

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

SCRAMOGE TECHNOLOGY LTD.,
Patent Owner.

IPR2022-00532
Patent 9,490,652 B2

Before KARL D. EASTHOM, BRIAN J. McNAMARA, and
KRISTINA M. KALAN, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. BACKGROUND

In response to a Petition (“Pet.”), on September 13, 2022, we instituted an *inter partes* review of claims 1–5 and 7 of U. S. Patent No. 9,490,652 B2 (“the ’652 Patent”). Paper 9 (“Dec. to Inst.”). Patent Owner filed a Patent Owner Response (Paper 14, “PO Resp.”), Petitioner filed a Petitioner Reply (Paper 15, “Pet. Reply”) and Patent Owner filed a Sur-Reply (Paper 16, “Sur-reply”). A transcript of an oral hearing held on June 12, 2023 (Paper 25, “Hr’g Tr.”) has been entered into the record. We also authorized the parties to simultaneously file post-hearing briefs to address a recent non-precedential decision by the Court of Appeals for the Federal Circuit.¹ See Petitioner’s Post Hearing Brief (Paper 24, “Pet. Post Hr’g Br.”) and Patent Owner’s Post Hearing Brief (Paper 23, “PO Post Hr’g Br.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. §318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. 42.1(d).

Having reviewed the arguments of the parties and the supporting evidence, we conclude that Petitioner has demonstrated by a preponderance of the evidence that the challenged claims are unpatentable.

II. THE ’652 PATENT

The ’652 patent describes a wireless charger as one that charges a portable device using a non-contact magnetic induction method. See Ex. 1001, 1:22–40, 4:31–35. The ’652 patent concerns a wireless charger

¹ *LBT IP I LLC v. Apple Inc.*, No. 22-1613 (Fed. Cir. 2023) (nonprecedential) (“*LBT*”).

equipped with an auxiliary power supply. *Id.* at 1:17–20. Figure 4 of the '652 patent is reproduced below.

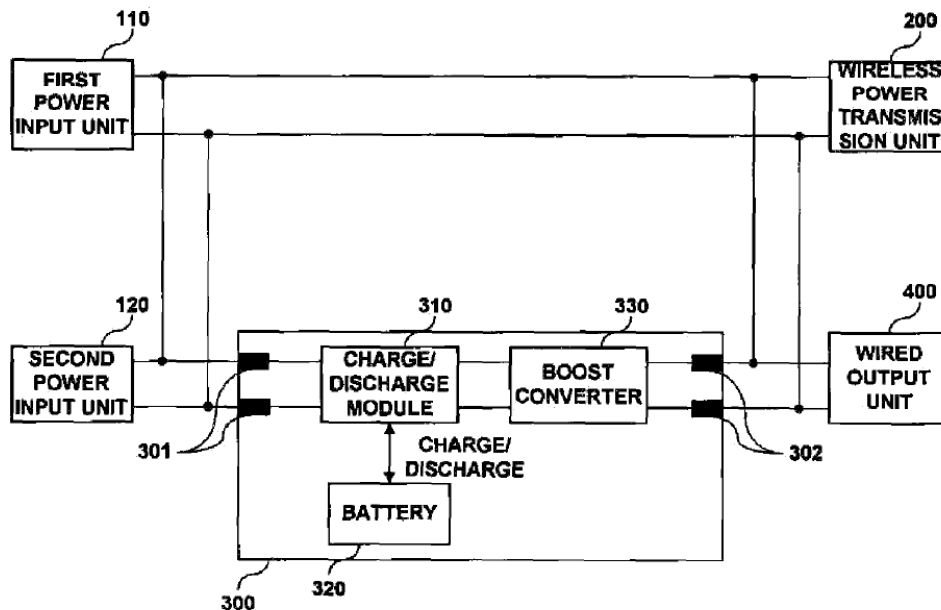


Figure 4 is a schematic diagram showing the configuration of a wireless charger equipped with auxiliary power unit 300. Ex. 1001, 3:46–49. Power unit 110 is connected to an external power supply and provides electrical power to auxiliary power unit 300. *Id.* at 5:46–49. Second power unit 120 is connected in parallel with first power unit 110, such that when either supply unit 110 or 120 is cut off, the other supply unit can provide power. *Id.* at 5:50–59. “Wireless power transmission unit 200 converts electrical power, supplied from the first power input unit 110 . . . into a magnetic field and charges the portable electronic device.” *Id.* at 5:50–53. Charge/discharge module 310 “may charge the battery 320 and, at the same time, provide the electrical power to the wireless power transmission unit 200.” *Id.* at 6:19–25. When first power input 110 and second power unit 120 are disconnected from the external power supply, charge/discharge module 310 “generates electrical power by discharging the battery 320 and

supplies the generated electrical power to the wireless power transmission unit 200.” *Id.* at 6:4–13, 6:26–32. The charger also includes boost converter 330. Boost converter 330 boosts the voltage received from charge/discharge unit 310 and provides a boosted voltage to wireless power transmission unit 200. *Id.* at 6:33–36. The charger may also include wired output unit 400. *Id.* at 6:37–48.

III. ILLUSTRATIVE CLAIM

Claim 1, reproduced below with reference designations used in the Petition, is illustrative of the subject matter of the ’652 patent.

- [1.0] A wireless charger including an auxiliary power supply, the wireless charger comprising:
 - [1.1] a power input unit which is connected to an external power supply;
 - [1.2] a wireless power transmission unit which wirelessly transmits electrical power to an electronic device through a magnetic field; and
 - [1.3] an auxiliary power unit which charges a battery provided therein with electrical power supplied from the power input unit, or charges the battery and, at the same time, provides the electrical power to the wireless power transmission unit, and
 - [1.4] provides the electrical power of the battery provided therein to the wireless power transmission unit when the power supply from the power input unit is stopped,
 - [1.5] wherein the auxiliary power unit comprises: the battery;
 - [1.6] a charge/discharge module which charges the battery with the electrical power supplied from the power input unit and outputs the electrical power stored in the battery when the power supply from the power input unit is stopped; and
 - [1.7] a boost converter which boosts the voltage of the electrical power output from the charge/discharge module and provides the boosted voltage to the wireless power transmission unit.

Ex. 1001, 9:7–32.

IV. GROUNDS OF INSTITUTION

We instituted trial on Petitioner’s sole challenge that claims 1–5 and 7 are unpatentable as obvious under 35 U.S.C. § 103 over Canadian Patent Application CA 2794703 (Ex. 1005, “Zhu”).

V. LEVEL OF ORDINARY SKILL

The level of ordinary skill in the art usually is evidenced by the references themselves. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). In the Decision to Institute we applied Petitioner’s proposed description of a person of ordinary skill as one with a bachelor’s degree in electrical engineering, or equivalent training, and approximately two years of experience working in the field of wireless power transmission, where lack of work experience can be remedied by additional education, and vice versa. Dec. to Inst. 6. As this description of a person of ordinary skill is unopposed and is consistent with the subject matter of the ’652 patent and the references, we apply it for purposes of this Decision.

VI. CLAIM CONSTRUCTION

Prior to institution, neither party proposed any claim constructions. In the Decision to Institute, we did not perceive a need to construe any term and we applied the plain and ordinary meaning to all terms. Dec. to Inst. 7. Petitioner contends that arguments in the Patent Owner Response unduly limit the claims by interpreting them to preclude any and all human interaction. Pet. Reply 2 (citing PO Resp. 14). Petitioner argues “[t]he claim language and the intrinsic evidence do not support Patent Owner’s interpretation that precludes human interaction” and “requests that the Board reject Patent Owner’s invitation to unduly limit the claims.” *Id.* We address

this issue further in our analysis of the prior art challenges. We determine, however, that no claim term requires express construction.

VII. ANALYSIS OF PRIOR ART CHALLENGES

A. Introduction

The sole challenge ground before us is that claims 1–5 and 7 would have been obvious over Zhu. “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

As part of determining whether a claim is obvious in light of the prior art, when in evidence, we consider any relevant objective evidence of non-obviousness. *See Graham*, 383 U.S. at 17. Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of non-obviousness, may lead to a conclusion that the challenged claims would not have been obvious to one of ordinary

skill. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Patent Owner does not present evidence of such objective considerations.

B. Zhu (Ex. 1005)

Zhu discloses a portable battery charger with inductive charging in which an output inductive coil under the surface of a housing transmits power to charge a portable device. *See generally* Ex. 1005. Zhu's wireless charger includes a battery connected to the output inductive coil that transmits power to a portable device. *Id.* at 5:1–2.² Figure 2 of Zhu is reproduced below.

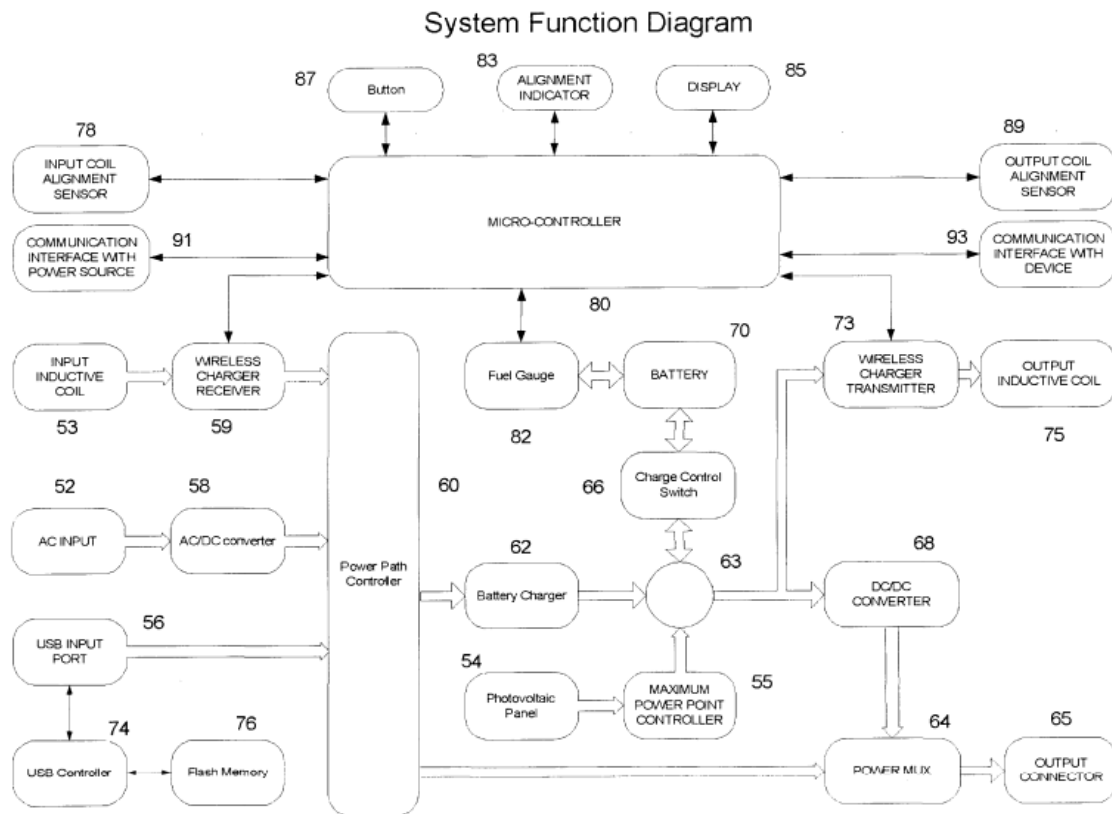


Fig. 2

² Page numbers are the page numbers added by Petitioner to Ex. 1005, not the page numbers of the original document.

Figure 2 of Zhu is a system function diagram of the portable battery charger. *Id.* at 6. Power path controller 60 can receive power from inductive coil 53 (through wireless charger receiver 59), AC input 52 (through AC/DC converter 58) and through a DC source (through USB input port 56). *Id.* at 6:1–16. Power path controller 60 transmits the power it receives (i) to battery charger 62 to charge battery 70, (ii) through battery charger 62 and junction 63 to wireless charger 73 to output inductive coil 75, (iii) through battery charger 62 and junction 63 to DC/DC converter 68 to upconvert from a battery voltage to a system voltage and through multiplexer (MUX) 64 or (iv) directly to MUX 64 for output through output power connector 65. *Id.* at 7:16–22.

If a load is present at inductive coil 75 and/or output power controller 65, because the priority of power path controller 60 is to charge the load, all or some of the power from the input sources is sent to output inductive coil 75 and/or output power connector 65; and any remaining power is used to charge battery 70. *Id.* at 7:23–8:1. In operation, charger 62 sends an interrupt to microcontroller 80 to verify the battery charge. *Id.* at 8:1–2. If battery 70 is not charged, switch 66 is turned on and increasing amounts of current enter the battery as load demand diminishes. *Id.* 8:2–5. If the load demands more power than is available from the input sources, output power is supplemented by battery 70. *See id.* at 8:6–9:12. If no power is available from source 52, 53, or 56, microcontroller 80 checks battery 70. *Id.* at 9:13–14. If power is available in battery 70 and the load is connected at output inductive coil 75, charge control switch 66 is turned on and current flows from the battery to wireless power transmitter 73 and output inductive coil 75; if the load is at output connector 65, microcontroller 80 signals DC/DC

converter 68 to open and current flows from DC/DC converter 68 (where the voltage is increased to 5V) and to output connector 65. *Id.* at 9:14–21.

If there is no load on output power connector 65, power path controller 60 sends input power directly to battery charger 62. *Id.* at 6:22–23. Microcontroller 80 informs charge control switch 66 if battery 70 is fully charged or can receive power. *Id.* at 6:23–26. If battery 70 can receive power, charge controller 66 sends power to it (i.e., the “battery pack;” if the battery is fully charged when no load is connected, charger 62 sends a trickle charge to the battery to maintain it. *Id.* at 6:23–7:2.³

C. Petitioner’s Challenge to Claim 1 As Obvious Over Zhu

1. Claim 1

Although Patent Owner’s claim 1 arguments focus on limitations 1.4 and 1.6, as the burden of persuasion is on the Petitioner, we consider Petitioner’s arguments as to all the limitations of claim 1. Patent Owner does not dispute explicitly Petitioner’s contentions concerning claim limitations 1.0–1.3, 1.5, and 1.7. *See generally*, PO Resp.

a) Claim limitation 1.0

Petitioner identifies the preamble of claim 1 as claim limitation 1.0. The preamble of claim 1 recites “[a] wireless charger including an auxiliary power supply.” Although Petitioner contends that the preamble of claim 1 is not limiting, Petitioner cites Zhu as disclosing a portable battery charger in which current flows from a battery to an output in inductive coil to charge a portable device when there is no AC input. Pet. 17 (citing Ex. 1005, code (57), 6:18–21; Ex. 1003 Phinney Decl. ¶ 41). Based on all the evidence and

³ As we preliminarily found in the Institution Decision, , Zhu’s reference to a “battery pack” is a reference to battery 70. *See id.*; Dec. on Inst. 18, n.7.

arguments in the record, we determine that Petitioner has demonstrated Zhu teaches the preamble of claim 1.

b) Claim limitation 1.1

Petitioner identifies as claim limitation 1.1 the recitation “a power input unit which is connected to an external power supply.” Pet. 18. Petitioner cites Zhu as disclosing its portable battery charger includes AC input 52 that receives power from a household socket, e.g., 120 V alternating current power. Pet. 19 (citing Ex. 1005, 3:24–27; Fig. 2; Ex. 1003, Phinney Decl. ¶ 43). Based on all the evidence and arguments in the record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 1.1.

c) Claim limitation 1.2

Petitioner identifies as claim limitation 1.2 the recitation “a wireless power transmission unit which wirelessly transmits electrical power to an electronic device through a magnetic field.” Pet. 19. Petitioner cites Zhu’s wireless charger transmitter 73 and output inductive coil 75 as together forming a wireless power transmission unit that wirelessly charges the battery of a portable device. Pet. 19 (citing Ex. 1005, 3:10–15). Petitioner further notes Zhu’s explanation that when a load, e.g., a portable device, is connected to output coil 75, current flows from battery 70 to wireless power transmitter 73 and output inductive coil 75, such that output inductive coil 75 inductively charges the battery of the portable device without connecting the portable device to the charger. *Id.* at 19–20 (citing Ex. 1005, 4:16–28, 6:18–21, Fig. 2).

Petitioner further contends that, to the extent Zhu does not explicitly describe that its inductive charging transmits electrical power through a magnetic field, a person of ordinary skill would have understood that the term “inductive charging” is shorthand for charging by “electromagnetic

induction,” a well-known technique for inducing current in a coil with an alternating electromagnetic field. *Id.* at 20–21 (citing Ex. 1003, Phinney Decl. ¶ 45; Ex 1006 ¶¶ 14–16 (describing inductive coupling as transferring energy from one circuit component to another through a shared electromagnetic field); Ex. 1008, 1 (defining “induction” as “a process . . . by which an electromagnetic force is produced in a circuit by varying the magnetic field linked with the circuit”). Based on all the evidence and arguments in the record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 1.2.

d) Claim limitation 1.3

Petitioner identifies as claim limitation 1.3 the recitation “an auxiliary power unit which charges a battery provided therein with electrical power supplied from the power input unit, or charges the battery and, at the same time, provides the electrical power to the wireless power transmission unit.” Pet. 21–22. Petitioner identifies Zhu’s battery 70 and its associated components as the claimed auxiliary power unit. Pet. 22. Petitioner notes that two of the components, i.e. battery charger 62 and charge control switch 66, charge battery 70 with electrical power from a DC input 52. *Id.* (citing Ex. 1005, 4:9–22, 5:2–3). Petitioner notes that Zhu explains that (i) AC input 52 is converted by AC/DC converter 58, (ii) the DC power is input to power path controller 60, and (iii) power path controller 60 can then transmit the power received to battery charger 62 to charge the battery, as claimed. *Id.* (citing Ex. 1005, 4:9–17). Petitioner notes that when there is no load, i.e., when there is no portable device to charge, Zhu routes all input power to the battery via charge control switch 66. *Id.* at 23–24 (citing Ex. 1005, 6:22–27). Petitioner also notes that when a load is present, i.e., when a portable device is being charged via the inductive coil, excess input power

not used to charge the device is diverted to the battery via control switch 66, such that the internal battery and the portable device are charged at the same time, as claimed. *Id.* at 23–25 (citing Ex. 1005, 4:23–5:4; Ex. 1003, Phinney Decl. ¶¶ 49–53). Based on all the evidence and arguments in the record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 1.3.

e) Claim limitation 1.4

Petitioner identifies as claim limitation 1.4 the recitation “[auxiliary power unit] provides the electrical power of the battery provided therein to the wireless power transmission unit when the power supply from the power input unit is stopped.” Pet. 25. Petitioner cites Zhu’s disclosure that (i) if there is no input source and a load is connected to output inductive coil 75, a microcontroller checks the level of the battery 70; and (ii) if there is sufficient energy in battery 70, charge control switch 66 is turned on, so that current flows from battery 70 to wireless power transmitter 73 and to output inductive coil 75. *Id.* (citing Ex. 1005, 6:18–21). Thus, Petitioner argues, Zhu discloses providing electrical power from the battery to the wireless power transmission unit when the power supply from the power input unit is stopped. *See* Ex. 1003, Phinney Decl. ¶¶ 54–55.

Patent Owner’s arguments concerning claim limitation 1.4 center on the meaning of “when the power supply from the input power unit is stopped.” PO Resp. 11. As a general principle, Patent Owner contends that the ’652 patent “discloses that the wireless charging feature automatically switches to a battery discharge mode when the power supplied from the external power supply is cut off or stopped” and “neither [situation] discloses nor requires any human action, such as pushing a button, to signal the charger to switch to the discharge mode if external power is cut off.” PO Resp. 4 (citing Ex. 1001, 4:44–48, 5:1–4, 6:4–12). According to Patent

Owner “[t]hese features of the 652 patent inventions are recited in the challenged independent claim and dependent claim 4.” *Id.*

Neither claim limitation 1.4 nor any other limitation in any of the challenged claims recites the term “automatically.” The subject matter Patent Owner cites from the Specification also does not use the word “automatically.” See Ex. 1001, 4:44–48 (“when the power supply from the power input unit 100 is stopped, the auxiliary power unit 300 discharges the battery 320 provided therein and supplies electrical power generated by the discharge to the wireless power transmission unit 200”); 5:1–4 (“when the power supply from the power input unit 100 is cut off, the charge/discharge module 310 switches the charge mode of the battery 320 to the discharge mode”); 6: 4–12 (“when the connection of the input . . . is cut off . . . and thus the external power supply . . . is cut off, the auxiliary power unit 300 may switch battery 320 from the charge mode to the discharge mode to generate electrical power”); see also *id.* at 6:26–32 (“when the first power unit 110 and the second power unit 120 are disconnected from the external power supply and thus the electrical power is cut off, the charge/discharge module 310 generates electrical power by discharging the battery”).

As noted above, Patent Owner does not propose a claim construction that limits the auxiliary power unit to providing battery power “automatically” upon a stoppage of the power supplied by the power input unit. Nevertheless, Patent Owner argues that Zhu does not teach limitation 1.4 because Zhu requires pushing button 87 to signal the microprocessor to check the battery for available power before allowing current to flow from the battery to the wireless power transmitter and inductive coil. PO Resp. 11–12 (citing Ex. 1005, 9:13–21).

According to Patent Owner, Petitioner's arguments based on Zhu fail because there is no evidence that a user would push the button on Zhu's device, let alone with the input power stopped or cut off. PO Post Hr'g Br. 1–2 (citing *LBT* for the proposition that the mere fact that a thing may result from a given set of circumstances is not sufficient). According to Patent Owner "[e]ven if a user could push the button on Zhu's device when the input power was stopped or cut off, that would not meet the challenged claim limitations because that user action would not necessarily occur." *Id.* at 2. Petitioner argues that, unlike in *LBT*, where there was no explicit disclosure of the limitation in the reference, Zhu explicitly teaches that if there is no input source and the microcontroller is signaled, current flows from the battery to the wireless output transmitter and the output inductive coil. Pet. Post Hr'g Br. 1 (citing Ex. 1005, 6:18–21).

Petitioner argues that, on its face, the claim language is silent as to human interaction, i.e., the claim does not preclude a human pushing a button to activate providing auxiliary power, as disclosed in Zhu. Pet. Reply 3, 6 (citing PO Resp. 4). Petitioner emphasizes that the claim is broadly written and does not even recite the act of switching to battery power—the claim only recites the functionality that the auxiliary power unit “provides” electrical power from the battery to the wireless power transmission unit. *Id.* at 3–4. Petitioner further emphasizes that the claim is drawn to a “wireless charger” apparatus, defined by what it is, not by what it does, and that Patent Owner does not identify any structural difference between the claimed apparatus and Zhu's apparatus. Pet. Reply 12 (citing *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469 (Fed. Cir. 1990)). Arguing that the author of the '652 patent assumed the risk of defining an element by its functionality, Petitioner asserts that Zhu's

wireless charger is reasonably capable of performing any functionality Patent Owner may ascribe to the “input power is stopped” limitations. *Id.* at 12–13 (citing *In re Schreiber*, 128 F.3d 1473, 1478 (Fed Cir 1997) and *ParkerVision, Inc. v. Qualcomm Inc.*, 903 F.3d 1354, 1361 (Fed. Cir. 2018)). For example, Petitioner notes that Zhu explicitly teaches a charger that is capable of providing current from the battery if the input power is accidentally cut off. *Id.* at 13 (citing Ex. 1005, 6:18–21)

Claim limitation 1.4 recites that the “auxiliary power unit . . . provides the electrical power of the battery . . . to the wireless power transmission unit when the power supply from the power input unit is stopped.” Ex. 1001, 9:14–21. Limitation 1.4, which is written in the passive voice, does not state whether the claim is limited to the auxiliary power unit acting on its own to provide the battery power to the wireless transmission unit or more broadly encompasses some intervening event triggering the auxiliary unit to provide battery power to the wireless transmission unit when the external supply power is stopped.

The Specification provides an example of auxiliary power supply 300 discharging the battery to provide electrical power to the wireless power transmission unit 200 when the power supply from power input unit 100 is stopped. *See* Ex. 1001, 4:44–61. Describing the embodiment in Figures 1 and 2, the Specification states “[f]or example, when a user accidentally or intentionally cuts off the connection between the external power supply . . . and the power input unit 100, the auxiliary power unit 300 switches the battery 320 . . . from a charge mode to a discharge mode.” *Id.* at 4:49–53; *see also id.* at 5:1–4 (“when the power supply from the power input unit 100 is cut off, the charge/discharge module 310 switches the charge mode of the battery to the discharge mode”).

Describing the embodiment in Figure 3 and 4, the Specification also states

when the connection of the input terminal 301 to both first power input unit 110 and the second power input unit 120 is cut off and thus electrical power supplied from the external power is cut off, the auxiliary power unit 300 may switch the battery 320 from the charge mode to the discharge mode to generate electrical power to provide the generated electrical power to the wireless transmission unit 200 through output terminal 302.

Id. at 6:4–12.

The above examples from the Specification state that the auxiliary power unit does the switching, i.e., the auxiliary power unit switches the source that powers the wireless transmission unit from the external supply to the battery. The Specification’s statement that auxiliary power unit 300 switches the battery from the charge mode to the discharge mode to supply power to the transmission unit when the user cuts off the connection to the external power supply “accidentally or intentionally,” suggests, but does not state explicitly, that the switching can be accomplished by the auxiliary power unit without user intervention or even the user’s knowledge that the external power supply was accidentally disconnected. *Id.* at 4:49–53. The question before us is whether the claim language should be read to preclude user interaction.

Patent Owner’s argument is that, as described in the Specification and recited in the claims, the cessation of power from an external source triggers a discharge from the battery into the load automatically, i.e., “when” a power cessation event occurs the battery provides the power to continue charging the load. Patent Owner distinguishes “when” in the claim from the teachings of Zhu, arguing that Zhu charges the load “if and only if” the user pushes a button to trigger the microcontroller to discharge the battery into

load, i.e., “when” a push button event occurs the battery provides the power to charge the load. Sur-reply 3–4. Thus, Patent Owner argues the claim term “when” means at the time a power cessation event occurs. Petitioner argues that “when” is not limited to the time an event occurs, but can be any time a condition is met, i.e., any time the external power is not provided.

The claim limitation does not define “when.” The above examples from the Specification do not preclude the circumstance where the external power is stopped or cut off and an intervening event after the supply of power ceases triggers the supply of battery power to the load. Even where the auxiliary unit does not supply battery power until a user triggers it, e.g., by pushing button 87 in Zhu, the auxiliary power unit provides battery power to the wireless transmission unit when the power supply from the power input unit is stopped or cut off. Petitioner argues that, unlike the limitation in *LBT* requiring activation “in response to” a signal, which the court interpreted to mean “automatically,” there is no such responsiveness recited in the claims before us, i.e., the claims merely recite providing battery power when the input power is stopped. Pet. Post Hr’g Br. 2.

To the extent applicant intended to limit the claims to a specific implementation that “automatically” switches to a mode in which the battery supplies power to the load immediately upon or in response to the cessation of external power, it was incumbent on the author of the patent application to recite such a limitation explicitly. Not only do the ’652 patent claims not recite such a limitation, no such limitation appears to be clearly described in the Specification. The Specification’s description of “when” power is supplied by the battery does not provide any further clarity relative to the claimed apparatus; for example, the Specification’s block diagrams are not circuit schematics that show how the apparatus “automatically” detects or

responds to the absence of power, the Specification does not discuss how the charge/discharge circuit “automatically” detects and responds to the absence of the external power supply, and the Specification does not include a timing diagram that shows when the charge/discharge unit is activated upon the absence of an external power supply. For example, the ’652 patent states only that “when the first power input unit 110 and the second power input unit 120 are disconnected from the external power supply and thus the electrical power supplied to the input terminal is cut off, the charge discharge/discharge module 310 generates electrical power by discharging the battery 320.” Ex. 1001, 6:26–33. Thus, there is insufficient support in the Specification for reading into the challenged apparatus claims Patent Owner’s proposed interpretation that the function occurs “automatically.”

Having reviewed all the evidence and arguments of record, we agree with Petitioner that Zhu would have disclosed or suggested claim limitation 1.4 to an ordinarily skilled artisan.

f) Claim limitation 1.5

Petitioner identifies as claim limitation 1.5 the recitation “wherein the auxiliary power unit comprises: the battery.” Pet. 26. As discussed above, Petitioner identifies the battery as one of the parts of an auxiliary power unit. *Id.* Based on all the evidence and arguments of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 1.5.

g) Claim limitation 1.6

Petitioner identifies as claim limitation 1.6 the recitation “[wherein the auxiliary power unit comprises:] a charge/discharge module which charges the battery with the electrical power supplied from the power input unit and outputs the electrical power stored in the battery when the power supply from the power input unit is stopped.” Pet. 27. Petitioner maps Zhu’s

charge control switch 66 to the claimed charge/discharge module and notes that Zhu's charge control switch 66 controls the flow of current into and out of battery 70. *Id.* (citing Ex. 1005, 6:18–27). For example, Petitioner points out Zhu's disclosure that when there is no load on the output inductive coil, input power is sent by power path controller 60 directly to battery charger 62 and charge control switch 66 sends power to the battery pack to charge it; but when there is no input source and a load is connected, charge control switch 66 is turned on, if there is sufficient energy in the battery, such that current flows from battery 70 to wireless power transmitter 73 and inductive coil 75. *Id.* at 27–28 (citing Ex. 1005, 6:18–26, Fig. 2.) According to Petitioner, Zhu's disclosure of a charge control switch that charges the battery with power from the AC input and outputs power from the battery when the AC input is stopped teaches claim limitation 1.6. *Id.* at 28–29 (citing Ex. 1003, Phinney Decl. ¶ 58).

Patent Owner argues that Petitioner mischaracterizes Zhu as teaching the recitation “when the power supply from the power input unit is stopped” because Zhu teaches switching when there is no input power to begin with and the user pushes a button. PO Resp. 14. Although Patent Owner argues that the claim is limited to “automatically” responding to a power cessation event, like limitation 1.4, limitation 1.6 does not include language that supports such a reading. Like limitation 1.4, limitation 1.6 is written in the passive voice. Limitation 1.6 recites only that the power is stopped—it does not recite the cause or length of the stoppage, or preclude human intervention in triggering the application of battery power to the load. In addition, as we discuss in our analysis of limitation 1.4, the Specification does not include any schematics or timing diagrams that support such a conclusion.

Patent Owner's arguments concerning claim limitation 1.6 are similar to those Patent Owner advances concerning claim limitation 1.4. PO Resp. 12–13 (arguing that “Zhu teaches switching when there is no input power to begin with and when the user pushes a button – it does not teach doing so when power stops.”). For the same reasons we determined Petitioner demonstrates that Zhu teaches limitation 1.4, we determine that Petitioner has demonstrated Zhu teaches limitation 1.6.

h) Claim limitation 1.7

Petitioner identifies as claim limitation 1.7 the recitation “[wherein the auxiliary power unit comprises:] a boost converter which boosts the voltage of the electrical power output from the charge/discharge module and provides the boosted voltage to the wireless power transmission unit.” Pet. 29. Petitioner cites Zhu as disclosing DC/DC converter 68, between junction 63 and the wireless charger transmitter 73, boosts the output of charge control switch 66 so that wireless charger transmitter 73 and output inductive coil 75 operate at a stepped-up voltage of 5V instead of the battery voltage. *Id.* (citing Ex. 1005, 5:26–6:7). Petitioner states that such boosting of insufficient battery voltage facilitates compliance with standards such as the QiTM standard. *Id.* Patent Owner does not explicitly argue that Zhu does not teach the boost converter element. Based on all the evidence and arguments in the record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 1.7.

i) Claim 1 conclusion

Having considered all the arguments and evidence of record, for the reasons discussed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 1 would have been unpatentable as obvious over Zhu.

2. *Claim 3*

Claim 3 is independent. Although Patent Owner's arguments in response to the Petition are directed primarily to limitation 3.6, we address each of Petitioner's contentions below.

a) *Claim Limitation 3.0*

Petitioner identifies the preamble of claim 3 as claim limitation 3.0. Pet. 32. Like the preamble of claim 1, the preamble of claim 3 recites “[a] wireless charger including an auxiliary power supply, the wireless charger comprising.” Petitioner asserts that Zhu discloses a portable battery charger with an inductive charging coil (the claimed wireless charger) including an internal battery (the claimed auxiliary power supply. Pet. 39–40 (citing Ex. 1005, (code 57), 6:18–21). Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu discloses the features recited in the preamble of claim 3.

b) *Claim Limitation 3.1*

Petitioner identifies as claim limitation 3.1 the recitation “a first power input unit.” Pet. 33. Noting that Zhu discloses a portable battery charger with four input sources (AC power input 52, input inductive coil 53, USB input 56, and photovoltaic (PV) panel 54), and that AC input 52 receives power from a household socket, e.g., 120 V AC power, Petitioner designates AC power input 52 as the claimed first power input unit. Pet. 40 (citing Ex. 1005, 3: 24–27). Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 3.1.

c) *Claim Limitation 3.2*

Petitioner identifies as claim limitation 3.2 the recitation “a second power input unit.” Pet. 34. Noting that Zhu's inductive coil receives current

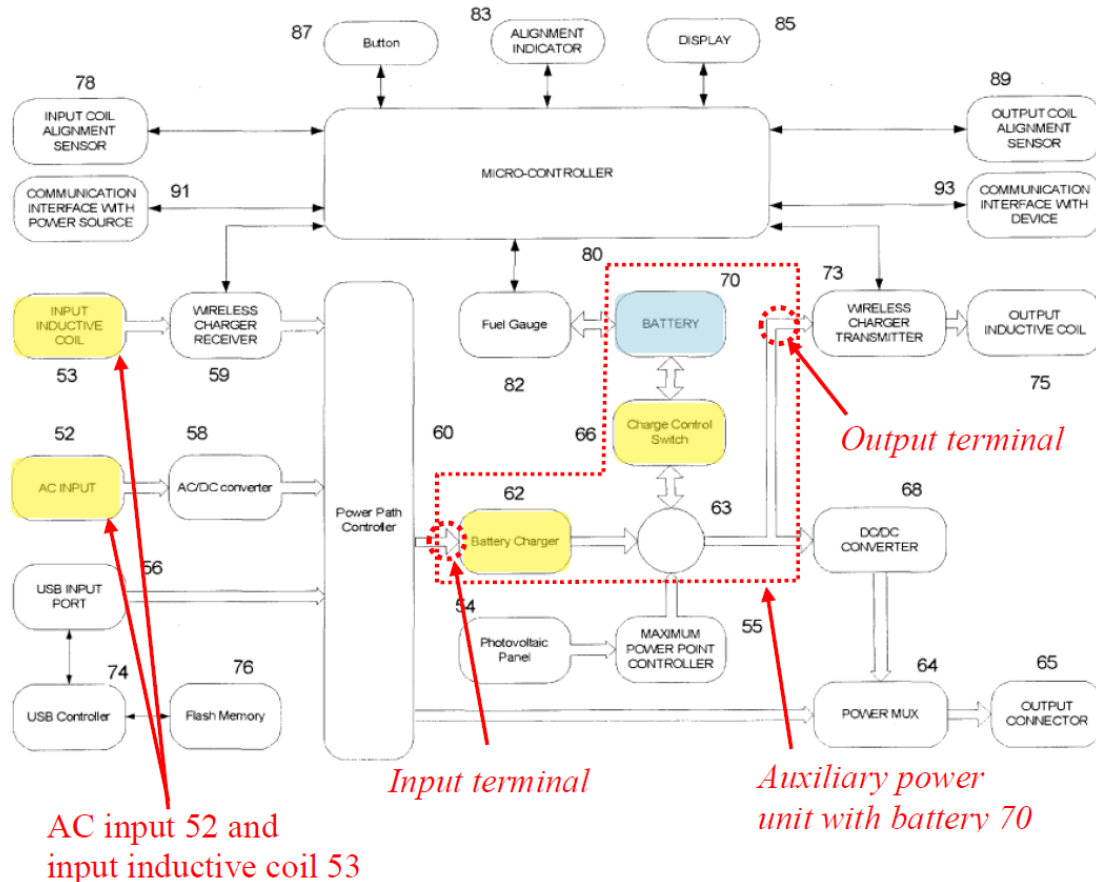
from an external inductive power source, Petitioner designates inductive coil 53 as the claimed second power input unit. Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 3.2.

d) Claim Limitation 3.3

Petitioner identifies as claim limitation 3.3 the recitation “a wireless power transmission unit which converts electrical power, supplied from the first power input unit or the second power input unit, into a magnetic field and charges an electronic device.” Pet. 35. Petitioner identifies Zhu’s wireless charger transmitter 73 and output inductive coil 75 as the claimed wireless power transmission unit that wirelessly transmits power to a portable device. Pet. 35–36; Ex. 1003 ¶¶ 68–69 (citing Ex. 1005, code 57, 3:10–15, 4:16–28, 6:18–21, Fig. 2). As Petitioner notes, Zhu discloses charging the battery of a portable device by aligning an input coil of the portable device to an output coil of the charger and inductively charging the device battery without connecting the device to the charger. *Id.* at 36 (citing Ex. 1005, code 57). Petitioner also notes that Zhu explains that the power applied to output inductive coil 75 is supplied by either AC input 52 (the claimed first power input unit) or the input inductive coil 53 (the claimed second power input unit). *Id.* Petitioner further notes that, to the extent Zhu does not articulate its “inductive charging” transmits electrical power through a magnetic field, a person of ordinary skill would have understood that such “inductive” charging methods transmit power through a magnetic field. Pet. 38; Ex. 1003 ¶¶ 70–72. Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 3.3.

e) *Claim Limitation 3.4*

Petitioner identifies as claim limitation 3.4 the recitation “an auxiliary power unit which includes an input terminal, an output terminal, and a battery, the input terminal being connected to the first power input unit and the second power input unit.” Pet. 38. Petitioner maps internal battery 70 and components associated with it, such as “battery charging and protection circuits,” to the claimed auxiliary power supply. Pet. 38–39 (citing Ex. 1005, 3:10–15). Petitioner provides the following annotated version of Figure 2 of the ’652 patent, as discussed by Dr. Phinney:



Ex.1005, Fig. 2 (annotated); Ex.1003, ¶ 74

Pet. 39–40. Petitioner states that Figure 2 illustrates AC input 52 and input inductive coil 53 are electrically connected via power path controller 60 to the input terminal of the auxiliary power unit. *Id.* (citing Ex. 1003 ¶ 75).

Petitioner cites Zhu as disclosing AC input 52, which is converted to DC by AC/DC converter 58, and input inductive coil 53, which receives and outputs DC power, provide inputs to power path controller 60, which transmits the power to battery charger 62 to charge the battery. Pet. 40 (citing Ex. 1005, 4:9–17). According to Petitioner, Zhu thus teaches the claimed electrical connection permitting power to flow from the AC input and input inductive coil to the internal battery to charge it. *Id.* (citing Ex. 1003, Phinney Decl. ¶ 76). Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 3.4.

f) Claim Limitation 3.5

Petitioner identifies as claim limitation 3.5 the recitation “wherein the auxiliary power unit charges the battery with electrical power supplied from the first power input unit or the second power input unit to the input terminal, or charges the battery and, at the same time, provides the electrical power to the wireless power transmission unit through the output terminal.” Pet. 40. Petitioner refers to the evidence cited in its discussion of claim limitation 3.4 and notes that, to facilitate battery charging, the auxiliary power unit includes battery charger 62 and charge control switch 66. Pet. 40–41 (citing Ex. 1005, 4:9–22, 5:2–3). Petitioner also notes that, when there is no load, all the power is routed to the battery via charge control switch 66 (a part of the auxiliary power unit) and that, when a load is present, after the necessary power is routed to the load, any power that remains is diverted by power path controller 60 to battery charger 62 to charge battery 70. *Id.* at 41–42. As a result, the input power charges the load and the internal battery as claimed. Pet. 42 (citing Ex. 1003 ¶¶ 79–80).

Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 3.5.

g) Claim Limitation 3.6

Petitioner identifies as claim limitation 3.6 the recitation “[the auxiliary power unit] provides the electrical power stored in the battery to the wireless power transmission unit through the output terminal when the electrical power supplied from the first power input unit and the second power input unit to the input terminal is cut off.” Pet. 43. Petitioner cites Zhu as disclosing that, if there is no input source (i.e., the first power unit and the second power unit are cut off) and there is enough energy in the battery, “charge control switch 66 (part of the *auxiliary power unit*) is turned on and provides current from the battery 70 to the output inductive coil 75 when power from the AC power input and input inductive coil is cut off.” Pet. 43–44 (citing Ex. 1005, 6:18–21; Ex. 1003 ¶¶ 81–82).

According to Patent Owner, Petitioner “erroneously equates there being no input source with electrical power being cut off.” PO Resp. 14. Patent Owner states that Zhu’s having no input source because it is not plugged in “is not the same as having power cut off.” *Id.* On this point, Patent Owner’s argument is unavailing. Without further qualification, the ’652 patent describes the electrical power supplied to main terminal 301 as “cut off” when power units 110 and 120 “are disconnected.” Ex. 1001, 6:26–33. Patent Owner also argues that, because Zhu teaches “microcontroller 80 checks the battery once the button is pushed (i.e. ‘once signalled to’),” Zhu teaches that user interaction is required before the

battery provides power to an external device.⁴ PO Resp. 14. We addressed this same issue in our dissuasion of limitation 1.4. Limitation 3.6 does not recite any additional limitation that precludes intervening actions from triggering the supply of power at times when the external power is not present, e.g., is disconnected.

Based on the arguments and evidence of record, we determine that Petitioner has demonstrated Zhu teaches claim limitation 3.6.

h) Claim 3 conclusion

Having considered all the arguments and evidence of record, for the reasons discussed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 3 is unpatentable as obvious over Zhu.

3. Claim 4

Claim 4 depends from claim 3. We address the additional limitations of claim 4 below.

a) Claim Limitation 4.1

Petitioner identifies as claim limitation 4.1 the recitation “a charge/discharge module which charges the battery with the electrical power supplied from the first power input unit or the second power input unit to the input terminal and generates electrical power by discharging the battery when the electrical power supplied from the first power input unit and the second power input unit is cut off.” Pet. 45. Petitioner references the

⁴ Patent Owner argues that “once signaled to” (Ex. 1005, 9:18–21) refers to “once the button 87 is pushed” (*id.* at 9:13–17) in the previous paragraph, i.e., signaling to microcontroller 80 that a user pushed button 87. PO Resp. 11–12. Petitioner disputes this. See Reply 9–11 (arguing claim construction).

evidence discussed with respect to claim limitations 3.5 and 3.6, noting that under no-load conditions power path controller 60 sends power to battery charger 62 and charge control switch 66 (the claimed charge/discharge module), which controls current flow into and out of the battery, sends the power to the battery charger 62 to charge battery 70. *Id.* (citing Ex. 1005, 6:22–27). The power is provided by the AC input unit 52 and inductive coil 53. *Id.* (citing Ex. 1005, 4:9–17). Referencing its discussion of claim limitation 3.4, Petitioner also notes that, when there is no input source and a load is present, if there is sufficient charge in the battery, Zhu’s charge control switch 66 is turned on, and current flows from battery 70 to wireless power transmitter 73 and output inductive coil 75. *Id.* (citing Ex. 1005, 6:18–21).

b) Claim Limitation 4.2

Petitioner identifies as claim limitation 4.2 the recitation “a boost converter which boosts the voltage of the electrical power generated by the charge/discharge module and provides the boosted voltage to the output terminal.” Pet. 47. Petitioner notes that Zhu’s battery 70 outputs voltage between 3.4V and 4.2V and that Zhu discloses an embodiment with a DC/DC converter (the claimed boost converter) between junction 63 and wireless charger transmitter 73, so that the wireless transmitter and output inductive coil 75 operate at 5V to comply with standards, e.g., the QiTM standard. *Id.* at 47–48; Ex. 1003 ¶¶ 87–88.

c) Patent Owner’s Claim 4 Arguments in Opposition

Patent Owner argues that Petitioner’s arguments as to claim 4 fail for the same reason they fail as to claim limitation 1.6. PO Resp. 14–15. In our discussion above, we determined that Petitioner has demonstrated Zhu discloses the limitations recited in claim 3 from which claim 4 depends, and

limitation 1.6. For the same reasons, we determine Petitioner has demonstrated that Zhu discloses the limitations recited in claim 4.

d) Claim 4 Conclusion

Having considered all the arguments and evidence of record, for the reasons discussed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 4 is unpatentable as obvious over Zhu.

4. Claims 2 and 5

Claim 2 depends from independent claim 1; claim 5 depends from independent claim 3. As the additional limitations in claims 2 and 5 recite the same subject matter, we address claims 2 and 5 together.

a) Analysis

Claims 2 and 5 each recite the wireless charger “further comprising a wired output unit which is connected in parallel to the wireless power transmission unit.” Petitioner notes that Zhu’s portable battery charger includes wired output connector 65, i.e., a USB connector, and that output connector 65 and output inductive coil 93 can be set up in parallel, if the voltage requirements for each output are the same. Pet. 31 (citing Ex. 1005, 3:15–19), *see also* Ex. 1003 ¶¶ 61, 62 (asserting that these teachings render claim 2 obvious).

Patent Owner contends that “[i]n contrast to the ’652 patent, Zhu contemplates multiple wired outputs,” but “does not contemplate parallel wired and wireless outputs.” PO Resp. 15–16 (citing Ex. 1005, 6:15–19). Patent Owner states that “Zhu’s teaching regarding voltage requirements and parallel outputs is made in the context of wired output connectors that are located after a DC/DC converter 68 and power mux 64.” Sur-reply 9 (citing Pet. Reply 15–16; Ex. 1005, 19, Fig. 2). According to Patent Owner, “Zhu

teaches outputs can be set up in parallel ***if the voltage requirements are the same for each output***, but ***not*** if the voltage requirements are different as each output would have its own DC/DC converter.” PO Resp. 15 (emphasis by Patent Owner). Patent Owner argues that if each output has its own DC/DC converter, the outputs are not set up in parallel and that “Zhu actually teaches away from this claim limitation because of the separate DC/DC converters.” Sur-reply 8–9.

Patent Owner also argues that Petitioner conflates Zhu’s teaching of multiple wired connections with Zhu’s teaching of a wired and wireless connection operating at different voltages to erroneously conclude that Zhu teaches the claimed parallel connection. PO Resp. 16. According to Patent Owner, Zhu teaches the voltage requirements for the wireless transmitter are not the same as those of the wired connection and specifically contemplate a DC/DC converter for the wireless connection. PO Resp. 16 (citing Ex. 1005, 9:5–8).

Patent Owner’s arguments are unavailing. Petitioner does not dispute that the ’652 patent describes parallel outputs if the voltage requirements are the same for each output, but disputes Patent Owner’s assertion that the disclosure is limited to wired outputs. Pet. Reply 14–15. The text of Zhu cited by Petitioner states: “[t]he battery charger 2 also has an output connector 65, in one embodiment in the form of a USB connector, however, one skilled in the art would appreciate that one charger may have several outputs, possibly each of a different format. If the voltage requirements are the same for each output, the outputs can be set up in parallel.” Pet. 31; Pet. Reply 14 (citing Ex. 1005, 3:15–19). The text cited by Petitioner describes “one embodiment.” As Petitioner points out, “[i]t is these ‘outputs’ that ‘can

be set up in parallel’ if the voltage requirements are the same.” Pet. Reply 15 (citing Ex. 1005, 3:15–19).

We also agree with Petitioner that Patent Owner’s allegation that Zhu’s wireless and wireless outputs cannot be set up in parallel because their voltage requirements are not the same is “demonstrably false.” *Id.* The subject matter cited by Petitioner from Zhu explicitly describes an embodiment in which a DC/DC converter placed between junction 63 and the wireless transmitter causes wireless transmitter 73 and inductive coil 75 to operate at 5 volts instead of the battery voltage, and in which “microcontroller 80 signals DC/DC converter 68 to open and the current flows from the battery through DC/DC converter 68 (where the voltage is increased to 5V) and out the output connector 65.” *Id.* at 15–16; Ex. 1005, 9:5–8,9:14–17. As noted above, Zhu describes that, in one embodiment, connector 65 is a USB connector. Ex. 1005, 3:15–19.

Having considered all the arguments and evidence of record, we determine that Petitioner has demonstrated that Zhu discloses all the elements of claims 2 and 5.

b) Claim 2 and 5 Conclusions

Having considered all the arguments and evidence of record, for the reasons discussed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2 and 5 are unpatentable as obvious over Zhu.

5. Claim 7

Claim 7 depends from claim 3.

a) Analysis

Claim 7 and recites the wireless charger “further comprising a switch which opens and closes the electrical connection between the first power

input unit and the wireless power transmission unit.” Petitioner notes that Zhu discloses that, when power received from the AC input 52 (the first power input unit) is sent from power path controller 60 into junction 63, a microcontroller determines whether a load is present; if the load is connected to wired output 65, the microcontroller commands junction 63 to route the power through DC/DC converter 68 to wired output 65; if the microcontroller determines a load is present on output inductive coil 75, the microcontroller commands junction 63 to route power to wireless charger transmitter 73 and output inductive coil 75. Pet. 49–50. Petitioner contends that Zhu thus teaches the claimed switch in the form of junction 63, as controlled by the microcontroller. *Id.* Patent Owner does not present any arguments directed to claim 7. *See generally* PO Resp.

b) Claim 7 Conclusion

Having considered all the arguments and evidence of record, for the reasons discussed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 7 is unpatentable as obvious over Zhu.

VIII. CONCLUSION⁵

Having considered all the arguments and evidence of record, for the reasons discussed above, we determine that Petitioner has demonstrated by a

⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent

preponderance of the evidence that claims 1–5 and 7 under 35 U.S.C. § 103 are unpatentable as obvious over Zhu.

In summary:

Claims	35 U.S.C. §	Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–5, 7	103	Zhu	1–5, 7	

IX. ORDER

In consideration of the above it is:

ORDERED that claims 1–5 and 7 are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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Patent 9,490,652 B2

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