Converters

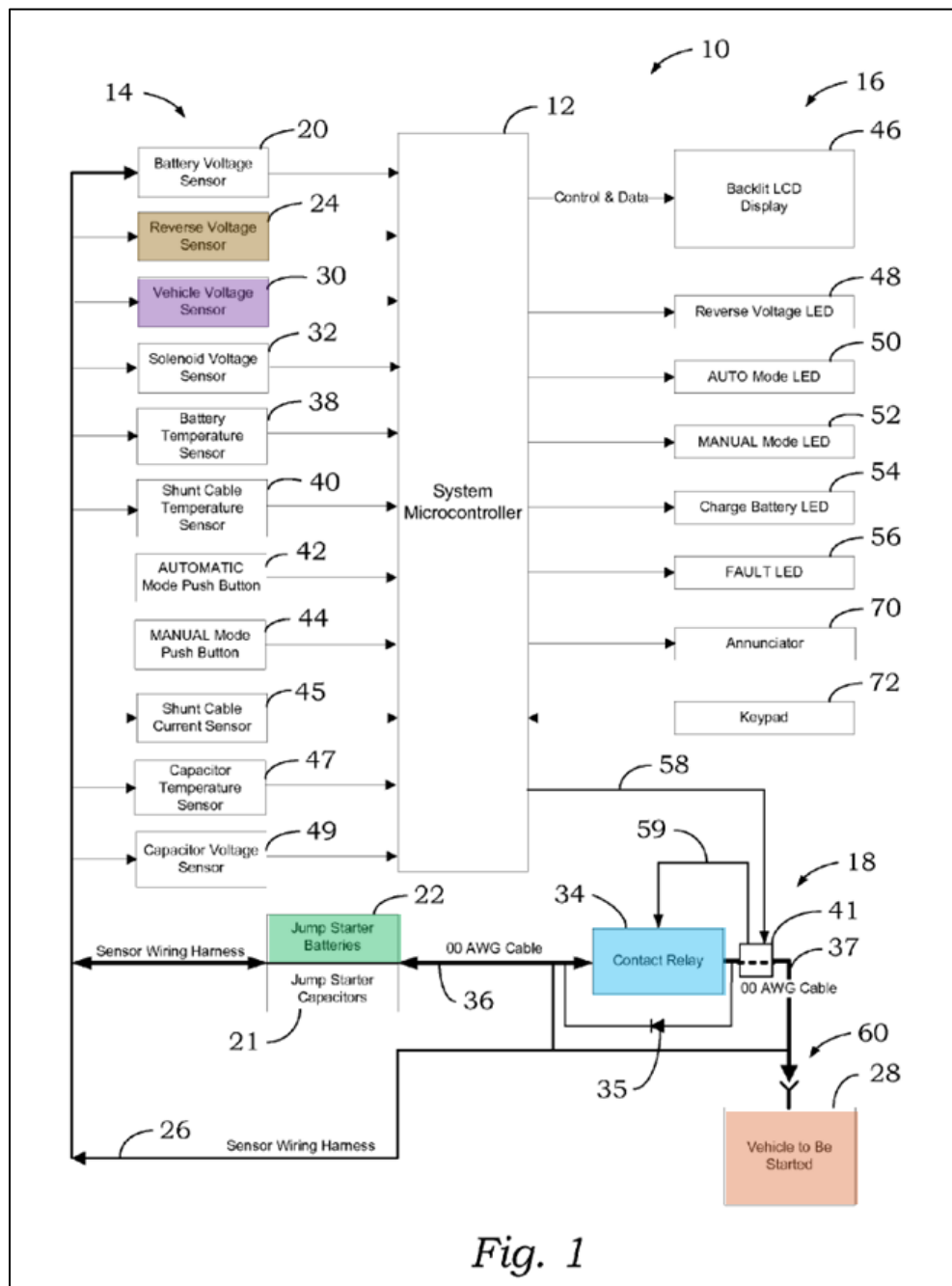
Even older than USB technology is the DC-DC “boost” converter (*i.e.*, a DC-DC converter circuit that “boosts” the input voltage to a higher level). As early as 1977, DC-DC boost converters have been known. EX1045, 2. As a further example, a 1981 patent by Citizen Watch Company teaches a “DC-to-DC voltage converter is disclosed for converting the voltage from a battery to provide a power supply voltage whose value can be equal to the battery voltage multiplied by or divided by a non-integral factor, e.g. 2/3.” EX1046, abstract. Further and as described below, using DC-DC converters to boost a standard 5V USB input to charge batteries with output voltages as high as 12V was taught prior to the ’203 patent by references such as Paparrizos and Zhao. §§IV.B, *infra*; XI, *supra*; EX1003, ¶41.

V. OVERVIEW OF THE PRIOR ART

A. Richardson

Richardson discloses a portable power source that can provide supplemental power to a vehicle's electrical system and jump start vehicle batteries. EX1005, ¶¶2, 6-7. Richardson's jump starter 10 also includes a programmable microprocessor 12 which controls the system. EX1005, ¶14; EX1003, ¶62.

Just like the '203 patent, Richardson acknowledges the potential problems that can occur when jump starting a vehicle battery, such as cross-connecting the jump starter's battery with the vehicle battery or inadvertently contacting live (*i.e.*, electrified) cable clamps causing sparking, fire, and/or injury. *See* EX1005, ¶5; EX1001, 1:20-27. To mitigate these problems, Richardson teaches "real-time monitoring of all system parameters to increase the safety and effectiveness of the unit's operation." EX1005, ¶6. More specifically, Richardson teaches automatically determining (1) whether a *proper polarity* connection exists between the **jump starter battery 22** and **the vehicle battery** via **reverse voltage sensor 24** and (2) the *presence* (*i.e.*, connection to) a vehicle battery via **vehicle voltage sensor 30**. *See, e.g.*, EX1005, ¶16; EX1003, ¶63. When both proper polarity and the presence of a battery detected, **the contact relay 34** of Richardson closes to distribute charge to **the vehicle battery**. *Id.*, Fig.1 (annotated); EX1003, ¶63.



Accordingly, Richardson is in the same field of endeavor as the '203 patent and addresses subject matter that was reasonably pertinent to problems facing the named inventors. *Compare* EX1001, Abstract, 1:17-24 with EX1005, Abstract; EX1003, ¶64.

Further, in its Final Written Decision, the Board has already confirmed the following teachings of Richardson as they relate to the invalidated claims of the '015 patent (and transversely to claim 1 of the '203 patent):

- Richardson discloses an apparatus for jump starting a vehicle engine. EX1034, 50.
- Richardson's disclosure relating to "jump starter batteries 22" constitutes an "internal power supply" as claimed in the '015 patent. *Id.*, 50-51.
- The parties agreed that Richardson's vehicle voltage sensor 30 is "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" as claimed in the '015 patent. *Id.*, 52-53.
- Richardson's "reverse voltage sensor 24" is a "reverse polarity sensor..." as claimed in the '015 patent. *Id.*, 53-54.
- The "contact relay 34" was shown to be a "power switch..." as claimed in the '015 patent. *Id.*, 54-55.
- Richardson's "system microcontroller 12" constitutes a "microcontroller..." as claimed in the '015 patent. *Id.*, 55-67.

B. Zhao

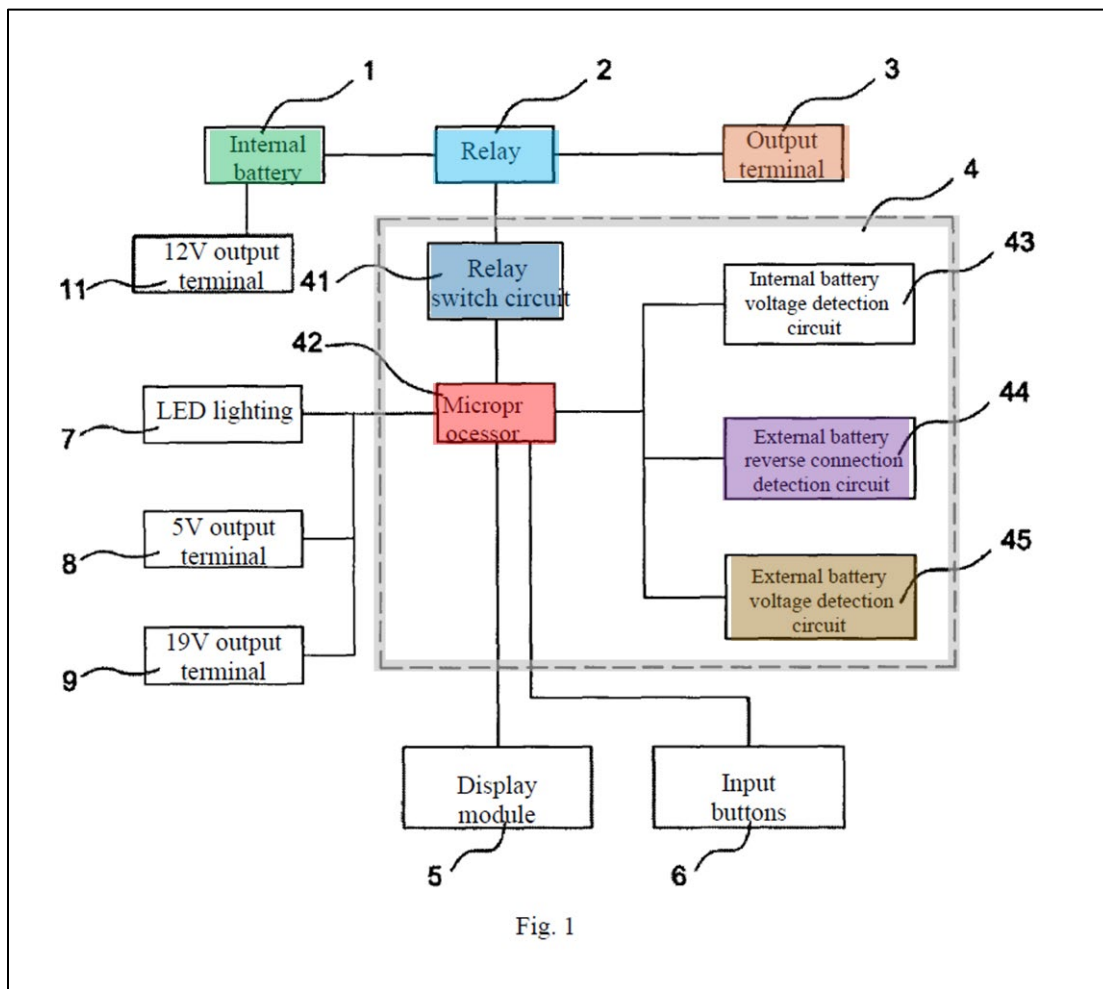
Zhao discloses a battery charging system that includes a step-up converter for boosting a DC input voltage. EX1006, Abstract. Specifically, Zhao's battery charging system uses a 5V USB input to charge high voltage battery packs, including multi-cell lithium batteries. *Id.*, 1:22-27, 2:63-3:11. Zhao's system also includes a "control circuit 102" which can control the ON/OFF state of the step-up converter. *Id.*, 4:59-64; EX1003, ¶65.

Zhao is in the same field of endeavor as the '203 patent. *Compare* EX1001, 1:42-44, 4:4-16 *with* EX1006, 1:19-30. Both Zhao and the '203 patent describe systems that include battery charging systems for high-voltage battery systems such as multi-cell lithium-ion battery packs. *Compare* EX1006, 1:22-27 *with* EX1001, 4:27-30 ("In one example embodiment, a high surge lithium polymer battery pack includes three 3.7, 2666 mAh lithium polymer batteries..."). As a POSITA would have understood, Zhao's battery charging system is analogous to the '203 patent's USB charging circuit, regardless of the intended discharge target of the '203 patent. In other words, a POSITA would have understood that the use of a battery is a different issue than how it was charged. Additionally, Zhao addresses subject matter that was reasonably pertinent to problems facing the named inventors. *Compare* EX1001, 4:4-16, 7:25-28 *with* EX1006, 1:25-27, 3:6-11; EX1003, ¶66.

C. Yu

Yu discloses an automotive starting device (*i.e.*, a jump starter). EX1007; EX1008³, Abstract. Yu's jump starter includes an internal battery pack 1, a control module 4 with a microprocessor 42, and an output terminal 3. EX1008, Abstract, ¶4. Through relay circuit 41 The microprocessor 42 controls a relay 2 which can connect power from the internal battery to a vehicle battery for a jump start. EX1008, ¶4. Before initiating a jump start, an external battery reverse connection detection circuit 44 detects whether the device is connected to the external battery with the correct polarity. EX1008, ¶9, Fig.1 (annotated); EX1003, ¶67. Yu's system also an external battery voltage detection circuit 45 which detects whether a battery is present (*i.e.* connected) or absent (*i.e.*, disconnected) by detecting the voltage of a vehicle battery when it is connected to the device. EX1008, claim 3, ¶¶6, 9, 23, 26-27, FIG.1 (annotated below), FIG.2; EX1003, ¶158.

³ Citations to Yu will be to the English translation, EX1008.



Yu is in the same field of endeavor as the '203 patent. *Compare* EX1001, Abstract *with* EX1008, Abstract. Additionally, Yu addresses subject matter that was reasonably pertinent to problems facing the named inventors. *Compare* EX1001, 1:17-24 *with* EX1008, Abstract; EX1003, ¶68.

D. Paparrizos

Paparrizos discloses a battery charging circuit with a “forward boost mode” or “forward mode” that can boost a lower input voltage (*i.e.*, 5V USB input) to a sufficient voltage using a DC-DC converter to charge higher voltage batteries,

including 12V multicell lithium-ion battery packs. EX1009, Abstract, 3:31-35, 2:30-40, 8:17-31. Paparrizos recognizes the convenience benefits of utilizing the “very popular [USB specification]” to allow consumers “to charge their USB devices from universal USB power sources.” EX1009, 1:18-26; EX1003, ¶69.

Paparrizos is in the same field of endeavor as the '203 patent. *Compare* EX1001, 1:42-44, 4:4-16 *with* EX1009, 1:18-26, 1:30-39, 2:30-40. Both Paparrizos and the '203 patent describe battery charging systems for high-voltage battery systems such as multicell lithium-ion battery packs and both describe charging 12V batteries. *Compare* EX1009, 2:30-40, 8:17-31 *with* EX1001, 4:27-30 (“In one example embodiment, a high surge lithium polymer battery pack includes three 3.7, 2666 mAh lithium polymer batteries...”). As a POSITA would have understood, Paparrizos battery charging system is analogous to the '203 patent's USB charging circuit, regardless of the intended discharge target of the '203 patent. Additionally, Paparrizos addresses subject matter that was reasonably pertinent to problems facing the named inventors. *Compare* EX1001, 4:4-16, 7:25-28 *with* EX1009, 1:23-26, 8:17-31; EX1003, ¶70; §IV.B, *supra*.

E. Epower-20 and Epower-21

The Epower-20 and Epower-21 disclose handheld car battery jump starters using lithium-ion battery packs and are thus in the same field of endeavor as Richardson, Zhao, and the '203 patent. EX1003, ¶71; EX1034, 85-91. The Board

has previously found that E-Power20 and E-Power21 are prior art and that EX1012 and EX1013 (describing the two devices) are printed publications. EX1034, 95-99. Patent Owner is precluded from challenging these determinations based on the principles of collateral estoppel. *See Nestle USA, Inc. v. Steuben Foods, Inc.*, 884 F.3d 1350, 1351 (Fed. Cir. 2018) (“Collateral estoppel protects a party from having to litigate issues that have been fully and fairly tried in a previous action and adversely resolved against a party-opponent.” (Citations Omitted)).

Regarding the teachings of Epower-20 and Epower-21, the Board found the following: “the combinations of Richardson and Epower-20 and Richardson and Epower-21 are proper and both combinations teach a USB output port configured to provide charging power from an internal battery to a USB-chargeable device.” *See* EX1034, 88. Epower-20 and Epower-21 are also both hand-held devices weighing 1 kg (2.2 lbs) and 1.5 kg (3.3 lbs) respectively. EX1012, 1 (“Whole set Weight: 1KG”), EX1013, 1 (“Whole set Weight: 1.5KG”); EX1003, ¶71.

F. Krieger

Krieger 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. EX1010, ¶16. Krieger further discloses “[power] switch 12 is [preferably] 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.” EX1010, ¶30. Krieger also teaches a vehicle isolation sensor and reverse polarity sensor (polarity sensing circuit) comprising “an optoisolator 16” which further comprises a phototransistor 22 and a light emitting diode (LED) 26.” EX1010, ¶32. As a POSITA would have understood, the “optoisolator 16” is “an optically coupled isolator phototransistor” as recited in claims 7-8 of the ’203 patent.

Krieger is in the same field of endeavor as the ’203 patent. *Compare* EX1001, 1:7-9 *with* EX1010, ¶2. Additionally, Krieger addresses subject matter that was reasonably pertinent to problems facing the named inventors. *Compare* EX1001, 1:20-27 *with* EX1010, ¶9; EX1003, ¶73.

Moreover, in its Final Written Decision, the Board has already confirmed the following teachings of Krieger as they relate to the invalidated claims of the ’015 patent (and transversely to claim 1 of the ’203 patent):

- Krieger’s “switch 12” was a solid-state device such as a number of FETs connected in parallel. EX1034, 77.
- The combination of Richardson and Krieger was proper and teaches the additional limitation of a solid-state power switch comprising a plurality of FETs in parallel. EX1034, 77-78.

- Krieger’s “opto-isolator 16” with “phototransistor 22” were shown to be inherently digital and perform the functions of both a vehicle isolation sensor and a reverse polarity sensor. EX1034, 78.
- Combining Richardson and Krieger is proper and teaches the additional limitation of a vehicle isolation sensor and a reverse polarity sensor comprising optically coupled isolator phototransistors as claimed by the ’015 patent. EX1034, 78-79.

G. AAPA

As discussed in §III.A above, the background section of the ’203 patent admits that several concepts related to portable jump starters and associated safety features were known in the art. EX1001, 1:20-3:14. These disclosures constitute Applicant Admitted Prior Art (“AAPA”). EX1003, ¶¶35, 47, 86, 121, 168.

VI. LEVEL OF ORDINARY SKILL

As of the claimed priority date of July 3, 2014, a POSITA would have been a person with a bachelor’s degree in electrical engineering or its equivalent and two years of experience in the field of electrical engineering including some experience in design of battery charging systems. EX1003, ¶19-30. This standard was adopted by the Board in the ’015-FWD. EX1034, 10-11.

VII. CLAIM CONSTRUCTION

Unless otherwise addressed herein, the terms of the '203 patent's claims are to be given their plain and ordinary meaning, as understood by one of ordinary skill in the art, in view of the '203 patent's specification. *See* 37 C.F.R. §42.100(b); 83 FR 51340; *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc); EX1003, ¶¶31-33.

At this time, Petitioner does not believe any construction would have an impact on the invalidity analyses set forth herein. *See HTC Corp. v. Cellular Communications Equip., LLC*, 877 F.3d 1361, 1367–68 (Fed. Cir. 2017) (affirming the Board absent an express construction of a term). Based on the evidence below and the similarities between the prior art and the specification and claims of the '203 patent, Petitioner submits there are no formal claim constructions necessary in this proceeding because “claim terms need only be construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (internal quotations omitted).

VIII. DISCRETION UNDER §325(d)

The Board should not exercise its discretion under §325(d) to deny institution. The Board uses a two-part framework to evaluate arguments under 35 U.S.C. §325(d): “(1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments

previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.” *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential). This framework is assessed under the *Becton* factors. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential).

A. Petitioner does not rely on the same or substantially the same prior art and arguments

Under part one of *Advanced Bionics*, the *Becton, Dickinson* factors (a), (b), and (d) each weigh against discretionary denial. The Grounds of this petition each rely on prior art references not previously before the office and not cumulative of references considered by the Examiner regarding the claims of the ’203 patent.

Ground 1 relies on a combination of Richardson and Zhao. Although Richardson was relied on by the Examiner, Zhao was not cited by either the Patent Owner or the Examiner. As explained in this petition, Zhao teaches USB charging via a DC-DC converter that increases the input voltage—the exact feature that the Examiner mistakenly believed was not taught by the prior art. EX1002, 6247 (Reasons for Allowance), 6250 (Interview Summary for Examiner’s amendment to incorporate claim 88 into the independent claim), 6210 (pending claim 88 reciting

the DC-DC Converter). In a related proceeding, Patent Owner has argued that Zhao is cumulative of references considered by the Examiner during prosecution of a related patent. EX1048, 31-39. Regardless of whether it is proper to extend the *Advanced Bionics* framework to *related* applications, Patent Owner's arguments are without merit.

Zhao is non-cumulative of references before the Examiner because Zhao teaches the USB charging limitations that the Examiner believed were missing from the prior art of record. Although the Examiner applied Tinaphong and Xinfang to aspects of the claimed USB charging features,⁴ Zhao is not cumulative of these references at least because Zhao teaches applying its USB charging circuit to **higher** voltage batteries suitable for use with a jump starter. EX1006, 1:22-27, 2:63-3:11; EX1003, ¶¶66, 75. Further, Patent Owner successfully removed Butler (which was cited by the Examiner as teaching the claimed USB features including the DC-DC converter). Therefore, the Examiner's consideration of Butler is irrelevant to the cumulativeness analysis. *See Best Buy Co., Inc. v. Driessen*, IPR2021-00198, Paper 23 at 13 (PTAB Apr. 27, 2021) (finding that a reference that was "removed ... as prior art ... is not a basis to exercise our discretion to deny institution"). Accordingly, the prior art and arguments raised in Ground 1 are "substantially different" than those

⁴ See EX1002, 1090 (citing Xinfang), 1093 (citing Tinaphong).

raised during prosecution. *See Peloton Interactive, Inc. v. NEC Corporation*, IPR2023-01241, Paper 17 at 14-15 (PTAB Feb. 7, 2024) (finding first part of *Advanced Bionics* not met where non-cumulative art not before the examiner taught a missing limitation for purposes of obviousness); *Samsung Electronics Co. Ltd. v. Headwater Research LLC*, IPR2023- 01157, Paper 9 at 6-7 (PTAB Jan. 22, 2024) (same).

Similarly, Ground 4 presents an obviousness challenge based on new art and arguments that were not previously considered by the Examiner—Yu in view of Paparrizos. Like Zhao, Paparrizos was not cited by the Examiner or the Patent Owner and teaches precisely the Examiner mistakenly believed was missing from the prior art of record— USB charging via a DC-DC converter that increases the USB input voltage to charge a higher voltage battery. EX1009, 3:2-6, 3:31-35; 8:10-31. Paparrizos, like Zhao, specifically teaches using a DC-DC converter with a **higher** voltage batter. EX1009, 8:10-31. Further, while Yu was cited in an IDS along with 118 other references, there is no evidence that Yu was substantively considered by the Examiner. EX1002 at 133, 2542, 3344-55. “The Board frequently holds that a reference that ‘was neither applied against the claims nor discussed by the Examiner’ does not weigh in favor of exercising the Board’s discretion under §325(d) to deny a petition.” *Amazon.com, Inc. v. M2M Sols. LLC*, IPR2019-01204, Paper 14 at 16 (PTAB. Jan. 23, 2020); *see also Apotex Inc. v. UCB Biopharma SPRL*,

IPR2019-00400, Paper 17 at 25 (PTAB July 15, 2019). Accordingly, the prior art and arguments raised in Ground 4 are “substantially different” than those raised during prosecution. *See Peloton*, IPR2023-01241, Paper 17 at 14-15; *Samsung*, IPR2023-01157, Paper 9 at 6-7.

Accordingly, Petitioner submits that this petition does not rely on the same or substantially the same prior art or arguments considered by the Examiner and the Board should not exercise its discretion under §325(d) to deny institution.

B. The Patent Office Materially Erred in Allowing the Claims of the '203 Patent

Petitioner submits that the Board need not reach part two of the *Advanced Bionics* framework. However, should the Board proceed to part two, Petitioner submits that the *Becton, Dickinson* factors (c), (e), and (f) each weigh against denial of institution. Specifically, the Examiner materially erred at least in (1) failing to sufficiently search for, evaluate, or appreciate prior art teachings of boosting a USB input voltage to charge a higher voltage battery via a DC-DC converter and/or (2) failing to recognize that combining known USB charging features (including DC-DC convertors) with known portable jump starter devices would have been obvious to a POSITA.

As discussed above, the Examiner failed to locate Zhao and Paparrizos which differ from the prior art of record by teaching up-converting (i.e., boosting or

increasing) the USB input voltage to charge higher voltage batteries that would be suitable for a jump starter. *See Samsung*, IPR2023-01157, slip op. at 6-7 (Paper 9) (granting institution where non-cumulative art, which was not before the examiner, taught a missing limitation).

Further, Patent Owner has argued in other proceedings that the Examiner's withdrawal of rejections based on Richardson meant that the Examiner agreed with arguments that USB charging circuits for low-voltage batteries (i.e., “step down” circuits) are non-analogous to jump starters like the Richardson and the '203 patent. EX1047, 16-19, 25-28, 34-35; EX1048, 15-16, 31-34. To the extent the Examiner accepted these arguments during prosecution, this is also material error. **First**, as discussed above, Zhao and Paparrizos teach using a 5V USB input to charge a high-voltage batteries via a DC-DC “step-*up*” converter. Therefore, arguments related to “step down” converters considered by the Examiner are irrelevant. **Second**, the evidence cited herein demonstrates that USB charging circuits for both higher and lower voltage batteries were well-known in the art and a POSITA would have been motivated to combine the USB charging circuits—including the DC-DC boost converter—into a battery powered jump starter like Richardson. This evidence—which includes Mr. MacCarley's declaration—was not before the Examiner. EX1001, Cover ([56] References Cited.) As this evidence shows, the Examiner's

withdrawal of rejections based on Richardson in view of various USB charging references was material error.

Accordingly, Petitioner respectfully submits that the Board should decline to exercise discretionary denial under §325(d).

IX. DISCRETION UNDER §314(A)

The Office’s June 21, 2022 Memorandum⁵ (“Guidance Memo”) states “the PTAB will not discretionarily deny institution of an IPR or PGR in view of parallel district court litigation where a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition.” Guidance Memo at 7. In accordance with this guidance, Petitioner has stipulated that, if this IPR is instituted, it will not pursue in the District Court Litigation any ground raised or that could have been reasonably raised in this Petition with respect to claims 1-11 of the ’203 patent. EX1030.

⁵ *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, available at www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621.pdf.

X. COLLATERAL ESTOPPEL

It is well established that collateral estoppel applies to IPR proceedings. *See Google LLC v. Hammond Dev. Int’l, Inc.*, 54 F.4th 1377, 1381 (Fed. Cir. 2022) (citing *Papst Licensing GMBH & Co. KG v. Samsung Elecs. Am., Inc.*, 924 F.3d 1243, 1251 (Fed. Cir. 2019)). In IPR proceedings estoppel “is not limited ‘to patent claims that are identical. Rather, it is the identity of the *issues* that were litigated that determines whether collateral estoppel should apply.’” *Nestle USA, Inc. v. Steuben Foods, Inc.*, 884 F.3d 1350, 1352 (Fed. Cir. 2018) (citations omitted). To invoke collateral estoppel a party must show: “(1) the issue is identical to one decided in the first action; (2) the issue was actually litigated in the first action; (3) resolution of the issue was essential to a final judgment in the first action; and (4) [the estopped party] had a full and fair opportunity to litigate the issue in the first action.” *Google*, 54 F.4th at 1381 (citations omitted). Collateral estoppel may also operate to bar re-litigation of common issues in actions involving different but related patents. *Mycogen Plant Science, Inc. v. Monsanto Co.*, 252 F.3d 1306, 1310 (Fed. Cir. 2001) (citing *Amgen, Inc. v. Genetics Inst., Inc.*, 98 F.3d 1328, 1329–32 (Fed. Cir. 1996); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1136 (Fed. Cir. 1985)).

Thus, the first collateral estoppel element is met. While the claims of the ’015 Patent and the ’203 Patent include minor differences, the overlapping features (i.e., the claimed safety features) have identical or nearly identical language. *See*

EX1051. Each of these elements were fully litigated by the Patent Owner and found to be invalid over Richardson. EX1034, 50-67, 92-94; §§V.A; V.E; V.F, *supra*. Additionally, the Board’s findings regarding the prior art and printed publication status of Epower-20 and Epower-21 are identical to the issues raised in this petition. EX1034, 85-91; §V.E, *supra*. To the extent any of the limitations include different or additional language, those differences are not substantial differences that would create a “new issue of validity” for the Board to resolve. *IronSource Ltd. v. Digital Turbine, Inc.*, PGR2022-00053, Paper 58, 15-16 (Mar. 12, 2024).

Regarding the elements (2)-(4) of the collateral estoppel analysis, there is no substantial dispute that the questions raised above were actually litigated, that the resolution of those issues were essential to the Board’s decision, and that Patent Owner had a full and fair opportunity to litigate these issues. Thus, the remainder of the elements for collateral estoppel are met. Specific issues for which Petitioner claims applicability of collateral estoppel are identified in the grounds below, as appropriate. §XI, *supra*.

XI. GROUND FOR UNPATENTABILITY

Petitioner requests cancellation of the challenged claims on the following Grounds.

A. Ground 1: Claims 1, 3-5, and 9 are unpatentable under §103(a) over Richardson in view of Zhao

1. Overview of the Combination and Motivation to Combine

A POSITA would have found it obvious to combine the teachings of Richardson and Zhao. Both references relate to systems that charge a multicell battery pack, and a POSITA would have been motivated to modify Richardson in view of Zhao to include a USB charging via a DC-DC boost converter to achieve the predictable result of effectively charging the batteries of Richardson's jump starter using the ubiquitous, widely available USB technology. EX1003, ¶¶74.

Specifically, Richardson teaches a battery-powered jump starter having an internal battery made up of a pack of series-connected batteries. *See* EX1005, FIG 2A (depicting "batteries 23"). For example, Richardson discloses each battery as a "12-volt batter[y]." EX1005, ¶34. Although Richardson is silent as to the specific chemistry of his series connected batteries, a POSITA would have understood that Richardson's description and figures are referring to multi-cell series connected lithium-ion batteries which are well-known for use as 12V rechargeable batteries. EX1003, ¶75.

Zhao discloses a system for charging battery-powered devices that have a multicell pack of series-connected battery cells. EX1006, 2:63-3:11. Zhao specifically teaches that its battery charging system can use low voltage inputs like

5V USB to charge batteries with a higher voltage rating. EX1006, 1:22-27; 2:51-54; 3:6-11. Zhao achieves charging using the 5V USB input by including a DC-DC converter that increases the voltage of the 5V USB input to the appropriate, higher voltage level required to fully charge the battery cells. EX1003, ¶76.

A POSITA therefore would have been motivated to combine the teachings of Richardson and Zhao because Zhao is directed to the known technique of charging (and recharging) a multicell battery pack of series-connected cells of a battery-powered device—which is the same battery architecture in Richardson’s jump starter—by using a DC-DC boost converter in accordance with its established function of converting a lower voltage input to a higher voltage output. EX1003, ¶77. Additionally, Zhao specifically teaches the desirable feature of charging a battery pack rated above 5V with a 5V USB input, which is a known technique that a POSITA would have been motivated to implement in a predictable manner to charge 12V batteries such as those disclosed by Richardson. *Id.* As a POSITA would have understood, the inclusion of a standardized power input port such as USB would provide a reliable and ubiquitous power input for users to easily charge the batteries. Although USB charging may be slower than charging via the vehicle’s battery taught by Richardson, the addition of a USB charging to Richardson’s system would allow the jump starter batteries to be charged in ways. For example, when a non-depleted vehicle battery is not available, a user could charge the jump starter

batteries using a USB input (e.g., leaving it charging overnight). To the extent that USB charging may be slower than the charging method already included in Richardson does not mean that a POSITA would not be motivated to combine the teachings of Richardson and Zhao. *See Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021). (“Our caselaw is clear. It's not necessary to show that a combination is ‘the *best* option, only that it be a *suitable* option.’”(citations omitted)). Using a USB power input and a DC-DC converter is a *suitable* way of charging the jump starter’s battery EX1003, ¶77.

Additionally, a POSITA would have been motivated to combine the particular teachings of Richardson and Zhao with a reasonable expectation of success for several reasons. EX1003, ¶78. **First**, A POSITA would have been familiar with the relevant USB standards and been motivated to implement USB technology when designing a portable battery-powered device. When modifying Richardson to implement a USB input circuit as taught by Zhao, a POSITA would have necessarily relied upon their knowledge regarding implementation of commercially available USB receptables (such as a micro-USB receptable) when designing a USB charging feature. §XI.A.2.d, *infra* .

Second, Zhao describes the details of the USB charging circuit in sufficient detail for a POSITA to implement the circuit in Richardson’s system. Zhao teaches the circuit topology including control circuits 102 which control the DC-Dc

conversion circuit to increase the input USB voltage to a desired output voltage. Indeed, Zhao describes its USB charging circuit in more detail than the 203 patent which only alludes to the off-the-shelf XR3403 chip. *See Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1569 (Fed. Cir. 1988) (recognizing that the prior art need only have the same “level of technical detail” as the asserted patent to be invalidating).

Third, the ’203 patent inventors believed that others in the industry would be readily able to produce a jump-starter that includes USB charging. In a January 17, 2014 email, the ’203 patent inventor, Jonathan Nook, requested that Carku produce a battery powered jump starter that included USB charging. EX1053, 159. Thus, even ’203 patent inventors agree that before the ’203 patent a POSITA (i.e., Carku company engineers) would have had a reasonable expectation of success in manufacturing a jump-starter with a USB input for charging. EX1003, ¶79.

Accordingly, a POSITA would have understood how to connect the boosted output voltage of Zhao’s step-up charging system to a battery pack for purposes of charging the battery and would, therefore, have a reasonable expectation of success in combining the teachings of Richardson and Zhao. EX1003, ¶79.

2. Claim 1

a. Preamble⁶

Richardson discloses a jump starter apparatus for jump starting a vehicle battery. EX1005, Abstract, claim 26. Specifically, Richardson describes “[j]ump starter 10” which includes “microprocessor 12” to control the system, thereby allowing the jump starter to boost or charge a vehicle battery by connecting the internal batteries of the jump starter to the positive and negative terminals of a vehicle battery. EX1005, ¶¶4, 7, 14, 16, 21, 35, FIG.1, FIG.2C, FIGS. 3-8; EX1003, ¶80-81.

The Board made similar factual findings regarding Richardson in the ’015-FWD, which was affirmed on appeal. EX1034, 50; EX1035, 2; EX1003, ¶82.

b. Limitation 1[A]

Richardson teaches this limitation. Richardson teaches its jump-starting apparatus has “one or more batteries.” EX1005, Abstract; ¶7, claim 1. As shown in figure 1 and 2A (annotated below), [jump starter batteries 22, 23](#) operate as a power

⁶ Because Petitioner includes the full claim language of the ’203 patent in the Listing of Challenged Claims, Petitioner does not reproduce the claim language here. The Board is encouraged to reference the Listing of Challenged Claims at p. viii-x.

supply for jump starting a vehicle's battery. EX1005, ¶¶16, 21, 35, Figs. 1, 2A; EX1003, ¶83.

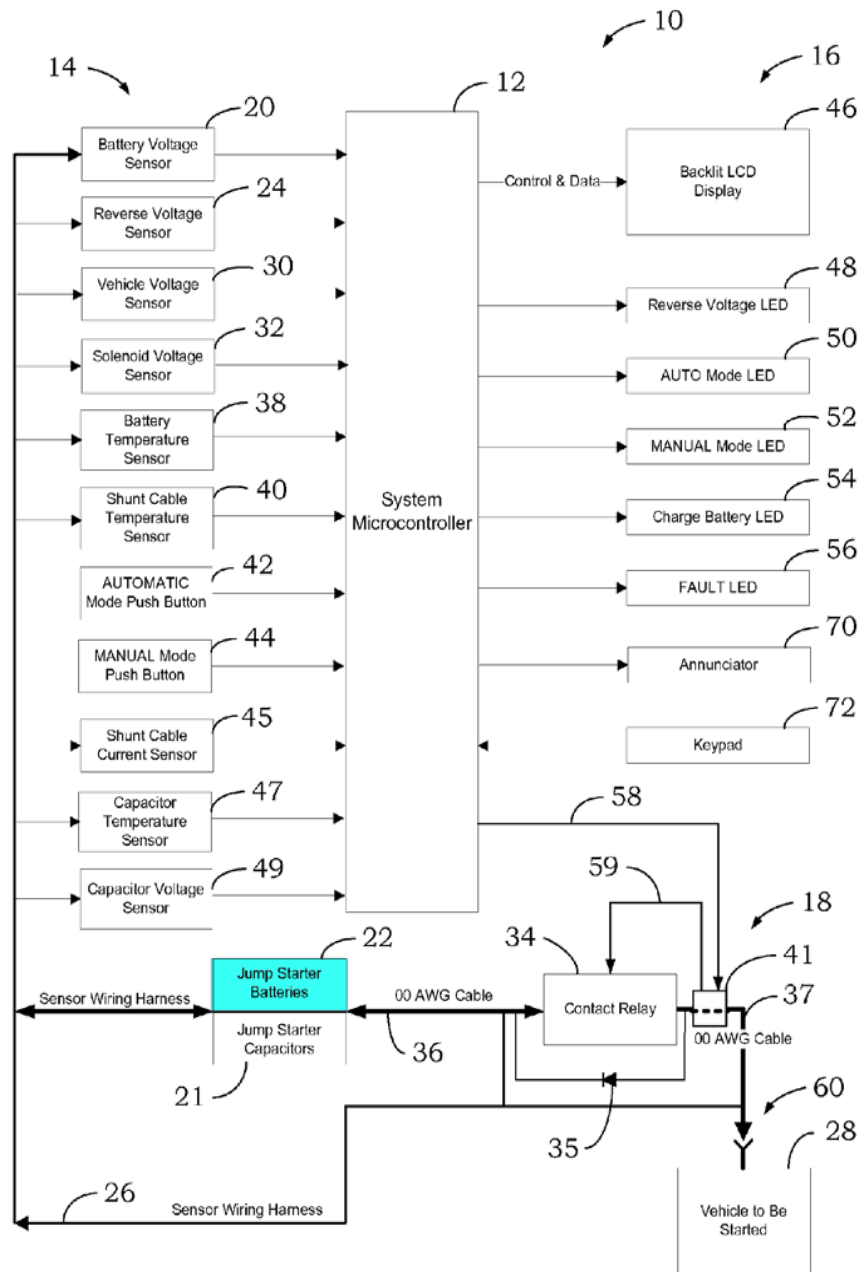
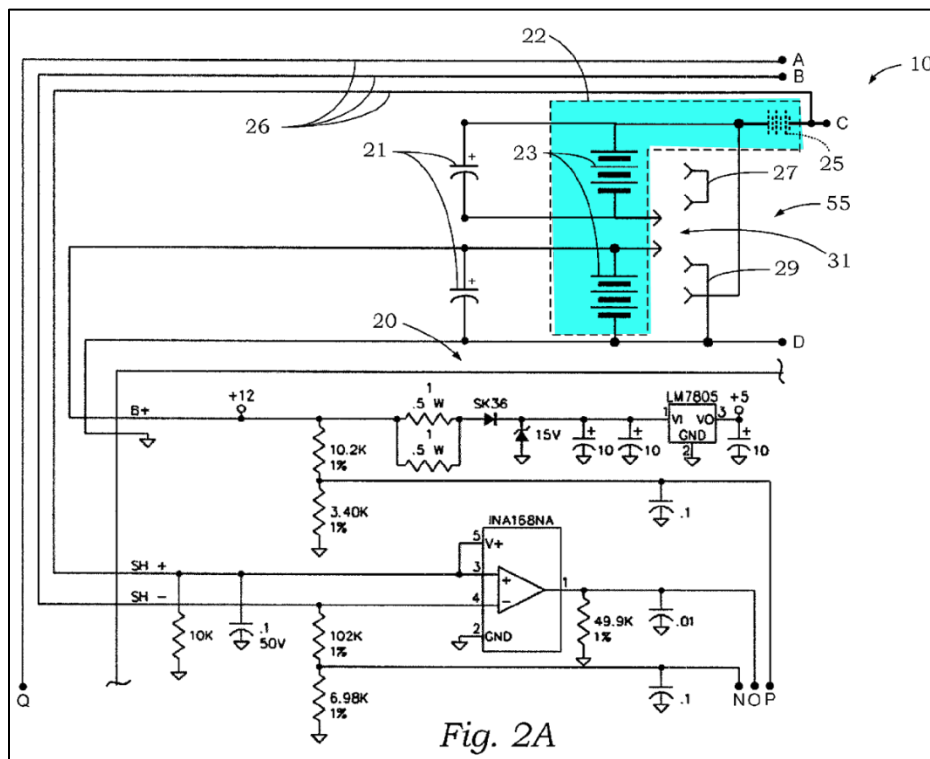


Fig. 1



The Board made similar factual findings regarding Richardson in the '015-FWD, which was affirmed on appeal. EX1034, 50-51. Richardson also expressly teaches that the jump starter batteries are rechargeable. EX1005, ¶¶7, 55 (“This allows the capacitors 21 and jump starter batteries 22 to be fully recharged...”), claim 25; EX1003, ¶¶84-85.

c. Limitation 1[B]

The Richardson-Zhao combination renders this limitation obvious. Richardson does not describe the type of input connector utilized for charging the jump starter batteries. However, as described above, Zhao teaches using a USB input to receive power from an external power source for charging one or more batteries. *See* §XI.A.2.b. As a POSITA would have understood, Zhao’s of a USB charging

circuit would necessarily include a USB port. Indeed, PO admits that USB input connectors are “standard.” EX1001, 7:23-25; §III.A, *supra*. For the reasons discussed above, a POSITA would have been motivated to combine Zhao and Richardson. §XI.A.1. In the combined Richardson-Zhao device which includes Zhao’s USB charging circuit, a USB port would be included. EX1003, ¶86.

d. Limitation 1[C]

The Richardson-Zhao combination renders this limitation obvious. Richardson’s jump starter includes circuitry for detecting a charger voltage and monitoring battery voltage to determine when the charging process is complete. Therefore, Richardson’s system includes components to detect an input charging voltage and to detect the charge level of the battery. EX1005, ¶29, ¶20, ¶28; §§V.A, XI.A.2.b-c, *supra*; EX1003, ¶87.

As discussed above, Zhao teaches a USB charging circuit that uses a DC-DC converter to increase a 5V USB input to a higher voltage in order to charge high voltage multi-cell batteries. *See* EX1006, 1:22-27, 1:34-45, 1:46-55, 2:51-3:11; *see also id.*, Abstract (“a battery charger can include: (i) a step-up converter configured to generate an output signal by boosting a DC input...”); EX1003, ¶¶87-88.

Specifically, Zhao’s system “include[s] a step-up converter and charging control circuit 201.” EX1006, 2:66-67. This step-up converter is a DC-DC converter which boosts (*i.e.*, increases) an input power signal to a higher-voltage output that

“can charge a plurality of series connected (e.g., lithium) batteries[.]” EX1006, 3:1-11. As a POSITA would have understood, Zhao’s step-up converter is a DC-DC converter recited in claim 1 of the ’203 patent. EX1003, ¶89. Further, a POSITA would have understood that Zhao’s system is suitable for use with a battery such as a 3S pack of lithium-ion cells rated at 11.1V or a 4S pack of lithium-ion cells rated at 14.8V (both of which would be well-suited for starting a traditional lead-acid vehicle starter battery rated at 12V). EX1003, ¶89; EX1006, 3:6-11. Indeed, Zhao acknowledges series connected lithium batteries and provides one example of an “8.4V [battery] if two lithium batteries are connected in series.” EX1006, 4:39-41; EX1003, 89.

A POSITA would have been motivated to combine Zhao’s charging system—which uses a DC-DC converter to boost a 5V USB input—with Richardson’s jump starter in order to provide multiple ways of charging Richardson’s battery, including through the use of a 5V USB input. EX1003, ¶90. A POSITA would have appreciated that such a combination would increase flexibility so that the jump starter batteries can be charged via a traditional high-voltage inputs, like an AC power brick and—when an AC power-outlet is unavailable—the user can rely on a USB power outlet to charge the jump starter’s battery. As discussed above, by 2011 USB technology had been widely adopted in over **7 billion** consumer devices. §II.B, *supra*. A POSITA would have understood that the inclusion of USB charging into

Richardson's jump starter would drastically increase the availability of power sources (i.e., USB outlets) that could be used to charge the jump starter's batteries. EX1003, ¶90.

The benefits of using USB as a charger has been well-known and utilized for years before the '203 patent. For example, in 2007 the Universal Serial Bus Implementers Forum ("USB-IF") issued its Battery Charging Specification, Revision 1.0 which noted the "convenience" of USB charging "has led to the creation of dedicated chargers that simply expose a downstream USB port." EX1025 at 6; EX1024, ¶¶1-4, 8. By the 2014 priority date of the '203 patent, a POSITA would have been well aware of the convenience benefits of including 5V USB charging. *See, e.g.*, EX1016 (US 2013/0285596 A1), ¶2 ("In order to achieve the greatest user convenience, modern mobile devices should support five volt and universal series bus (USB) charging."); EX1003, ¶91.

As it relates to automotives, USB charging ports had become standard equipment in many cars and trucks before the '203 patent. EX1049, 1 ("With USB ports now commonplace in new cars, trucks and SUVs, it didn't take long for engineers to realize more is better."); EX1031; EX1032. Paparrizos confirms that USB "has become very popular and consumers have become used to being able to charge their USB devices from universal USB power sources." EX1009, 1:18-23. Indeed, the '203 patent is explicit the USB connectors, chargers, and cables were

“standard.” See EX1001, 7:40-48. As yet another example, as early as **2001** component suppliers such as Linear Technologies had developed and marketed integrated circuits for the specific application of boosting a 5V USB input to charge higher voltage batteries. EX1027, 1-2. Lastly, Chinese patent CN203788026 to Wang—filed April 18, 2014—explicitly contemplates USB charging the batteries of a jump starter via a DC-DC boosting technique. EX1022; EX1023, Abstract, claim 1, ¶¶3-9, 13, 16-17, FIG.1. While the Chinese patent does not qualify as prior art (due to being a foreign patent publication), its filing predates the ’203 patent and is, therefore, evidence that a POSITA would have recognized the same problem to which the challenged claims are directed (i.e., charging jump starter batteries) and the same proposed solutions (i.e., USB charging and DC-DC conversion circuits). See *Cross Med. Prod., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1322-23 (Fed. Cir. 2005). EX1003, ¶92-98.

Accordingly, a POSITA would have been motivated to combine the teachings of Richardson and Zhao with a reasonable expectation of success and predictable results. EX1003, ¶99.

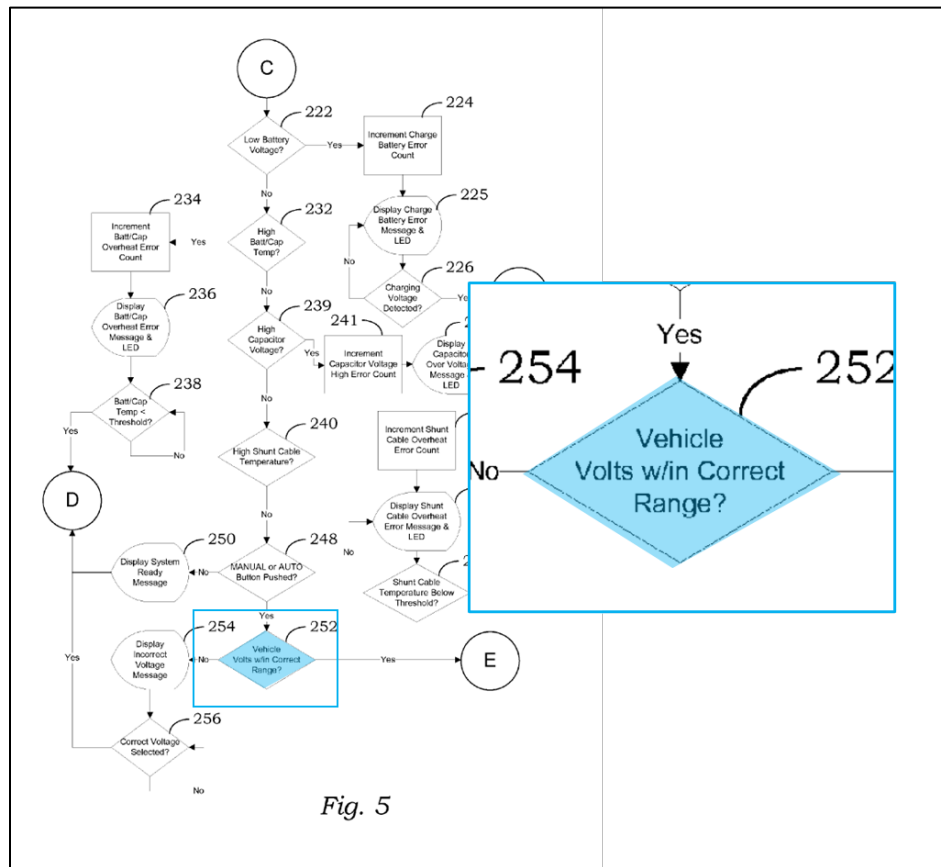
e. Limitation 1[D]

Richardson teaches this limitation. The Board previously found—and the Federal Circuit affirmed—that Richardson’s vehicle voltage sensor 30 is “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.” EX1034, 51-67; EX1035, 2; §V.A, *supra*; EX1003, ¶100. Patent Owner is precluded from arguing otherwise under principles of collateral estoppel. §X, *supra*.

To the extent collateral estoppel is found to not apply, Richardson discloses a vehicle battery isolation sensor as claimed. EX1005, ¶¶7, 27, 34, 41, Figs. 3-6. Richardson’s system uses vehicle voltage sensor 30 to monitor voltage received from the vehicle system on line 37 to determine the plugged or unplugged status of the jumper cables, indicating whether a vehicle battery is present (*i.e.*, connected to the jump starter) or absent (*i.e.*, disconnected). EX1005, ¶¶16,41. Richardson’s battery presence sensor is separate from its reverse polarity sensor or circuit. EX1005, Figs. 1, 3, ¶27; EX1003, ¶101.

Richardson’s Fig. 5 (annotated below) shows the various detections and logic decisions made in the jump starter system. EX1005, FIG.5A.



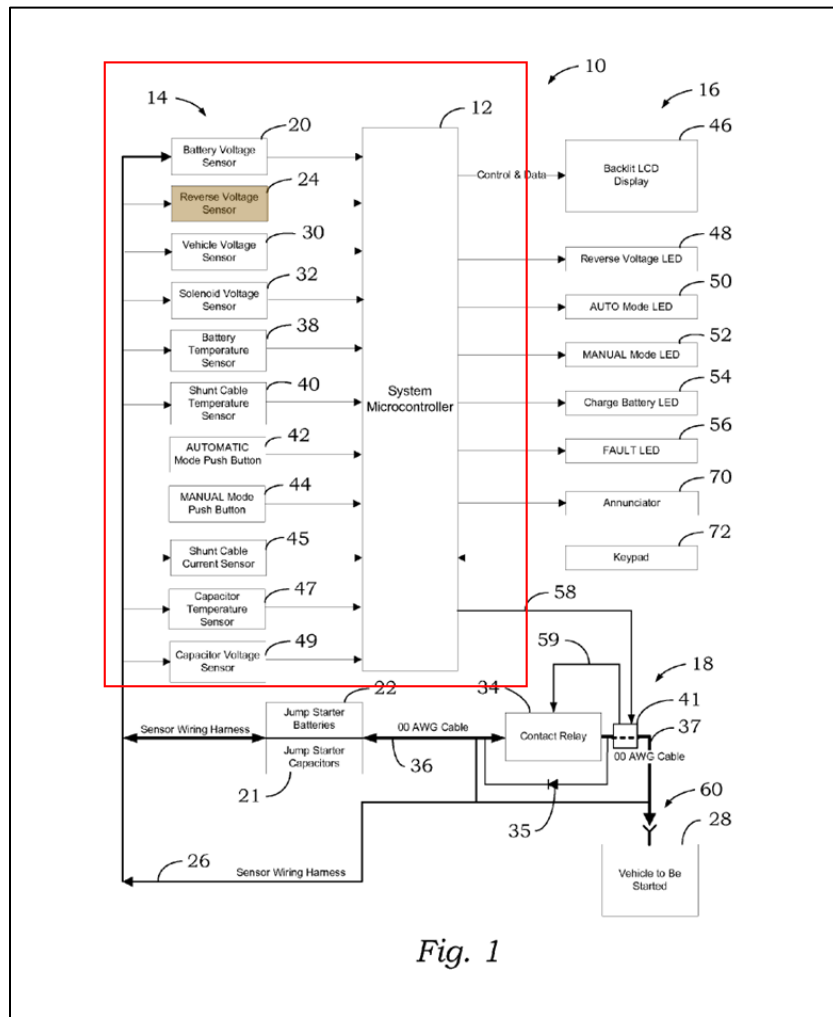
EX1003, §102. As a POSITA would have understood, Richardson’s device makes a determination of battery presence at [step 252](#) of the processing loop in connection with the operation of vehicle voltage sensor 30. EX1005, FIG.5.; EX1003, ¶103.

f. Limitation 1[E]

Richardson teaches this limitation. The Board previously found—and the Federal Circuit affirmed—that Richardson discloses a “reverse polarity sensor....” See EX1034, 51-67; EX1035, 2; EX1003, ¶104. Patent Owner is precluded from arguing otherwise under principles of collateral estoppel. See §X, *supra*.

To the extent collateral estoppel is not found to apply, Richardson teaches a reverse polarity sensor as claimed. For example, Richardson discloses a control system that includes microprocessor⁷ 12 and associated sensors including the reverse voltage sensor 24. EX1005, FIG.1 (annotated below). “[O]nce 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.” EX1005, ¶27; *see also, id.*, ¶¶16, 20, FIG.1; EX1003, ¶¶105, 116.

⁷ Also referred to as “microcontroller 12.” *See* EX1005, ¶18.



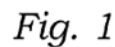
Specifically, “[i]f the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set....” *Id.* “[A]ny further jump starter action by the operator is ignored until the reverse polarity condition is corrected 220....” *Id.* Richardson teaches the “reverse polarity sensor” as claimed. Indeed, Patent Owner admitted that “**Richardson** discloses detecting

proper polarity” during prosecution of the related ’023 patent. EX1039, 20 (emphasis in original); EX1003, ¶106.

g. Limitation 1[F]

Richardson discloses this limitation. The Board previously found—and the Federal Circuit affirmed—that Richardson discloses a “power switch” as claimed. EX1034, 54-55; EX1035, 2; EX1003, ¶107. Patent Owner is precluded from arguing otherwise under principles of collateral estoppel. §X, *supra*.

To the extent collateral estoppel is not found to apply, Richardson teaches the claimed “power switch.” Richardson discloses “[contact relay 34](#)” which functions as a power switch to turn on power as claimed. For example, when a jump start is initiated, [contact relay 34](#) is closed to connect the jump starter’s batteries to the vehicle battery, thereby transferring power for a jump start. EX1005, ¶¶21, 35-36, 54, FIG.1 (annotated); EX1003, ¶108.



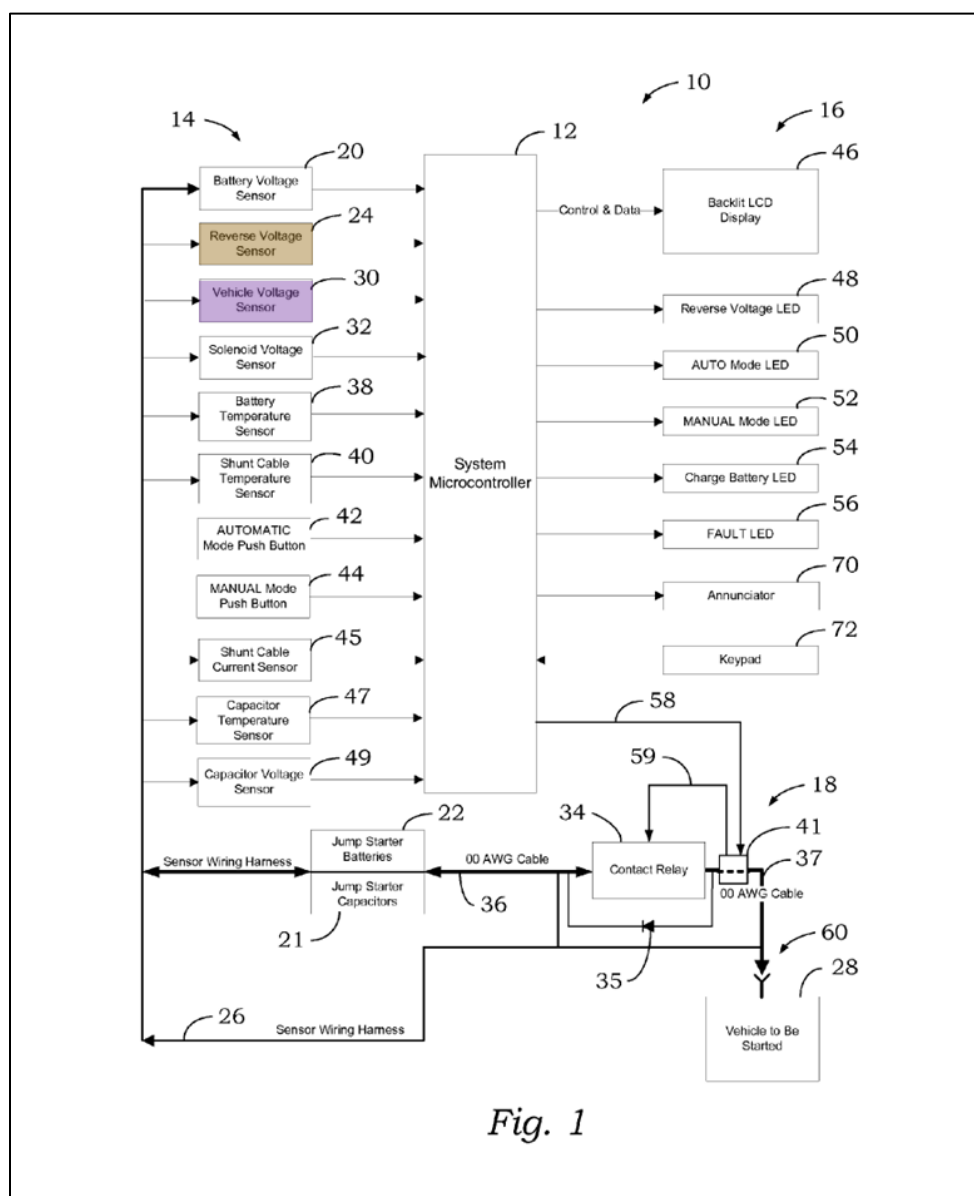
Richardson similarly discloses a jump starter with “a relay connected to said conductive leads” and “a processor for controlling said relay to selectively apply electrical power from said jump starter batteries and said jump starter capacitors to said electrical system of the engine.” EX1005, claim 26. Richardson’s Fig. 6 shows

the processing steps which control the operation of the contact relay 34. EX1005, FIG.6 (Step 268: “Close Starter Contact Relay”); EX1003, ¶109.

h. Limitation 1[G]

The Board previously found that Richardson discloses controlling the power switch based on signals from the vehicle battery isolation sensor and the reverse polarity sensor as claimed. EX1034, 51-67; EX1035, 2; EX1003, ¶110. Patent Owner is precluded from arguing otherwise under principles of collateral estoppel. §IX, *supra*.

To the extent collateral estoppel is not found to apply, Richardson discloses Limitation 1[G]. §§XI.A.2.e-f, *supra* ; EX1003, ¶¶110-111. Also, to the extent Patent Owner argues this limitation requires separate or distinct signals from a battery presence sensor and a reverse polarity sensor (or otherwise requires separate or distinct signals indicating battery presence and polarity), Richardson discloses separate signals and separate sensors for detecting battery presence and polarity. EX1005, FIG.1, FIG.3, ¶27; EX1003, ¶111. As shown in figure 1, Richardson’s **reverse voltage sensor 24** and **vehicle voltage sensor 30** are separate components. EX1005, FIG.1 (annotated)

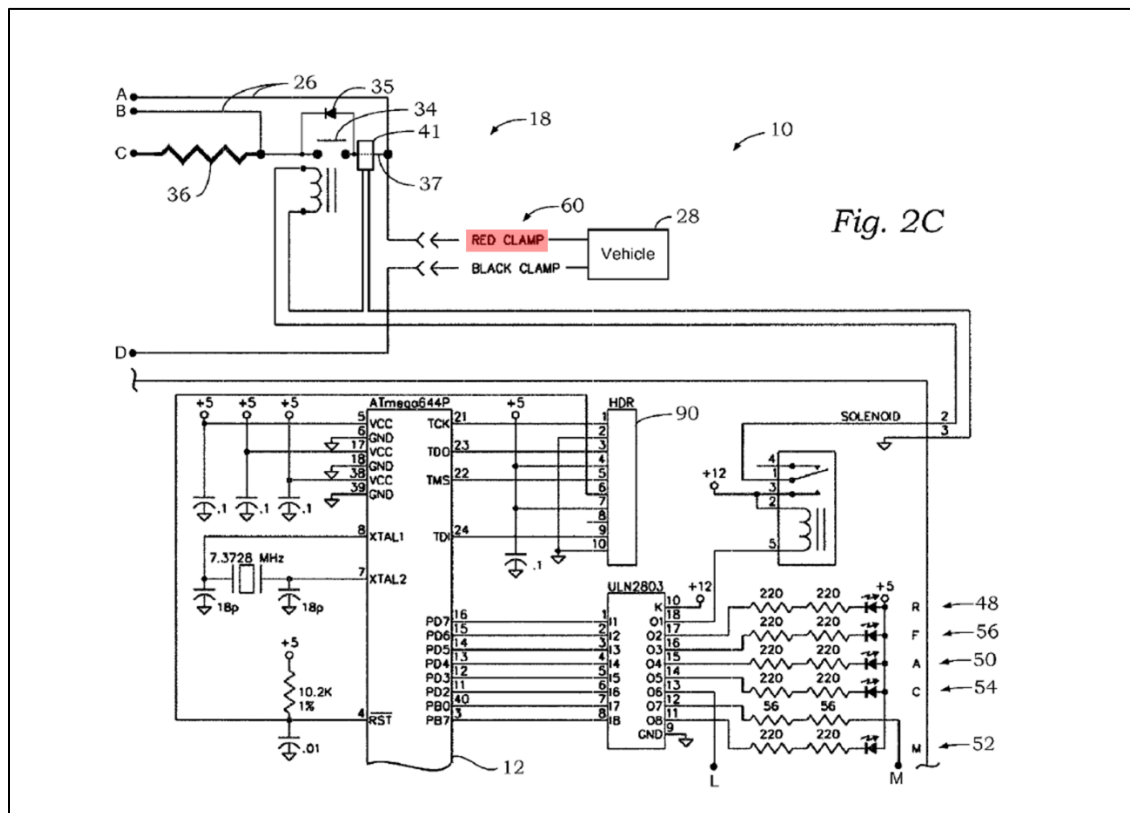


3. Claim 3

a. Limitations 3[A] and 3[B]

Richardson teaches this limitation. Richardson discloses a “pair of conductive leads” which include a positive polarity terminal connector as claimed. EX1005, Abstract; *see also* EX1005, claim 26. The conductive leads are depicted in FIG 2C

as jumper cables 60 as “**RED CLAMP**” and “**BLACK CLAMP**.” EX1005, ¶16, 27. As a POSITA would have understood, Richardson chooses conventional colors for his jumper cables: **red** for connecting to a positive battery terminal and **black** for connecting to a negative (or ground) terminal. See EX1005, ¶27; EX1003, ¶112; see also EX1005, FIG.2C (annotated).



Richardson teaches a positive battery terminal connector (“RED CLAMP”, shown in Fig. 2C) for electrically connecting the jump starter apparatus to a positive terminal of the vehicle battery and a negative battery terminal connector (“BLACK CLAMP” shown in Fig. 2C), for electrically connecting the jump starter apparatus to a negative terminal of the vehicle battery.” EX1003, ¶113.

4. **Claim 4**

Richardson teaches this limitation. Specifically, Richardson teaches a controller (**microcontroller 12**) that receives the signals from the vehicle battery isolation sensor (**vehicle voltage sensor 30**) and the reverse polarity sensor (**reverse voltage sensor 24**) and controls the power switch (**contact relay 34**). Figure 1 (annotated below) shows that “a contact relay control output 58 operates the contact relay 34 through temperature sensor 41” and that microcontroller 12 receives signals from various sensors including vehicle voltage sensor 30 and reverse voltage sensor 24. EX1005, Fig.1, ¶21; EX1003, ¶114.

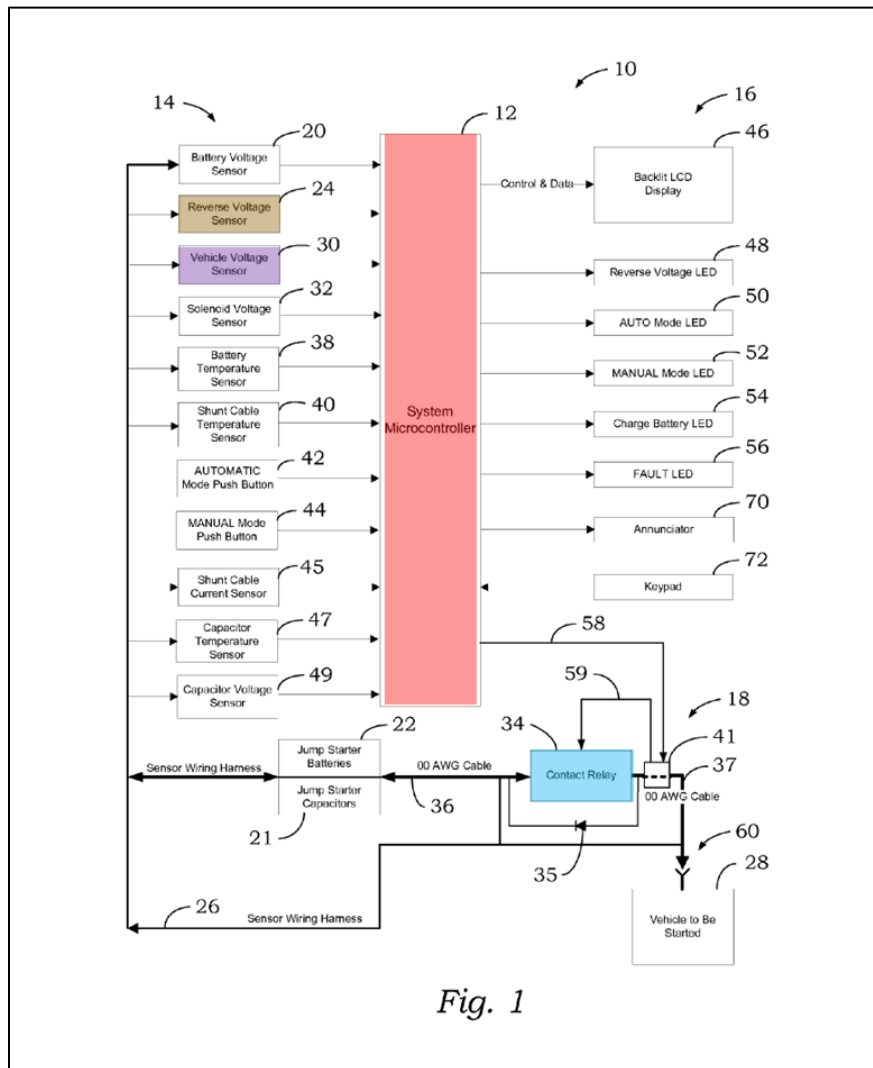


Fig. 1

5. Claim 5

Richardson teaches this limitation. Richardson discloses a controller (microcontroller 12) configured to automatically cause the vehicle battery isolation sensor (vehicle voltage sensor 30) to detect presence of the vehicle battery and the reverse polarity sensor (reverse voltage sensor 24) to detect polarity of the vehicle battery when the vehicle battery is electrically connected to the jump starter apparatus and the jump starter apparatus becomes operational. EX1005, Fig.1

(annotated above); §XI.A.2.e-f, *supra*. Richardson monitors (*i.e.*, “detects”) vehicle battery voltage and connection polarity automatically once the jump starter is connected to the vehicle battery—which establishes the electrical connection. EX1005, ¶¶16, 27, 35; EX1003, ¶116.

The Board made similar factual findings regarding Richardson in the ’015-FWD, which was affirmed on appeal. EX1034, 51-67; EX1035, 2; EX1003, ¶117.

6. Claim 9

The Richardson-Zhao combined device renders this limitation obvious. As discussed above, Richardson teaches one or more rechargeable batteries. §XI.A.2.b, *supra*. Further, Richardson that “[t]he voltage profile of the [jump starter] battery 22 is monitored to determine if the charge is complete 230.” EX1005, ¶29, ¶20 (discussing charging of the batteries), ¶28. Thus, Richardson teaches circuitry that detects the progress of charging the jump starter’s batteries. EX1003, ¶118.

Zhao discloses a charging control circuit 201 configured to control the charging of one or more rechargeable batteries from a USB port. *See* EX1006, 2:63-3:11 (“charging control circuit 201 can charge a plurality of series connected (e.g., lithium) batteries” using, for example “DC input voltage V_{in} ... provided to the step-up converter by a universal serial bus (USB) charger”); §§XI.A.2.c-d, *supra*. A POSITA would have found it obvious to combine the teachings of Richardson and Zhao. A POSITA would have further understood that when adding Zhao’s USB

charging circuitry, the charging control circuit would also be included to avoid damage to batteries. EX1006, 1:25-30; EX1003, ¶120; §XI.A.1, *supra*.

B. Ground 2: Claims 2, 10, and 11 are unpatentable under §103(a) over Richardson and Zhao in further view of AAPA or Epower-20/Epower-21

1. Claim 2

As discussed above, the Richardson-Zhao combination renders claim 1 obvious. *See* §XI.A.2, *supra*. The combination of Richardson–Zhao and AAPA renders obvious claim 2. Richardson repeatedly to its disclosed power source as “portable”. EX1005 at ¶¶2, 8-11, 14, claim 1. The ’203 Patent admits that hand-held jump starters were known in the prior art. *See* EX1001, 3:10-14 (“U.S. Pat. No. 5,793,185 issued Aug. 11, 1998, discloses a hand-held jump starter...”). To the extent that Richardson’s disclosure of “portable” does not constitute “hand-held” as claimed, a POSITA would have been motivated to make Richardson-Zhao combined device “hand-held” in order to improve the portability of the device. EX1003, ¶121.

Alternatively, claim 2 is also obvious in view of Richardson and Zhao in further view of EPower-20 and/or EPower-21. The Board previously found that the “combination of Richardson and Epower-20 and Richardson and EPower-21 are proper.” EX1034, 88. Epower-20 and Epower-21 are both hand-held devices. EX1012, 1 (“Whole set Weight: 1KG”); EX1013, 1 (“Whole set Weight: 1.5KG). A POSITA would have found it obvious to make the Richardson–Zhao combined

device into a hand-held device as taught by Epower-20 and Epower-21 to improve portability of the device. EX1003, ¶121; §§IV.E, XI.A.1, *supra*.

2. Claims 10 and 11

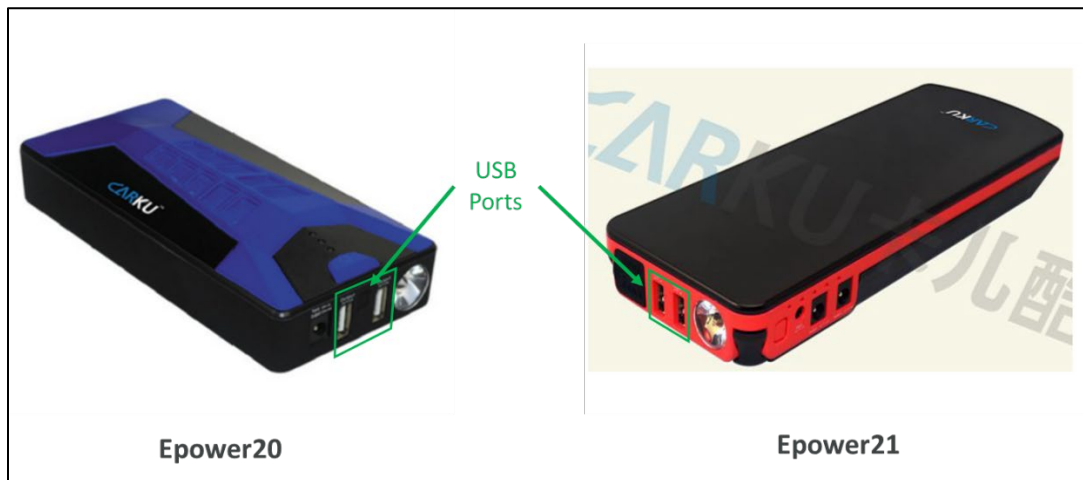
As discussed above, the Richardson–Zhao–AAPA/Epower-20/Epower-21 combined device renders claim 9 obvious and the same combination renders claims 10 and 11 obvious. EX1003, ¶123

Claim 10 requires the jump starter apparatus be “configured to provide power for charging an external device” and claim 11 further requires that “a USB output port for providing power from the rechargeable power supply” to provide the power to an external device. §§XI.A.2, XI.A.6, *supra*. EX1003, ¶124.

Epower-20 discloses an “Output” described as “5V/2A” and “5V/1A” for use with “mobile phone, tablet PC, other digital devices” and includes a “3-in-1 Mobile Phone Cable” having a USB connector as shown in the annotated figure below. EX1012. Epower-21 discloses similar outputs and includes an image of the same 3-in-1 USB cable. EX1013; EX1003, ¶125.

Accessories for Option		
3-in-1 Mobile Phone Cable	Micro USB, iPhone4, iPhone5	
		

As shown in the annotated images of the Epower-20 and Epower-21 both devices include USB.



A POSITA would have found it obvious to include the USB output ports taught by Epower-20/Epower-21 in the Richardson-Zhao-AAPA/Epower-20/Epower-21 device to power external devices, as taught by Epower-20/Epower-21. Indeed, the Board’s invalidation of a nearly identical claim of the ’015 Patent based on the combination of Richardson and Epower20 or Epower21 further confirms that claims 10 and 11 are obvious. *See* EX1034, 86-89 (finding unpatentable a claim reciting “a

USB output port configured to provide charging power from said internal power supply to a USB-chargeable device”); EX1003, ¶¶127-128.

C. Ground 3: Claims 6-8 are unpatentable under §103 by Richardson and Zhao in further view of Krieger

The Richardson-Zhao combined device renders claim 1 obvious. The same combination in further view of Krieger renders claims 6-8 obvious. Richardson and Krieger both teach jump starter devices. EX1003, ¶129. Krieger teaches a power switch 12 that is akin to Richardson’s contact relay 34, where Krieger’s power switch is a FET switch. Krieger also teaches vehicle battery isolation and reverse polarity sensors—akin to Richardson’s vehicle voltage sensor and reverse voltage sensor—that an optically coupled isolator phototransistor. *See* EX1010, ¶¶30, 32; §V.F, *supra*. A POSITA would have recognized that the improvements provided by these features in Krieger would improve the device of the Richardson-Zhao combination in the same way given the similarity of the devices. EX1003, ¶129. Indeed, the Board has already confirmed that the combination of Richardson and Krieger is proper and that substantially identical features to those recited in claims 6-8 are rendered obvious by the combination of Richardson and Krieger. EX1034, 77-81; §V.F, *supra*.

1. Claim 6

Claim 6 further limits the power switch to “a FET switch.” EX1001, 9:15-16.

Krieger discloses a power switch comprising a plurality of FETs. *See* EX1010, ¶30; IV.F, *supra*. A POSITA would have found it obvious to use a FET switch, taught by Krieger, as the contact relay 34 (i.e., the power switch) in the Richardson-Zhao combined device. EX1003, ¶131. The Board’s previous findings that Krieger and Richardson rendered obvious a substantively identical claim of the ’015 patent that recited that “said power switch comprises a plurality of FETs in parallel” further confirms that claim 6 is rendered obvious by the Richardson-Zhao-Krieger combination. EX1034, 77-78; §V.F, *supra*.

2. Claims 7-8

Claim 7 further limits the reverse polarity sensor to “an optically coupled isolator phototransistor coupled to a vehicle battery terminal connector via a diode.” EX1001, 17-20. Claim 8 limits the vehicle battery isolation sensor to “an optically coupled isolator phototransistor coupled to a vehicle battery terminal connector via a diode.” EX1001, 10:1-4. Krieger discloses a vehicle isolation sensor and reverse polarity sensor comprising of an optically coupled isolator phototransistor. EX1010, ¶32; §V.F, *supra*. As a POSITA would have understood, Krieger uses the opto-isolator 16 to perform both the vehicle isolation sensor and reverse polarity sensor. Accordingly, Krieger teaches that battery presence sensors and reverse polarity sensors may be made of “an optically coupled isolator phototransistor.” EX1003,

¶¶132-133.

A POSITA would have found it obvious to use opto-isolator sensors as the vehicle voltage sensor of Richardson and as the reverse voltage sensor of Richardson. A POSITA would have been particularly motivated to use optocouplers of the type disclosed by Krieger for sensing correct polarity connection because the opto-coupler used in Krieger is an inherently digital device that would be preferable to analog sensors. EX1003, ¶135. Both claims 7 and 8 are rendered obvious by the Richardson-Zhao combination in further view of Krieger. The Board’s previous findings that Krieger and Richardson rendered obvious a substantively identical claim further confirms that claims 7 and 8 are rendered obvious by the Richardson-Zhao-Krieger combination. EX1034, 77-79; §V.F, *supra*.

D. Ground 4: Claims 1, 3-5, and 9 are unpatentable under §103(a) over Yu in view of Paparrizos

1. Overview of the Combination

Yu teaches a battery-powered device for jump starting 12V vehicle batteries. EX1008, Abstract, ¶4. Yu discloses an embodiment with a “12V/1A” input for charging a 12V battery. EX1008, FIG.9; EX1003, ¶138.

Paparrizos teaches a circuit for charging electronic devices having a multicell pack of series-connected cells. EX1009, 2:32-40. Paparrizos discloses its circuit can use 5V USB to charge higher voltage batteries and specifically refers to “a high

surge lithium polymer battery pack includes three 3.7, 2666 mAh lithium polymer batteries...”. EX1009, 8:17-31; EX1003, ¶139.

A POSITA would have found it obvious to combine teachings of Yu and Paparrizos. Both references involve devices with higher voltage (>5V) battery packs and are, therefore, analogous to each other and the '203 patent. A POSITA would have been motivated to modify Yu in view of Paparrizos to include a USB charging input and associated circuit to achieve the predictable result of effectively charging the batteries of Yu's jump starter through a ubiquitous readily available power-source (*i.e.*, USB). EX1003, ¶¶140.

A POSITA therefore would have combined Yu and Paparrizos with are reasonable expectation of success and predictable results because Paparrizos employs well-known and widely utilized concepts of using 5V USB input and a DC-DC boost converter to charge higher voltage batteries. EX1003, ¶141. Additionally, implementing Paparrizos USB charging circuit—including the DC-DC conversion circuit—would have required nothing more than implementing a well-known circuit into the jump-starter-battery-charging portions of Richardson's jump-starter. EX1003, ¶141.

Further discussion of motivation to combine and expectation of success are detailed for each challenged claim. EX1003, ¶142.

2. Claim 1

a. Preamble

Yu teaches this limitation. Yu discloses a jump-starting apparatus for jump starting a vehicle battery. EX1008, Abstract; claim 1, ¶¶1, 3-4, 9, 21, 26. For example, Yu's device has an output terminal for conveying power to jump start a vehicle battery. *See* EX1008, ¶4, FIG.1 ("output terminal" identified as reference numeral 3). EX1003, ¶143.

b. Limitation 1[A]

Yu alone and/or in combination with Paparrizos teaches this limitation. Yu discloses a device with "an internal battery" constituting a power supply. EX1008, Abstract; FIG. 1, claim 1, ¶¶4, 9, 21. The internal battery "will output current to the vehicle to be started through the output terminal 3." As a POSITA would have understood, Yu's internal battery is a multicell battery pack of series-connected cells with an output voltage of approximately 12V such that a vehicle battery (which is typically 12V) can be jump started using Yu's device. EX1008, ¶26. Yu expressly discloses that the disclosed internal battery is rechargeable. *See* EX1008, ¶¶4 (disclosing "a charging input interface"), 19, 21 (same), 28 ("To allow the internal battery 1 to be charged, a charging input 10 interface is provided on the device."). EX1003, ¶144.

Further, Paparrizos discloses a battery charging unit with a battery pack comprised of rechargeable lithium cells. EX1009, 2:30-40. Paparrizos further teaches that the battery may further comprise “more than one battery cell connected in series” to predictably achieve any range of output voltages including those higher than 8.4V (i.e., including 12V). *Id.*, 2:30-40 (“The battery voltage of such batteries typically range from 6-8.4V but can provide lower or higher voltages.”). To the extent Yu does not specifically teach that an internal battery that is rechargeable, a POSITA would have been motivated to include the rechargeable battery pack as disclosed by Paparrizos as the power supply in Yu’s device to allow the battery to be recharged after use. A POSITA would have had a reasonable expectation of success using Paparrizos lithium-ion multi-cell battery because Paparrizos specifically teaches that such a battery is suitable for voltage ranges “higher” than 8.4V—the 12V battery output required for jump starting a vehicle battery is in the range of “higher than 8.4V.” The benefits of using rechargeable batteries in any device are very well known and a POSITA would have had a reasonable expectation of success in combining the teachings of Yu and Paparrizos and would have yielded predictable results. EX1003, ¶146.

c. Limitation 1[B]

The Yu-Paparrizos combination renders this limitation obvious. Yu discloses a charging input interface, which can be a 12V/1A barrel-style receptacle. EX1008, Abstract, FIG.9.

Paparrizos teaches charging high voltage batteries using a 5V USB input. EX1009, Abstract, 3:31-35, 2:30-40, 8:17-31. Paparrizos recognizes the convenience benefits of utilizing the “very popular [USB specification]” to allow consumers “to charge their USB devices from universal USB power sources.” EX1009, 1:18-26. Paparrizos also teaches including a USB port to allow for USB charging input. *Id.*, 7:66-67, 8:7-9. EX1003, ¶¶147-148.

A POSITA would have been motivated to combine the teachings of Yu and Paparrizos to include the USB charging feature of Paparrizos in the jump-starter of Yu so that the jump-starter’s internal battery can be charged using a 5V USB input. As taught by Paparrizos, the addition of a USB input for charging would allow consumers to utilize a very-popular (and widely adopted) means of charging Yu’s jump-starter. A POSITA would have been motivated to include the USB charging feature as an additional and alternative charging input so that Yu’s device could be charged with a 12V power input (if available) and the 5V USB input when an outlet providing 12V is not available. §XI.A.2.c, *supra*. Indeed, Paparrizos teaches that USB charging circuit may be configured to activate the DC-DC boost circuit when

the input voltage is detected to be lower than the charged voltage charging level (i.e., the fully-charged voltage level of the battery). EX1009, 8:10-28. Accordingly, Paparrizos acknowledges that different input voltages can be used and a POSITA would have understood the benefits of allowing for multiple different input voltages. Thus, a POSITA would be motivated to include the additional USB input in order to allow Richardson's jumper starter batteries to be charged using a USB input. EX1003, ¶149.

Further, when implementing the USB charging features of Paparrizos in Yu's device, a POSITA would have included the USB receptacle, such as a micro-USB or other version of USB port, as taught by Paparrizos. EX1009, 2:56-63, FIG.1B (USB connector 16b); FIG.1C (micro-USB connector 16c). A POSITA would have had a reasonable expectation of success in adding Paparrizos USB charging features because USB is a well-known and standardized specification. Further, a POSITA would have achieved predictable results because the Yu-Paparrizos combination would have required nothing more than the addition of known ports (i.e., USB port) and known circuit components (*i.e.*, the USB charging circuits). As discussed regarding the Richardson-Zhao combination, the use of USB charging in high-voltage batteries was known in the art well before the '203 patent, including the use of USB charging of jump-starters. §XI.A.2.c-d, *supra*; EX1003, ¶150.

d. Limitation 1[C]

The Yu-Paparrizos combined device renders this limitation obvious. As discussed above regarding limitation 1[B], the Yu-Paparrizos combined device includes the USB-charging features taught by Paparrizos. Paparrizos' USB charging features include a battery charging circuit which can operate in a "boost (power stepped up mode)" and a "forward mode" to boost an input voltage from a USB source to a higher output to charge an internal battery of a device. EX1009, 1:34-38, FIG.1B, FIG.1C. When in "forward mode," a buck boost circuit 212 operates "as a boost converter" to drive a charger 214 (e.g., a linear charger, or any other suitable circuit) ... to provide a charging current for battery 14." EX1009, 4:36-39, 3:11-23; EX1003, ¶¶153-154. As a POSITA would have understood, this buck boost circuit 212 is a "DC-DC converter" as claimed because it converts a DC 5V USB input to a higher voltage DC output to charge a rechargeable battery. EX1003, ¶154.

As discussed above, the inclusion of Paparrizos USB charging features—including the DC-DC boost converter circuit—would have been obvious to a POSITA, and a POSITA would have had a reasonable expectation of success and would have achieved predictable results. §XI.D.2.c, *supra*; EX1003, ¶157.

e. Limitation 1[D]

Yu teaches and/or renders obvious this limitation. Yu discloses a control system which includes a vehicle battery isolation sensor as claimed. Specifically,

Yu's system includes a **microprocessor 12** connected to sensors which include **an external battery voltage detection circuit 45** which detects whether a battery is present (*i.e.* connected) or absent (*i.e.*, disconnected) by detecting the voltage of an external battery (*i.e.*, vehicle battery) when it is connected to the device. EX1008, claim 3, ¶¶6, 9, 23, 26-27, FIG.1 (annotated below), FIG.2. Yu's battery presence sensor (**external battery voltage detection circuit 45**) is separate from its reverse polarity sensor (**external battery reverse connection detection circuit 44**). *Id.* Yu teaches that "[w]hen the device is connected to an external vehicle battery, the device will detect the external battery voltage and display the voltage on the LCD simultaneously." As a POSITA would have understood, the detection of the external battery voltage is an indication of whether the battery external battery is connected or not (*i.e.*, when no battery is connected, no voltage will be displayed). EX1003, ¶158. This is further corroborated by Yu's disclosure preventing "generation of electric sparks when connecting or disconnecting from the vehicle." EX1008, ¶3. A POSITA would have understood that, to prevent generating sparks, Yu's microprocessor would determine whether a battery is present (*i.e.*, connected to Yu's jump starter) before switching on the relay 2 to energize the connections to the vehicle battery terminals. EX1008, ¶¶3, 9, 26; EX1003, ¶158.

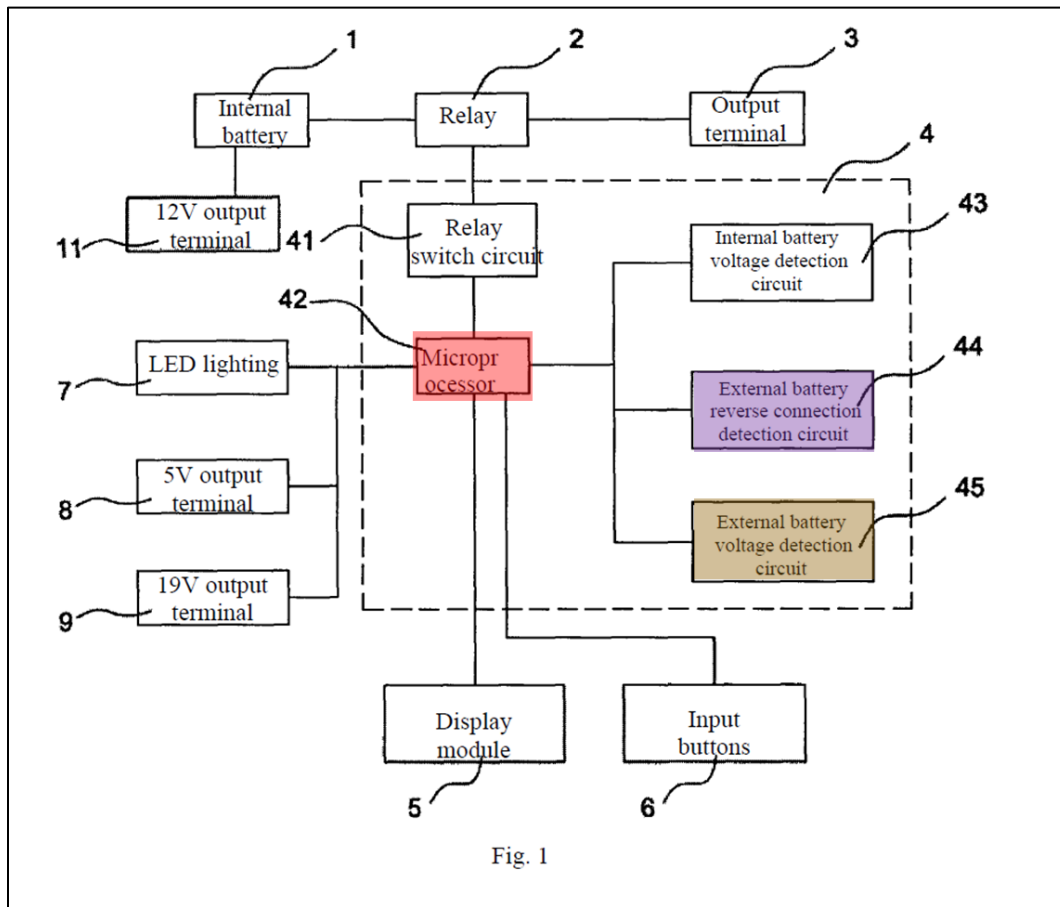
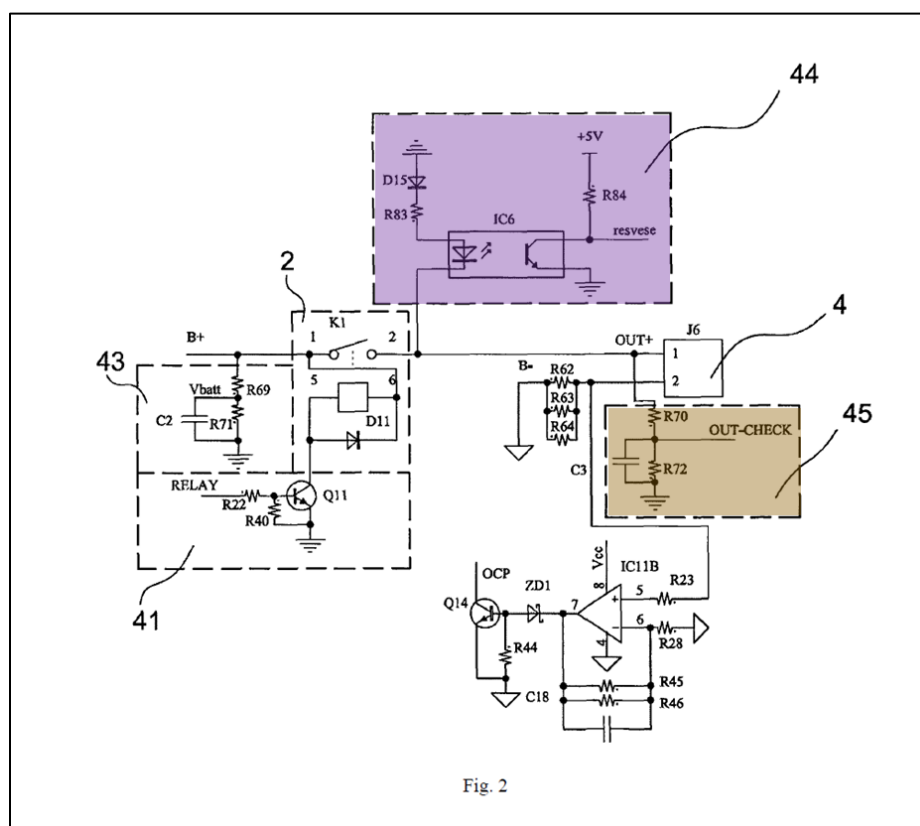


Fig. 1

Fig. 2 of Yu shows an example of the external battery detection circuit 45 which includes a voltage divider that provides the “OUT-CHECK” output signal.

EX1008, FIG.2; EX1003, ¶159.

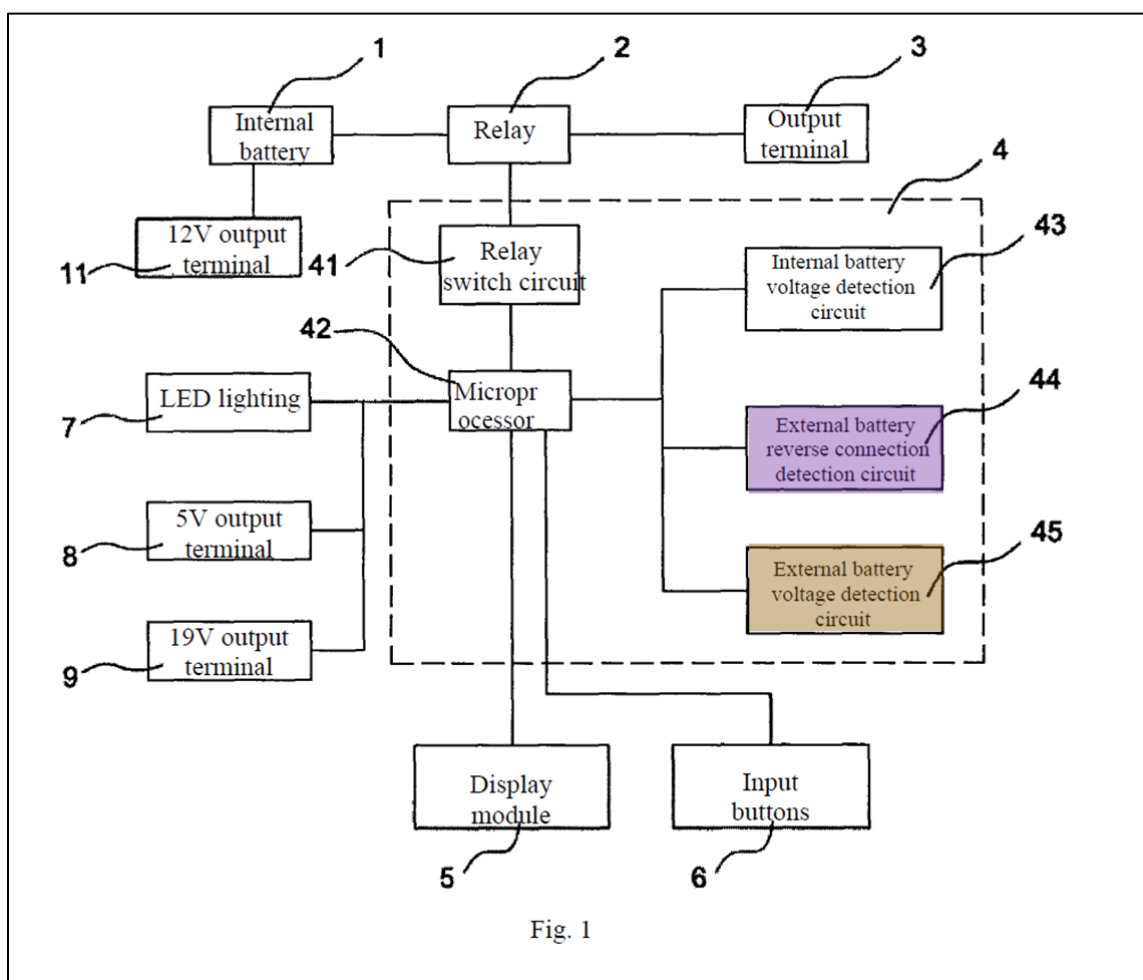


To the extent Patent Owner argues Yu does not disclose a battery presence sensor, it would have been obvious to a POSITA to detect the presence of vehicle battery based upon the OUT-CHECK signal received from external battery detection circuit 45. A POSITA would have recognized that the OUT-CHECK signal will have different values when an external battery is detected and when it is not. EX1003, ¶160. Accordingly, using the OUT-CHECK signal to detect the presence of a vehicle battery would have required only comparing the signal to predetermined thresholds. For example, if the OUT-CHECK signal indicates that no voltage has been detected or a voltage near 0 volts have been detected, the microprocessor 12 can determine that no vehicle battery is connected to the device. Conversely, if a voltage is detected

by the external battery voltage detection circuit at or above a predetermined threshold (for example, 1V), the microprocessor would be programmed to determine an external battery is present and connected to the device. A POSITA would have been motivated to implement these changes to obtain the known benefit of enhancing safety and avoiding generation of sparks, as taught by Yu. EX1003, ¶160. A POSITA would have made such modifications with predictable results since the comparison of values against predetermined thresholds requires nothing more than basic knowledge of electrical circuits and microprocessors. *Id.*

f. Limitation 1[E]

Yu teaches this limitation. Yu teaches a reverse polarity sensor ([external battery reverse connection detection circuit 44](#)) as claimed. EX1008, Abstract, claim 1, claim 3, ¶¶4, 6, 21, 23, 26-27, FIG.1, FIG.2. For example, Yu teaches that when a vehicle battery is connected with the wrong polarity, [the external battery reverse connection detection](#) circuit detects this incorrect connection and the relay (i.e., the power connection witch) is prevented from closing. EX1008, Abstract, claim 1, ¶¶3-4, 9, 21, 26; FIG.1 (annotated below); EX1003, ¶161.

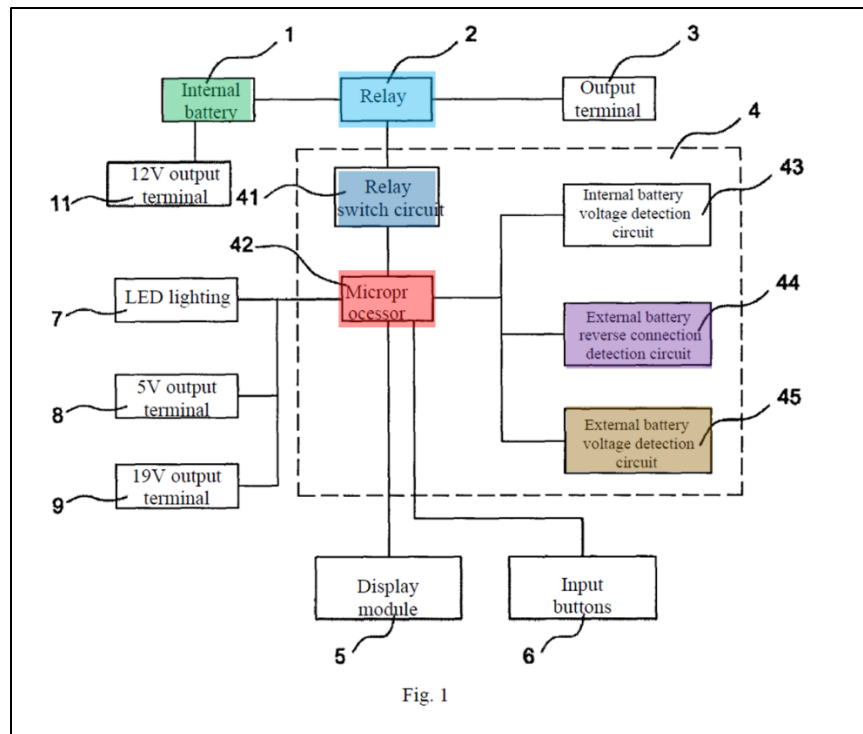


Yu further discloses an exemplary embodiment where the external battery reverse connection detection circuit is depicted as an optocoupler which can provide an output signal to the microprocessor labeled as “resvese” in Figure 2. EX1007, FIG.2; EX1008, FIG.2. Yu’s optocoupler is the same as the “optically coupled isolator phototransistor” described in the ’203 patent as the reverse battery sensor. EX1001, 5:44-47 (“The reverse battery sensor 10 comprises an optically coupled isolator phototransistor (4N27) connected to the terminal of vehicle battery 72...”); 5:49-53 (“if the battery 72 is connected to the terminals of the booster 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.”); EX1003, ¶162.

g. Limitation 1[F]

Yu teaches this limitation. Yu teaches a power switch ([relay 2](#)) configured to electrically connect the power supply to the vehicle battery as claimed. EX1008, Abstract, claim 1, ¶¶4, 9, 21, FIG.1, FIG.2.



Specifically, Yu discloses a that **microprocessor 42** “controls the opening and closing of the relay through the **relay switch circuit** to control current output from the **internal battery** to the output terminal.” EX1008, Abstract. Yu discloses the jump start process includes closing “**relay 2**” which then causes the internal battery

to output current to the vehicle battery through the output terminal 3. EX1008, ¶26; EX1003, ¶163.

h. Limitation 1[G]

Yu teaches this limitation. Specifically, Yu teaches that “[u]nder normal circumstances, the relay is in an off state. If the output terminal 3 is connected to an external battery with incorrect polarity, a signal is provided to the microprocessor 42 through the external battery reverse connection detection circuit 44, so that the relay 2 controlled by the microprocessor 42 will not close, preventing the wrong polarity from causing a large flow of current.” Yu teaches that the power switch (relay 2) is controlled (*i.e.*, kept in an off state) based on the external battery reverse connection circuit. EX1008, ¶26. Yu teaches that “[i]f the output terminal 3 is connected to the external battery with correct polarity, the external battery voltage detection circuit 45 will operate” and “[i]f the external battery voltage is within the normal range, then the JUMP button of the input buttons 6 can be pressed to close the relay 2.” The power switch (relay 2) is only closed if a proper connection (*i.e.*, not reversed) is detected and if a normal battery voltage is detected. EX1008, ¶26; EX1003, ¶166.

3. Claim 3

a. Limitations 3[A] and 3[B]

Yu teaches this limitation. Yu discloses “wiring” (also referred to as “external battery wiring” or “output terminal 3 wiring”) which includes a positive battery

terminal connector and negative battery terminal connector as claimed. EX1008, Abstract, claim 1, ¶¶4, 21, 26. As a POSITA would have understood, to jump start a vehicle battery, both negative and positive terminal connectors must be present in the device of Yu. Indeed, Yu's inclusion of a reverse connection detection circuit indicates there is both a positive polarity connector and a negative polarity connector which a user could improperly connect in a reverse manner. EX1003, ¶167.

To the extent Yu does not explicitly disclose or depict the positive or negative terminal connectors, a POSITA would have understood that Yu implicitly or inherently discloses these features. Figure 8 depicts output terminal 3 as a receptacle that a POSITA would have recognized as an EC5 connector, capable of mating with a plug integrated with wiring with cable clamps or other connectors for connecting to the positive terminal of the vehicle battery. EX1008, FIG.8; Abstract, ¶¶2-3, 8, 26; FIG.2. Moreover, the '203 patent admits such cables (and associated terminals, clamps or other connectors) were known. EX1001, 1:13-19 ("Prior art devices are known, which provide either a pair of electrical connector cables... 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"), 1:20-27, 1:34-38. Thus, a POSITA would have understood Yu's teaches and/or renders obvious a positive polarity battery terminal connector and a negative polarity battery terminal connector as claimed. EX1003, ¶169.

4. Claim 4

Yu teaches this limitation. Yu discloses “the microprocessor controls the opening and closing of the relay through the relay switch circuit to control current output[.]” EX1008, Abstract, ¶4; *see* §XI.D.2.h, *supra*. Yu teaches that the microprocessor 42 receives “signal[s] from the external battery reverse connection circuit 44” and the external battery voltage sensor 45. EX1008, ¶¶23, 26. Yu further teaches that once the vehicle battery is connected to the device, if appropriate conditions are detected by the external battery reverse connection detection circuit 44 and external battery voltage detection circuit 45, Yu’s microprocessor 42 can close the relay 2 to output current to the vehicle battery. EX1008, ¶¶9, 26. After the jump start is complete, the microprocessor will control the relay to open, and the wiring can be disconnected from the vehicle battery. *Id.* Accordingly, Yu’s microprocessor 42 receives inputs from the external vehicle battery reverse connection circuit 44 and the external vehicle battery voltage detection circuit 45 and controls the relay 2 based on signals from those detection circuits. EX1003, ¶170.

5. Claim 5

Yu teaches this limitation. EX1003, ¶172-73. Yu discloses a controller configured to automatically cause the vehicle battery isolation sensor to detect presence of the vehicle battery and the reverse polarity sensor to detect polarity of

the vehicle battery when the vehicle battery is electrically connected to the jump starter apparatus and the jump starter apparatus becomes operational. Yu's relay is configured to be controlled by a system comprised of the control module, microprocessor, and associated sensors and circuitry. EX1008, Abstract, claim 1, claim 3, ¶¶4, 6, 21, 23, 26-27, FIG.1, FIG.2. Yu discloses that the detecting of the presence of a battery and the detection of correct polarity is automatic. *See* EX1008, ¶26 ("If the output terminal 3 is connected to an external battery with incorrect polarity, a signal is provided to the microprocessor 42 through the external battery reverse connection detection circuit 44, so that the relay 2 controlled by the microprocessor 42 will not close... If the output terminal 3 is connected to the external battery with correct polarity, the external battery voltage detection circuit 45 will operate."); EX1003, ¶172.

6. Claim 9

The Yu-Paparrizos combined device renders this claim obvious. As discussed above, Paparrizos' USB charging features include a battery charging circuit which can operate in a "boost (stepped up mode)" and a "forward mode" to boost an input voltage from a USB source to a higher output to charge an internal battery of a device. EX1009, 1:34-38, FIG.1B, FIG.1C. When in "forward mode," a buck boost circuit 212 operates "as a boost converter" to drive a charger 214 (e.g., a linear charger, or any other suitable circuit)... to provide a charging current for battery 14."

EX1009, 4:36-39,3:11-23. Paparrizos further teaches a USB charging circuit that may be configured to activate the DC-DC boost circuit when the input voltage is detected to be lower than the charged voltage charging level (i.e., the fully-charged voltage level of the battery). EX1009, 8:10-28. §XI.D.2.b-d, *supra*. Thus, Paparrizos' USB charging circuit controls charging of the batteries by activating the “forward mode” when certain conditions are met (i.e., the input voltage is lower than the target battery voltage). EX1003, ¶173.

E. Ground 5: Claims 2, 10, and 11 are unpatentable under §103(a) over Yu and Paparrizos in further view of AAPA or Epower-20/Epower-21

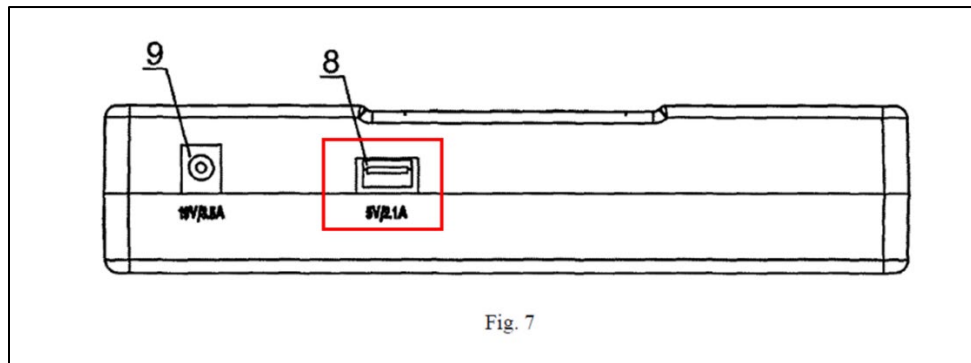
1. Claim 2

As discussed above, the Yu-Paparrizos combined device renders claim 1 obvious. The same combination in further view of AAPA or Epower-20 and/or Epower-21 renders claim 2 obvious. As discussed in regard to Ground 2, Claim 2 above, AAPA, Epower-20, and Epower-21 each teach handheld jump-starter devices. For the same or similar reasons discussed above, it would have been obvious to a POSITA to modify the Yu-Paparrizos device to have a hand-held form factor. §XI.D.2, XI.B.1, *supra*; EX1003, ¶174.

2. Claims 10-11

As discussed above, the Yu-Paparrizos combination render claim 9 obvious. §XI.D.6, *supra*. Yu teaches the additional limitations recited in claims 10 and 11.

Specifically, Yu's device includes "a 5V voltage output circuit connected to the 5V output terminal 8," the output terminal and 5V output circuit being "use[able] as a general power supply for other electrical equipment." EX1008, ¶¶24, 28. Figure 7 of Yu (annotated below) depicts output terminal 8 as a USB port.



Accordingly, Yu teaches a USB output port (output terminal 8) for providing power from the rechargeable power supply for charging the external device, as recited in claim 11. This same output terminal 8 is configured to provide power for charging an external device as recited in claim 10. Epower-20/Epower-21 also discloses a USB output port. §XI.B.2, *supra*. As a POSITA would have understood, any USB port that is used as "a general power supply," as taught by Yu, can be used to charge an external device. EX1003, ¶176.

F. Ground 6: Claims 6-8 are unpatentable under §103(a) over Yu and Paparrizos in further view of Krieger

1. Claim 6

As discussed above, the Yu-Paparrizos combined device renders claim 1 obvious. The same combination in further view Krieger renders claim 6 obvious.

As discussed in regard to Ground 3 above, Krieger teaches using a FET switch as a power switch in jump-starter device. For the same or similar reasons discussed above, it would have been obvious to a POSITA to modify the Yu-Paparrizos device to use the FET switch taught by Krieger as the relay switch of Yu. See §XI.D.2 and XI.C.1, *supra*. EX1003, ¶177.

2. Claims 7-8

As discussed above, the Yu-Paparrizos combined device renders claim 1 obvious. The same combination in further view Krieger renders claims 7 and 8 obvious. As discussed in regard to Ground 3 above, Krieger discloses a vehicle isolation sensor and reverse polarity sensor comprising of an optically coupled isolator phototransistor. EX1010, ¶32; §V.F, *supra*. For the same or similar reasons discussed above, a POSITA would have found it obvious to use opto-isolator sensors as the external vehicle battery voltage detection circuit of Yu and as the external vehicle battery reverse connection detection circuit of Yu. EX1003, ¶178. See §XI.D.2 and XI.C.2, *supra*.

XII. CONCLUSION

Petitioner has demonstrated in this Petition that Claims 1-11 of the '203 patent are unpatentable. Petitioner respectfully requests institution of an *inter partes* review of the '203 patent and Claims 1-11 be cancelled.

Dated: September 9, 2024

Respectfully submitted

By: /s/ Ryan N. Miller
Ryan North Miller
Reg. No. 68,262

Counsel for Petitioner
Deltran USA LLC

PETITIONER MANDATORY NOTICES

Real Party-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that the real party-in-interest is Deltran USA LLC. Deltran Operations, Inc. is also a real party-in-interest.

Deltona Transformer Corporation (“DTC”) is also named as a real party-in-interest in this Petition. DTC is a co-defendant in the related litigation listed below. Petitioner does not believe DTC rises to the level of real party-in-interest as DTC has not exercised any control over this Petition or Deltran’s decision to file this Petition. However, because DTC agree to be bound by the estoppel provisions of 35 U.S.C. § 315(e), and to prevent a costly challenge by Patent Owner regarding whether DTC is a real party-in-interest, DTC has been named as real party-in-interest.

Related Matters

Pursuant to 37 C.F.R. §42.8(b)(2), to the best knowledge of the Petitioner, the ’203 patent is involved in the following cases:

- *The NOCO Company v. Deltona Transformer Corporation et al.*, 6-23-cv-02194, Middle District of Florida.

Related patents also asserted in the above captioned litigation include U.S. Patent No. 11,447,023 (the ’023 Patent) and U.S. Patent No. 11,584,243 (the ’243 Patent).

The '023 Patent has been challenged by another petitioner in *ADC Solutions Auto, LLC d/b/a Type-S v. The Noco Company*, IPR2024-00577, PTAB. Trial was instituted in IPR2024-00577 on August 29, 2024. EX1055.

The '243 Patent has been challenged by another petitioner in *ADC Solutions Auto, LLC d/b/a Type-S v. The Noco Company*, IPR2024-00671, PTAB. Trial was instituted in IPR2024-00671 on August 29, 2024. EX1054.

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Please address all correspondence to lead and back-up counsel. Petitioner consents to service in this proceeding by email at the addresses above.

Dated: September 9, 2024

Respectfully submitted
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CERTIFICATION OF WORD COUNT

The Petition excluding the caption, Table of Contents, Table of Authorities, Table of Exhibits, Mandatory Notices under 37 C.F.R. §42.8, this Certification, and Certificate of Service contains 13,983 words.

Respectfully submitted,

Dated: September 9, 2024

By: /Ryan N. Miller/
Ryan North Miller
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Lead Counsel for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.105, Petitioner certifies that this Petition for Inter Partes Review and supporting evidence was served by mail, on or no later than September 10, 2024, to counsel for Patent Owner, according to the filed mandatory notices and power of attorney, as listed below:

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