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Paper 23
Date: June 11, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THE NOCO COMPANY, INC.,
Petitioner,

v.

PILOT, INC.,
Patent Owner.

IPR2023-00167
Patent 11,235,673

Before JEFFREY W. ABRAHAM, JULIA HEANEY, and STEVEN M. AMUNDSON, *Administrative Patent Judges*.

HEANEY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Dismissing Petitioner's Motion to Enter Judgment Under Collateral Estoppel and 37 C.F.R. § 42.73(D)(3)

35 U.S.C. § 318(a)

I. INTRODUCTION

The NOCO Company, Inc. ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–24 in U.S. Patent No. 11,235,673 B2 (Exhibit 1001, "the '673 patent") under 35 U.S.C. §§ 311–319. Paper 1 ("Pet.").

We instituted review based on all challenged claims and all challenges included in the Petition. Paper 6. During the course of trial, Patent Owner filed a Patent Owner Response (Paper 8, "PO Resp."), and Petitioner filed a Reply to the Patent Owner Response (Paper 16, "Pet. Reply"). Petitioner filed the Declaration of Jonathan R. Wood, Ph.D. (Ex. 1003) in support of the Petition. Patent Owner filed the Declaration of Joseph C. McAlexander III (Ex. 2001) with its Response.

With our authorization (Ex. 3001), Petitioner filed a motion for entry of judgment on the basis of collateral estoppel and 37 C.F.R. § 42.73(d)(3) due to the Final Written Decision in IPR2022-01237 finding all challenged claims of related U.S. Patent No. 11,127,077 unpatentable. Paper 20.[1]

We have jurisdiction under 35 U.S.C. § 6. We issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons explained below, Petitioner has shown by a preponderance of the evidence that claims 1–24 in the '673 patent are unpatentable. *See* 35 U.S.C. § 316(e) (2018).

[1] Because we find that Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable even when considering Patent Owner's arguments on the merits, we dismiss Petitioner's motion as moot.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 75. Patent Owner identifies itself as the real party in interest. Paper 3, 1.

B. Related Matters

The parties identify the following litigation involving the '673 patent: *Pilot, Inc. v. The NOCO Company, Inc.*, No. 2:22-cv-00389 (D. Ariz.). Pet. 75; Paper 3, 2. Petitioner also indicates that it filed a petition requesting review of U.S. Patent No. 11,124,077 in IPR2022-01237, which includes claims that are substantially similar to the claims of the '673 patent. Pet. 75.

C. The '673 Patent (Exhibit 1001)

The '673 patent, titled "Automobile Charger," is directed to "a novel automobile charger with a safe power supply charging quickly." Ex. 1001, code (54), 1:24–25. The '673 patent describes problems with conventional automobile chargers. *See* Ex. 1001, 1:30–36. For instance, the patent states that "current automobile chargers have common problems" because they cannot "automatically detect" the following:

(1) "whether a load is connected";

(2) "whether an electrode is connected with an automobile storage battery reversely";

(3) "whether an automobile engine or the storage battery has a reverse current"; and

(4) "whether the battery state is suitable for heavy current power generation."

Id. at 1:30–36. The patent purports to address those problems with "a novel automobile charger with the safe power supply charging quickly." *Id.* at 1:37–38, 1:44–46.

The '673 patent aims to solve these problems, and depicts one solution in Figure 1, reproduced below.

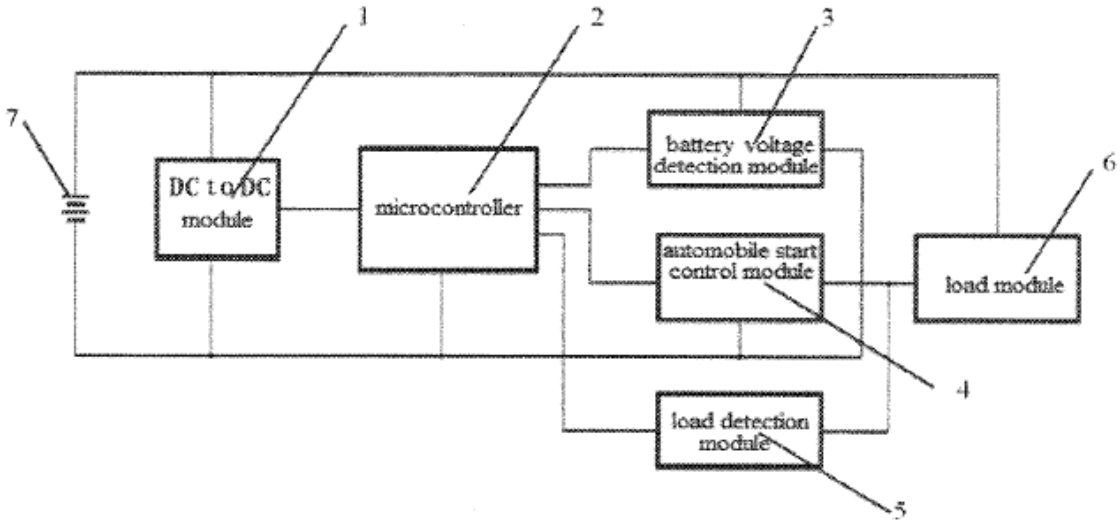

Figure 1 is a block diagram showing an embodiment of the automobile charger, including DC-to-DC module 1, microcontroller 2, voltage detection module 3, automobile start control module 4 (an electronic switch), load detection module 5, load module 6 (comprising the automobile battery and engine), and direct current power supply 7 (the jump starter battery). *Id.* at 2:32, 3:1–4, 3:35–37.

The '673 patent explains that the DC-to-DC module provides "the stable voltage for the microcontroller which collects relevant data" and the microcontroller "determines whether the automobile storage battery is connected with the automobile engine through the load detection module." Ex. 1001, 4:16–21, 4:25–27. The positive pole of the direct current power supply is connected with one lead of the DC-to-DC module, one end of the battery voltage detection module and one end of the load module; the negative pole of the direct current voltage is connected with the other end of the DC-to-DC module, one end of the microcontroller, one end of the automobile start control module and the other end of the battery voltage

detection module. *Id.* at 3:18–26. When the load is correctly connected, the automobile start control module is automatically activated, and the battery starts to supply power to the load module. *Id.* at 4:22–24. If the load is not connected, or positive and negative polarities are reversed, the automobile start control module is automatically deactivated, and the battery stops supplying power to the load module. *Id.* at 4:25–35.

The '673 patent further explains that the automobile start control module conducts the power supply for the load module through the microcontroller (Ex. 1001, 2:7–11), which collects relevant data to conduct the corresponding control (*id.* at 2:4–6). In a standby mode, the microcontroller closes all outputs when the voltage of the direct current power supply is lower than that of the state being able to supply power and then recovers when it is higher than that of the state being able to supply power. *Id.* at 2:25–30; *see also id.* at 4:36–38 ("the microcontroller closes all outputs when the battery voltage is lower than 9V, and recovers the normal operation only when the battery voltage is larger than 10V").

The '673 patent states that its automobile charger provides benefits over prior art devices, including, *inter alia*, (1) controlling the supply power for the load, which "can offer more protection for the product, and reduce the product size and material cost," (2) providing low voltage protection to prevent damage caused by over-discharging the battery, (3) preventing improper operations by the user, such as reversed polarity, which can cause damage to the automobile or direct current power supply, and (4) employing voltage backflow protection for an abnormal load, "wherein the automobile start line is closed to protect the battery when an abnormal voltage is detected." Ex. 1001, 2:7–49.

Figure 2 of the '673 patent, reproduced below, depicts a circuit diagram for an automobile charger:

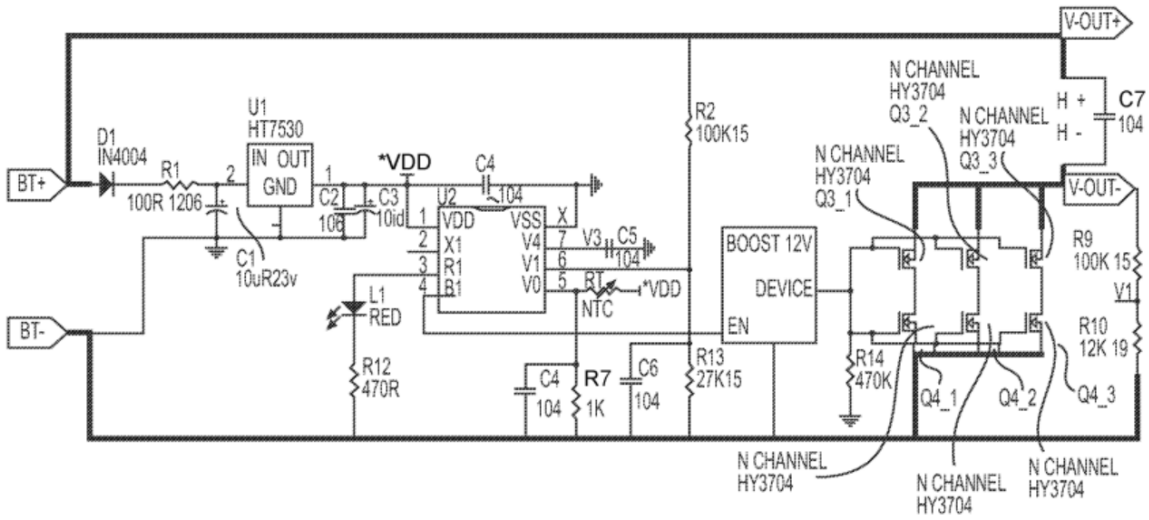

Figure 2

Figure 2 illustrates an automobile charger including microcontroller U2 and the modules illustrated in Figure 1, except the load module (the automobile storage battery and the automobile engine). *See* Ex. 1001, 2:64–65, 3:36–4:12, Figs. 1–2.

As an example, the DC-to-DC module in Figure 2 comprises "a diode D1, a resistor R1, capacitor C1, a HT7530 voltage stabilizing tube, [and] capacitors C2 and C3." Ex. 1001, 3:39–40, Fig. 2. As another example, the battery voltage detection module in Figure 2 comprises "resistors R2, R13 and capacitor C6." *Id.* at 4:9, Fig. 2. As another example, the load detection module in Figure 2 comprises "capacitor C7, resistors R9, 10, a capacitor C6 and a resistor R13." *Id.* at 4:2–3, Fig. 2.

Additionally, Figure 2 depicts electronic switching circuitry comprising a plurality of n-channel transistors identified as Q3_1, Q3_2, Q3_3, Q4_1, Q4_2, and Q4_3. Ex. 1001, Fig. 2; *see id.* at 2:13–15, 2:32,

4:42. Further, Figure 2 shows Q3_1, Q3_2, and Q3_3 connected to a negative terminal (V-OUT-) of a depleted battery and Q4_1, Q4_2, and Q4_3 connected to a negative terminal (BT-) of a power-supply battery. *Id.* at Fig. 2.

D. The Challenged Claims

Petitioner challenges claims 1–24 ("the challenged claims"). Pet. 1.

Claim 1, the sole independent claim, exemplifies the challenged claims and is reproduced below (with formatting added for clarity and with bracketed numbers and letters[2] added for reference purposes):

1. A charger comprising:

[1(a)] a microcontroller;

[1(b)(i)] a battery connected to a voltage regulator,

[1(b)(ii)] the battery capable of supplying power, via the voltage regulator, to the microcontroller,

[1(b)(iii)] the battery also capable of supplying power to an automobile battery when the battery has a predetermined voltage;

[1(c)(i)] a load detector circuit, connected to the microcontroller, to detect when the charger is correctly connected to the automobile battery,

[1(c)(ii)] and the microcontroller generating an output signal, when the charger is correctly connected the automobile battery; and

[1(d)] switching circuitry, including at least one switch, to operatively connect the battery to the automobile battery when

[2] We use the same numbers and letters that Petitioner uses to identify the claim language. *See* Pet. 21–29.

the microcontroller generates the output signal to supply a charge to the automobile battery.

Ex. 1001, 5:15–30.

E. Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Ground No.	Challenged Claim(s)	35 U.S.C. §[3]	Reference(s)/Basis
1	1, 2, 4–7, 12–14, 18–22	103	Krieger[4]
2	23	103	Krieger, Baxter[5]
3	16, 17	103	Krieger, Tracey[6]
4	1–10, 12–15, 18–22, 24	103	Richardson[7]
5	11	103	Richardson, Lai[8]
6	16, 17	103	Richardson, Tracey
7	13, 14, 18–22	103	Richardson, Krieger
8	23	103	Richardson, Krieger, Baxter

Pet. 6–7.

[3] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the challenged claims have an effective filing date after March 16, 2013, we apply the AIA versions of the statutory bases for unpatentability.

[4] US 2004/0130298 A1 to Krieger et al., published July 8, 2004 (Ex. 1005).

[5] US 2010/0173182 A1 to Baxter et al., published July 8, 2010 (Ex. 1006).

[6] WO 2012/080996 A1 to Tracey et al., published June 21, 2012 (Ex. 1007).

[7] US 2013/0154543 A1 to Richardson et al., published June 20, 2013 (Ex. 1004).

[8] US 8,232,772 B2 to Lai et al., issued July 31, 2012 (Ex. 1008).

III. PATENTABILITY ANALYSIS

A. Legal Principles: Obviousness

A patent may not be obtained "if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains." 35 U.S.C. § 103. An obviousness analysis involves underlying factual inquiries including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective indicia of nonobviousness, such as commercial success, long-felt but unsolved needs, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18, 35–36 (1966); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–48 (Fed. Cir. 2016) (en banc). When evaluating a combination of references, an obviousness analysis should address "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Notwithstanding what the teachings of the prior art would have suggested to a person of ordinary skill in the art, objective evidence of non-obviousness may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence of non-obviousness "may often be the most probative and cogent evidence in the record" and "may often establish that an invention appearing to have been obvious in light of the prior art was not." *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (quoting *Stratoflex, Inc. v.*

Aeroquip Corp., 713 F.2d 1530, 1538 (Fed. Cir. 1983)). Such evidence, however, does not necessarily control the obviousness conclusion. *See, e.g., Pfizer, Inc. v. Apotex, Inc.* 480 F.3d 1348, 1372 (Fed. Cir. 2007) ("Here, the record establishes such a strong case of obviousness that Pfizer's alleged unexpectedly superior results are ultimately insufficient.").

We analyze the obviousness issues according to these principles.

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner argues a person of ordinary skill in the art at the time of the alleged invention would have had "at least a Bachelor's Degree in a relevant engineering discipline such as electrical engineering and at least two years of relevant experience in the design and/or development of automotive electrical systems, or a Masters or more advanced degree in a relevant engineering discipline such as electrical engineering." Pet. 5. Dr. Wood's

testimony supports Petitioner's assertion. *See* Ex. 1003 ¶ 46. Patent Owner does not dispute the level of skill in the art.

We adopt Petitioner's description of an ordinarily skilled artisan as consistent with the '673 patent and the asserted prior art.

C. Claim Construction

We construe claim terms "using the same claim construction standard" that district courts use to construe claim terms in civil actions under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b) (2023). Under that standard, claim terms "are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention." *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by "look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner does not propose an explicit construction for any claim term. *See, e.g.*, Pet. 7. Patent Owner does not propose an explicit construction for any claim term. *See* PO Resp.

"[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). We determine that no claim term requires an explicit

construction to decide whether Petitioner satisfies the "preponderance of the evidence" standard for proving unpatentability.

D. Alleged Obviousness over Richardson: Claims 1–10, 12–15, 18–22, and 24

Petitioner contends that claims 1–10, 12–15, 18–22, and 24 are unpatentable under § 103 as obvious over Richardson. *See* Pet. 43–66.[9] For the reasons explained below, we agree with Petitioner that claims 1–10, 12–15, 18–22, and 24 are unpatentable under § 103 as obvious over Richardson.

1. Objective Indicia of Nonobviousness

Patent Owner alleges there is evidence supporting the objective indicia of nonobviousness of commercial success, long-felt need, skepticism of experts, teaching away by others, recognition of a problem, and copying of the invention by competitors. PO Resp. 14. Patent Owner argues it is "entitled to a presumption of nexus because its commercial embodiment uses the same circuit and programming as described and claimed in the '673 patent." *Id.* at 15.

Patent Owner bears the burden of establishing that a nexus exists between the objective evidence and the claimed invention. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019). Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining non-obviousness. *Demaco Corp. v. F. Von*

[9] Throughout their papers, the parties have italicized reference names and certain portions of text. *See, e.g.,* Pet. 43, PO Resp. 28. For consistency and readability, we remove all such emphasis in our quotation of the parties' papers, except where noted.

Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (Fed. Cir. 1988). "A nexus may not exist where, for example, the merits of the claimed invention were 'readily available in the prior art.'" *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016) (quoting *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed. Cir. 1983)). Further, "there is no nexus unless the evidence presented is 'reasonably commensurate with the scope of the claims.'" *Id.* (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)).

A patentee is entitled to a presumption of nexus "when the patentee shows that the asserted objective evidence is tied to a specific product and that product 'embodies the claimed features, and is coextensive with them.'" *Fox Factory*, 944 F.3d at 1373 (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). "[I]f the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus." *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000). Coextensive "mean[s] that the product 'is the invention disclosed and claimed'. . . . A product is 'essentially the claimed invention when, for example, the unclaimed features amount to nothing more than additional insignificant features.'" *Campbell Soup Co. v. Gamon Plus, Inc.*, 10 F.4th 1268, 1276–77 (Fed. Cir. 2021) (emphasis and citation omitted).

In *Zaxcom, Inc. v. Lectrosonics, Inc.*, the Federal Circuit indicated that *Fox Factory's* "coextensiveness" requirement is the same as the "commensurate in scope" standard regarding the "presumption of nexus." 2022 WL 499843 at *2 (Fed. Cir. Feb. 18, 2022) (published only in

Westlaw) (citing *Fox Factory,* 944 F.3d at 1373). Specifically, the court held that "the Board determined that Zaxcom's evidence of industry praise and long-felt need was entitled to *a presumption of nexus*, *noting that these indicia were commensurate in scope with the claims as now narrowed*, . . . a determination that comports with the legal standards for a presumption." *Id.* "Ultimately, the fact finder must weigh the [objective indicia] evidence presented in the context of whether the claimed invention as a whole would have been obvious to a skilled artisan." *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 33 (PTAB Jan. 24, 2020) (precedential) (citing *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331–32 (Fed. Cir. 2016)).

Patent Owner relies on its commercial products as embodiments of the '673 patent, for objective indicia of nonobviousness. For example, Patent Owner argues its products achieved commercial success because they "used the same circuit disclosed in Figure 2 of the '673 Patent and both products were programmed to function as described in the '673 Patent." PO Resp. 17. As to long-felt need and failure of others, Patent Owner points to

> the large number of manufacturers of lithium-based jump starters attempting to sell products in the United States but failing to produce a product safe enough for companies like Lowes to feel comfortable providing them to its customers until Pilot's patent application published, allowing other manufacturers to copy the disclosed invention.

Id. at 18. In essence, Patent Owner argues that the safety features described in the '673 patent created the retail market for portable lithium-ion jump starters. *Id.* at 14–19.

We find that Patent Owner's arguments incorrectly apply the legal standard for nexus, and Patent Owner's evidence of objective indicia is not coextensive or commensurate in scope with the challenged claims. Patent

Owner fails to connect any claim of the '673 patent to any feature of its commercial products which allegedly achieved commercial success. *See* PO Resp. 14–19. Patent Owner's reliance on Figure 2 of the '673 patent, or another part of the specification, is insufficient because it does not tie the commercial products to the challenged claims. Therefore, Patent Owner has failed to show that it is entitled to a presumption of a nexus between the objective evidence and the claimed invention.

We also find that Patent Owner presents insufficient evidence to establish a nexus by the alternative route of showing its objective indicia are the "direct result of the unique characteristics of the claimed invention" rather than a feature that was known in the prior art. *Fox Factory,* 944 F.3d at 1373–74. Patent Owner does not present argument as to unique characteristics of the claimed invention that were not already described in Richardson or Krieger, or provide evidence to support such an analysis. *See* PO Resp. 14–19.

In summary, Patent Owner does not meet its burden to show a presumption of nexus, or show a nexus to the alleged objective indicia of commercial success, long-felt need, skepticism of experts, teaching away by others, recognition of a problem, and copying of the invention by competitors. The failure to show a nexus is fatal to Patent Owner's contention regarding objective indicia. With this determination in mind, we turn to the evidence and argument regarding the remaining *Graham* factors in evaluating Petitioner's obviousness contentions as to each of the challenged claims.

2. OVERVIEW OF RICHARDSON (EXHIBIT 1004)

Richardson is a U.S. patent application publication titled "Method and Apparatus for Providing Supplemental Power to an Engine," filed on February 15, 2013, and published on June 20, 2013. Ex. 1004, codes (12), (22), (43), (54). Richardson states that the invention relates "to a portable power source for a motor vehicle," and more particularly "to a method and apparatus to provide supplemental power to start internal combustion and turbine engines." *Id.* ¶ 2; *see id.* at code (57).

Richardson describes potential problems due to "the use of conventional jumper cables." *See* Ex. 1004 ¶ 5. For instance, if "the batteries are cross-connected or the clamps inadvertently contact each other when one end of the jumper cables is connected to a battery, sparking can occur resulting in damage to the battery, the electrical system of the vehicle, and injury to the user of the jumper cables." *Id.* Further, if "the jumper cables are not properly connected, there is a potential for the batteries exploding and fire, which may result in injury to those in proximity to the vehicle being jumped." *Id.*

To address those issues, Richardson discloses a portable supplemental power source or jump starter that:

(1) includes "one or more internal batteries and capacitors to provide the power to" a depleted battery; and

(2) monitors (a) the voltage of the depleted battery and (b) "the current delivered by the jump starter batteries and capacitors" to "determine if a proper connection has been established and to provide fault monitoring."

Ex. 1004 ¶ 7; *see id.* ¶¶ 8, 14, code (57), Fig. 1. "For safety purposes, only if the proper polarity is detected can the system operate." *Id.* ¶ 7; *see id.* at code (57).

"Once the vehicle is started, the vehicle's electrical system may recharge the batteries and capacitors before the unit automatically electrically disconnects from the vehicle's battery." Ex. 1004 ¶ 7; *see id.* ¶ 55, Fig. 1. Recharging permits the batteries and capacitors "to be fully recharged in about 1 to 5 minutes and can therefore start many vehicles in a row without becoming discharged." *Id.* ¶ 55.

Richardson's Figure 1 (reproduced below) depicts a jump starter:

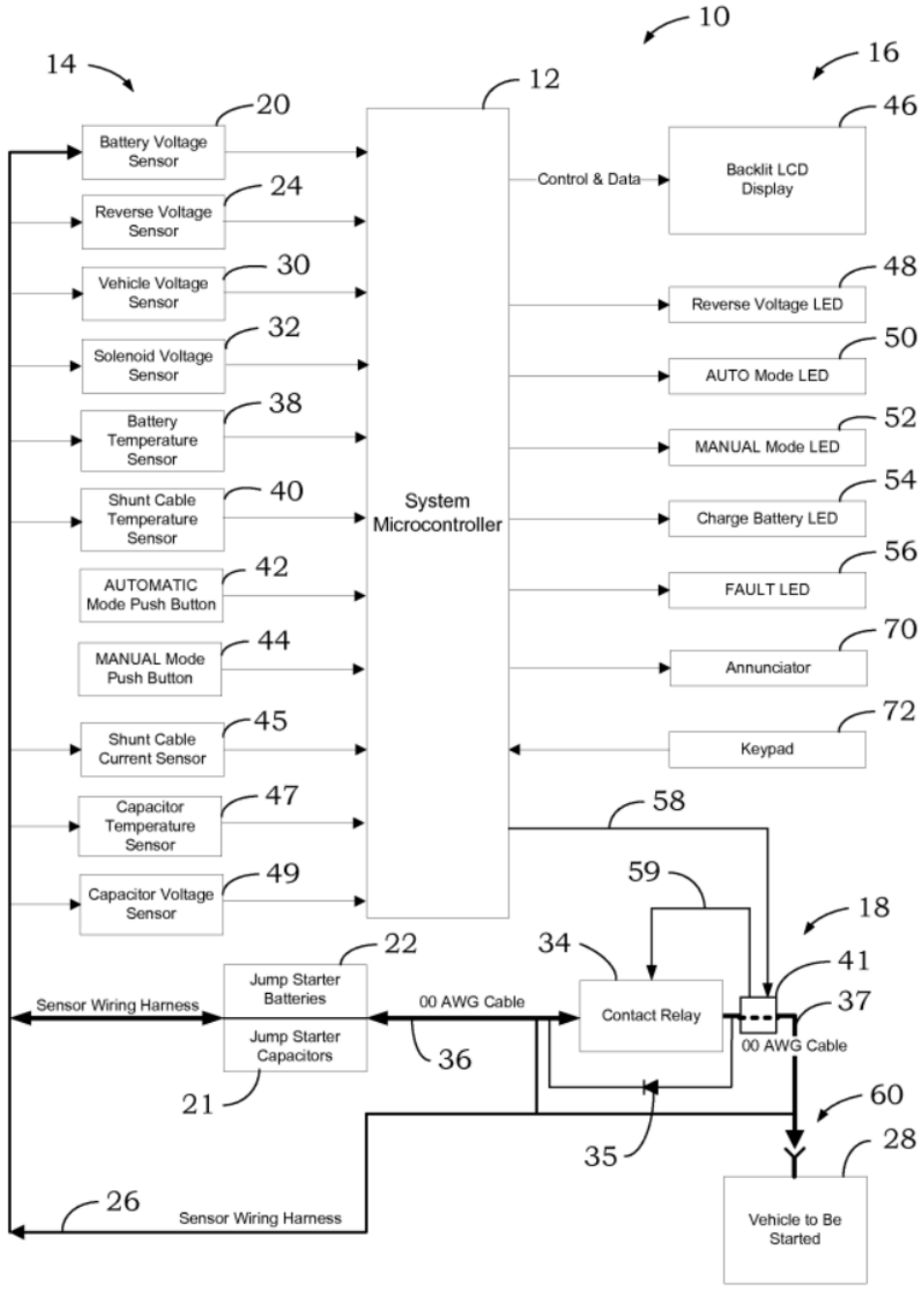

Fig. 1

Figure 1 illustrates jump starter 10 including microprocessor 12, jump starter capacitors 21, jump starter batteries 22, contact relay 34, jumper cables 60, various sensors, and various mechanisms for providing information to a

user. Ex. 1004 ¶¶ 14–16, 20, 27, Fig. 1. For example, LCD display 46 may "display user instructions, error messages, and real-time sensor data during operation of the jump starter 10." *Id.* ¶ 20, Fig. 1.

Microprocessor 12 "receives inputs 14 and produces informational outputs 16 and control outputs 18." Ex. 1004 ¶ 14, Fig. 1; *see id.* ¶¶ 20–21. Microprocessor 12 receives inputs from, among other things, the following sensors:

(1) "battery voltage sensor 20" that "monitors the voltage level of one or more jump starter batteries 22";

(2) "reverse voltage sensor 24" that "monitors the polarity of the jumper cables on line 26 which are connected to the vehicle's electrical system" to "determine if the cables have been properly connected to the vehicle"; and

(3) "vehicle voltage sensor 30" that "monitors the voltage on line 37 (voltage of the vehicle)."

Id. ¶¶ 14, 16, 27, Fig. 1.

Microprocessor 12 includes contact relay control output 58 that "operates the contact relay 34 through temperature sensor 41." Ex. 1004 ¶ 21, Fig. 1. "When the jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter capacitors 21 and batteries 22 are connected to the starter system or batteries of the vehicle to be started 28." *Id.* ¶ 21. "The contact relay 34 is opened when a successful start cycle has been completed, a start fault has occurred or the operator interrupts the jump starter cycle." *Id.*

3. INDEPENDENT CLAIM 1

(a) Preamble

Claim 1 recites a "charger." Ex. 1001, 5:14.

Petitioner contends that Richardson teaches claim 1's preamble because Richardson discloses a "portable supplemental power source (jump starter) of the present invention [that] is generally indicated by reference numeral 10." Pet. 44 (alteration by Petitioner) (quoting Ex. 1004 ¶ 14).

Generally, a preamble does not limit a claim. *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). We need not decide whether claim 1's preamble limits the claim because we agree with Petitioner that Richardson teaches claim 1's preamble. *See* Pet. 44; Ex. 1003 ¶¶ 56–58, 123.

(b) Limitation 1(a)

Claim 1 recites "a microcontroller." Ex. 1001, 5:15 (limitation 1(a)). Petitioner contends that Richardson teaches limitation 1(a) because Richardson discloses "jump starter 10 includes a programmable microprocessor 12 which receives inputs 14 and produces informational outputs 16 and control outputs 18." Pet. 45 (quoting Ex. 1004 ¶ 14).

For the reasons stated by Petitioner and supported by Dr. Wood's testimony (Ex. 1003 ¶ 124), we agree with Petitioner that Richardson teaches limitation 1(a).

(c) Limitation 1(b)(i)

Claim 1 recites "a battery connected to a voltage regulator." Ex. 1001, 5:16 (limitation 1(b)(i)).

Petitioner contends that Richardson teaches limitation 1(b)(i) because Richardson's microprocessor-controlled jump starter includes the following:

(1) "one or more jump starter batteries 22" as well as "one or more capacitor[s] 21 . . . to provide additional energy storage"; and

(2) a voltage regulator (LM7805) connected to the "one or more jump starter batteries 22."

Pet. 45–46 (alterations by Petitioner) (quoting Ex. 1004 ¶¶ 15–16).

To support its contentions, Petitioner provides a highlighted version of Richardson's Figure 2A as reproduced below (Pet. 46):

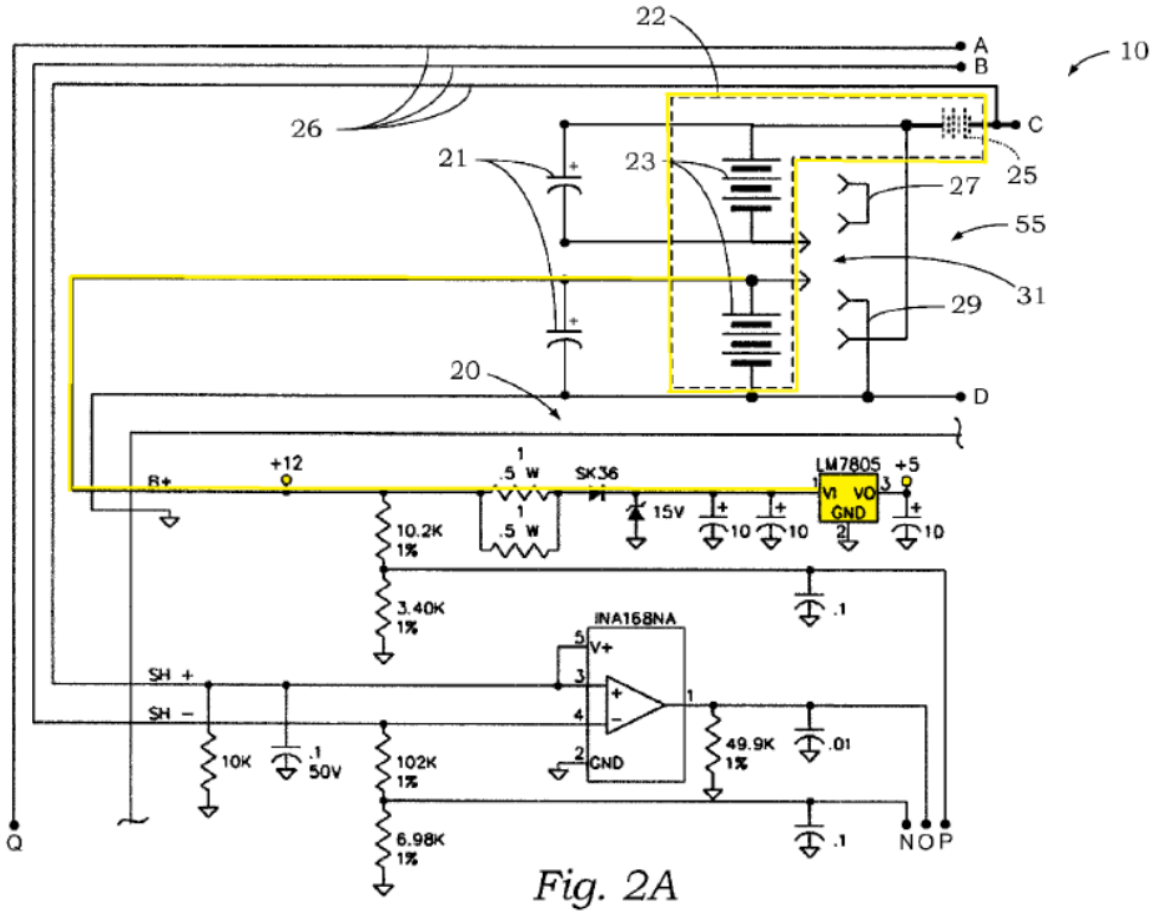

Fig. 2A

Figure 2A is part of a schematic diagram for jump starter 10 together with Figures 2B–2D. Ex. 1004 ¶¶ 9, 22, Fig. 2A. The above highlighted version of Figure 2A includes yellow highlighting over the following parts of the diagram: (1) the dashed lines denoting jump starter batteries 22, i.e., the batteries identified by reference numerals 23 and 25; (2) the component identified as LM7805; and (3) the conductor connecting jump starter

batteries 22 to the component identified as LM7805. *See* Pet. 46; Ex. 1003 ¶ 125.

Further, Dr. Wood testifies that an ordinarily skilled artisan would have "recognized that LM7805 is a standard part number for a voltage regulator." Ex. 1003 ¶ 126 (citing Ex. 1012 (U.S. Patent No. 7,363,129 B1), 9:51–53).

For the reasons stated by Petitioner and supported by Dr. Wood's testimony, we agree with Petitioner that Richardson teaches limitation 1(b)(i). *See* Pet. 45–46; Ex. 1003 ¶¶ 125–126.

(d) Limitation 1(b)(ii)

Claim 1 recites "the battery capable of supplying power, via the voltage regulator, to the microcontroller." Ex. 1001, 5:16–18 (limitation 1(b)(ii)).

Petitioner contends that Richardson teaches limitation 1(b)(ii) because microprocessor 12 "is supplied with power (+5V) from the one or more batteries 22 via the voltage regulator (LM7805)." Pet. 47 (quoting Ex. 1004 ¶ 14).

For the reasons stated by Petitioner and supported by Dr. Wood's testimony, we agree with Petitioner that Richardson teaches limitation 1(b)(ii). *See* Pet. 47; Ex. 1003 ¶ 127.

(e) Limitation 1(b)(iii)

Claim 1 recites "the battery also capable of supplying power to an automobile battery when the battery has predetermined voltage." Ex. 1001, 5:18–20 (limitation 1(b)(iii)).

Petitioner contends that Richardson teaches limitation 1(b)(iii) because Richardson includes "one or more internal batteries [22] and

capacitors [21] to provide the power to the battery of the vehicle to be jump started." Pet. 47–48 (quoting Ex. 1004 ¶ 7). Petitioner also contends that Richardson discloses the following:

> (1) "[w]hen the jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter capacitors 21 and batteries 22 are connected to the starter system or batteries of the vehicle to be started 28";
>
> (2) "[i]f the voltage level of the jump starter batteries 22 drop[s] below a value of twenty percent of the normal level, a charge battery LED 54 is illuminated";
>
> (3) "[t]he charge battery LED 54 remains illuminated until the batteries 22 are charged to a minimum state of charge such as fifty percent, for example"; and
>
> (4) "[i]f the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set," "the event [is] recorded in memory," and the system "prohibits any further jump starter action by the operator until a charging voltage is detected."

Id. at 48–49 (quoting Ex. 1004 ¶¶ 20–21, 28).

According to Petitioner, "the boosting battery is 'capable' of supplying power to an automobile battery when the [boosting] battery has at least a predetermined voltage, i.e., the jump starter batteries 22 are charged to a minimum state of charge such as fifty percent." Pet. 48.

For the reasons stated by Petitioner and supported by Dr. Wood's testimony, we agree with Petitioner that Richardson teaches limitation 1(b)(iii). *See* Pet. 47–49; Ex. 1003 ¶¶ 128–130.

(f) Limitation 1(c)(i)

Claim 1 recites "a load detector circuit, connected to the microcontroller, to detect when the charger is correctly connected to the automobile battery." Ex. 1001, 5:21–23 (limitation 1(c)(i)).

Petitioner contends that Richardson teaches limitation 1(c)(i) because Richardson includes reverse voltage sensor 24 and vehicle voltage sensor 30 (both connected to microprocessor 12) that respectively monitor the polarity of the jumper cables connected to the vehicle battery and the voltage of the vehicle battery to detect possible fault conditions, such as a disconnected vehicle battery. Pet. 49–50 (citing Ex. 1004 ¶¶ 16, 20, 27, 36, 41).

To support its contention, Petitioner provides a highlighted excerpt from Richardson's Figure 1 as reproduced below (Pet. 50):

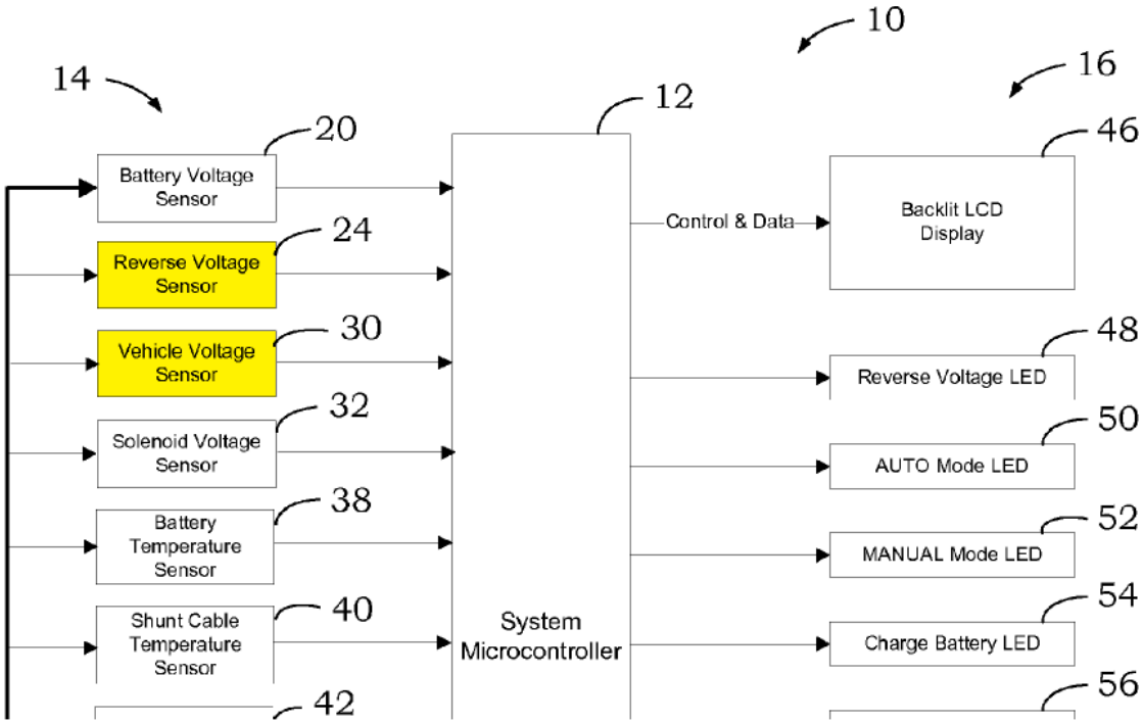

Figure 1 illustrates jump starter 10 including microprocessor 12 and various sensors. Ex. 1004 ¶¶ 14–16, 20, 27, Fig. 1. The above highlighted excerpt from Figure 1 has yellow highlighting over the following sensors:

(1) reverse voltage sensor 24 that monitors the "polarity of the jumper cables" connected to the vehicle's electrical system and supplies an input to microprocessor 12; and

(2) vehicle voltage sensor 30 that monitors the "voltage of the vehicle" and supplies an input to microprocessor 12.

See Pet. 50–51; Ex. 1003 ¶¶ 133–134; Ex. 1004 ¶¶ 14, 16, Fig. 1.

Petitioner asserts that reverse voltage sensor 24 "monitors the polarity of the jumper cables on line 26 which are connected to the vehicle's electrical system" and determines whether the jumper cables "have been properly connected to the vehicle." Pet. 50–51 (quoting Ex. 1004 ¶¶ 16, 27). Petitioner asserts that vehicle voltage sensor 30 "monitors the voltage on line 37 (voltage of the vehicle)" and determines whether one of the jumper cables "has been disconnected" from "the vehicle's battery or starter system." *Id.* (quoting Ex. 1004 ¶¶ 16, 41).

According to Petitioner, an ordinarily skilled artisan would have understood that Richardson's reverse voltage sensor 24 and vehicle voltage sensor 30 "are part of a 'load detector circuit' connected to" microprocessor 12 that detects "when the jump starter 10 is correctly connected to the automobile battery 28." Pet. 51–52 (citing Ex. 1003 ¶ 135).

We agree with Petitioner that Richardson teaches limitation 1(c)(i). *See* Pet. 49–52; Ex. 1003 ¶¶ 60–61, 63, 126–131. In Richardson's microprocessor-controlled jump starter, microprocessor 12 employs various sensors to determine whether one of the jumper cables "has been disconnected" from "the vehicle's battery or starter system" and whether the jumper cables "have been properly connected to the vehicle." Ex. 1004 ¶¶ 16, 20, 27–28, 41; *see* Ex. 1003 ¶¶ 60–61, 63, 126, 128–130.

As an example, if "the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22," then (1) "a reverse polarity connection of the jumper cables to the vehicle is determined," (2) "an error flag is set," (3) "the event [is] saved in non-volatile memory," (4) a "'Reverse Polarity' error message is displayed," (5) "the reverse voltage LED 48 is illuminated," and (6) "further jump starter action by the operator is ignored until the reverse polarity condition is corrected." Ex. 1004 ¶ 27; *see id.* ¶ 20; Ex. 1003 ¶¶ 60, 129.

As another example, if "the system detects an increase in the difference between the measured jump starter battery voltage 20 and the voltage measured 30 across the contact relay 34 indicating that one of the jump starter cables has been disconnected" from "the vehicle's battery or starter system," then (1) "a jumper cable unplugged error count is incremented," (2) a "'Jumper Cable Unplugged' error message is displayed," (3) "the contact relay 34 is opened," and (4) "the fault LED 56 is illuminated." Ex. 1004 ¶¶ 41–42; *see id.* ¶ 36; Ex. 1003 ¶¶ 63, 130.

As yet another example, if "the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level," then (1) "an error flag is set," (2) "the event [is] recorded in memory," (3) the "charge battery LED 54 is illuminated," and (4) "the LCD 46 displays a 'Charge Battery' message." Ex. 1004 ¶¶ 28–29; *see id.* ¶ 20; Ex. 1003 ¶¶ 61, 126.

(f) Limitation 1(c)(ii)

Claim 1 recites "the microcontroller generating an output signal, when the charger is correctly connected the automobile battery." Ex. 1001, 5:23–25 (limitation 1(c)(ii)).

Petitioner contends that Richardson teaches limitation 1(c)(ii) because microprocessor 12 in Richardson's microprocessor-controlled jump starter includes contact relay control output 58 that "operates the contact relay 34 through temperature sensor 41." Pet. 52 (quoting Ex. 1004 ¶ 21). Petitioner quotes Richardson's disclosure about how the jump starter functions as follows: "When the jump starter operation has been successfully initiated, the contact relay 34 is closed and the jump starter capacitors 21 and batteries 22 are connected to the starter system or batteries of the vehicle to be started 28." *Id.* (quoting Ex. 1004 ¶ 21). According to Petitioner, "control of the contact relay 34 by the microprocessor 12 is conditioned on a determination that the automobile battery is correctly connected." *Id.*

For the reasons stated by Petitioner and supported by Dr. Wood's testimony, we agree with Petitioner that Richardson teaches limitation 1(c)(ii). *See* Pet. 52–53; Ex. 1003 ¶ 132.

(g) Limitation 1(d)

Claim 1 recites "switching circuitry, including at least one switch, to operatively connect the battery to the automobile battery when the microcontroller generates the output signal to supply a charge to the automobile battery." Ex. 1001, 5:26–29 (limitation 1(d)).

Petitioner contends that Richardson teaches limitation 1(d) because contact relay 34 in Richardson's microprocessor-controlled jump starter "connects the jump starter batteries 22 to the automobile battery 28 when the microprocessor 12 generates the contact relay control output signal 58 to supply charging current to the automobile battery 28." Pet. 53–54 (citing Ex. 1004 ¶ 21).

For the reasons stated by Petitioner and supported by Dr. Wood's testimony, we agree with Petitioner that Richardson teaches limitation 1(d). *See* Pet. 53–54; Ex. 1003 ¶¶ 133–134.

(h) Conclusion

For the reasons discussed above, Richardson teaches all of the elements of claim 1. *See supra* §§ III.D.3(a)–(g). Petitioner has shown by a preponderance of the evidence that claim 1 is unpatentable under § 103 as obvious over Richardson.

4. DEPENDENT CLAIM 24

Claim 24 depends from claim 1 and further requires that "the microcontroller determines whether a battery state is suitable for a heavy current power generation." Ex. 1001, 6:38–40.

Petitioner contends Richardson in view of an ordinarily skilled artisan's knowledge renders obvious the invention covered by claim 24. *See* Pet. 65–66. Specifically, Petitioner asserts that Richardson discloses that if "the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set and the event recorded in memory 224." *Id.* at 65 (quoting Ex. 1004 ¶ 28). Petitioner also asserts that an ordinarily skilled artisan would have understood that "Richardson's process of detecting that the voltage level of the batteries 22 is 'equal to a state of charge of eighty percent or more below a fully charged voltage level 222' would operate to determine whether the battery state is suitable for heavy current power generation." *Id.* at 66 (quoting Ex. 1004 ¶ 28) (citing Ex. 1003 ¶ 169).

Patent Owner argues that "Petitioner never addresses" the additional limitation of claim 24 and that Richardson does not teach it, for several reasons. PO Resp. 27–29.

After considering the parties' arguments and evidence, we determine that Petitioner meets its burden of proof for claim 24. We agree with Petitioner that Richardson's process of detecting the voltage level of batteries would operate to determine whether the battery state is suitable for heavy current power generation. *See* Pet. 65–66. Dr. Wood's testimony supports this. Ex. 1003 ¶ 169.

Patent Owner's argument that the Petition fails to connect the voltage level of a battery, which Richardson detects, to the battery's ability to generate a heavy current, is not persuasive. *See* PO Resp. 28. Richardson explicitly states that its system measures the voltage level of batteries, determines their state of charge, and prohibits further jump starter action if the state of charge is below a certain level. Ex. 1003 ¶ 28. We find that a person of ordinary skill in the art would have understood the relationship between voltage and current, and that Richardson's measurement of voltage could also be used to determine whether a battery is at suitable charge level to supply the necessary amps. The '673 patent itself describes that in standby mode

> the microcontroller closes all outputs when the battery voltage is lower than 9V, and recovers the normal operation only when the battery voltage is larger than 10V

Ex. 1001, 4:35–38. In other words, the '673 patent, like Richardson, uses battery voltage level to determine suitability for power generation.

Patent Owner further argues "Richardson is solely concerned with detecting and preventing 'excess current draw from batteries during jump

starting.'" PO Resp. 28 (quoting Ex. 1004 ¶ 17). This argument is not persuasive because it fails to consider Richardson's teachings as a whole. *In re Burckel*, 592 F.2d 1175, 1179 (CCPA 1979). As discussed in section III.D.2. above, Richardson addresses several potential problems due to the use of jumper cables, and discloses a portable jump starter including safety features to address those problems, which are not limited to the problem Patent Owner identifies. *See* Ex. 1004 ¶¶ 5, 7, 14, 16, 21.

Patent Owner further argues Richardson does not determine a battery's suitability for heavy current generation, because Richardson's detection and prevention occurs only after the connection is made, in relation to vehicle voltage. PO Resp. 28 (citing Ex. 1004 ¶ 17; Ex. 2001 ¶¶ 81, 83). Patent Owner's argument is based on Richardson's identification in paragraph 28 of "voltage sensor 30" as the vehicle voltage sensor. Ex. 1004 ¶ 28 (*see* Ex. 2001 ¶ 81). Mr. McAlexander explains that a person of ordinary skill would understand from Richardson's Figures 2A, 2B, and 2C that vehicle voltage sensor 30 can only measure the voltage of the charger battery "after contact relay 34 has been closed and the starting procedure has been initiated." Ex. 2001 ¶¶ 82–84 (citing Ex. 1004 ¶ 21) (emphasis in original).

Petitioner responds that a person of ordinary skill in the art "would immediately understand" that "Richardson obviously meant to say 'voltage sensor ***20***'" in paragraph 28, not voltage sensor 30. Pet. Reply 12 (emphasis in original). Petitioner points to Richardson's paragraph 16 which states "[a] battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22" and relies on Mr. McAlexander's deposition where he testified that the sentence of Richardson paragraph 28 on which Patent

Owner relies is not correct as written and that it would make more sense if it instead referred to voltage sensor 20, because voltage sensor 30 isn't used to measure the voltage of jump starter batteries 22. *Id.* at 13 (citing Ex. 1014, 67:4, 67:15–17; Ex. 1004 ¶ 16). Petitioner also relies on the flowchart in Richardson's Figures 3–7, which shows that safety check 222 occurs before the jump starter battery connection is made. *Id.* at 13–14 (citing Ex. 1014, 67:22–71:10; Ex. 1004 ¶ 35). Patent Owner does not respond to any of these arguments or evidence.

Having considered both sides' evidence and argument, we find that Richardson discloses or suggests determining whether a battery state is suitable for heavy current power generation, as recited in challenged claim 24. Richardson, and Mr. McAlexander's deposition testimony, support Petitioner's argument that a person of ordinary skill would have understood that Richardson describes determining whether a battery is at a suitable charge level for heavy current power generation.

5. DEPENDENT CLAIMS 2–10, 12–15, AND 18–22

The parties do not dispute the elements of dependent claims 2–10, 12–15, and 18–22, with regard to Petitioner's challenge to those claims as obvious over Richardson. We have reviewed Petitioner's undisputed showings as to each of the elements of these dependent claims, and find that Richardson discloses all of the elements of these claims. *See* Pet. 55–65; Ex. 1003 ¶¶ 140–167. We also determine that Richardson in view of an ordinarily skilled artisan's knowledge renders obvious these claims.

E. Alleged Obviousness over Richardson and Lai: Claim 11

Claim 11 depends from claim 4 and additionally requires "a start control module to prevent recharging of a normal voltage of the battery."

Ex. 1001, 6:11–13. Petitioner contends that claim 11 is unpatentable under § 103 as obvious over Richardson and Lai. *See* Pet. 66–69.

1. OVERVIEW OF LAI (EXHIBIT 1008)

Lai is a U.S. patent titled "Over Voltage and Over Current Protection Integrated Circuit," filed on May 27, 2008, and issued on July 31, 2012. Ex. 1008, codes (12), (22), (45), (54). Lai states that the invention relates "to over voltage and over current protection circuits," and more particularly "to a single integrated circuit containing both over current and over voltage protection for use in conjunction with other circuitry to provide redundant protection." *Id.* at 1:18–22; *see id.* at code (57).

Lai explains that a "Li-ion rechargeable battery is very sensitive to over charge" and that over charging "may lead to explosion, flame or other hazardous situations." Ex. 1008, 1:34–36. Thus, "it is very critical" from a "safety point of view" that the "Li-ion battery is properly protected against over charge." *Id.* at 1:39–41. Lai also explains that providing separate chips for each type of protection "requires a great deal of space within an electronic device." *Id.* at 1:54–56. According to Lai, "there is a need for a chip for providing an electronic device with multiple types of over voltage and over current protection in order to save space within the electronic device." *Id.* at 1:57–59.

Lai's Figure 1 (reproduced below) depicts a block diagram for an integrated circuit (IC) that provides battery protection against over current, over voltage, and over charge:

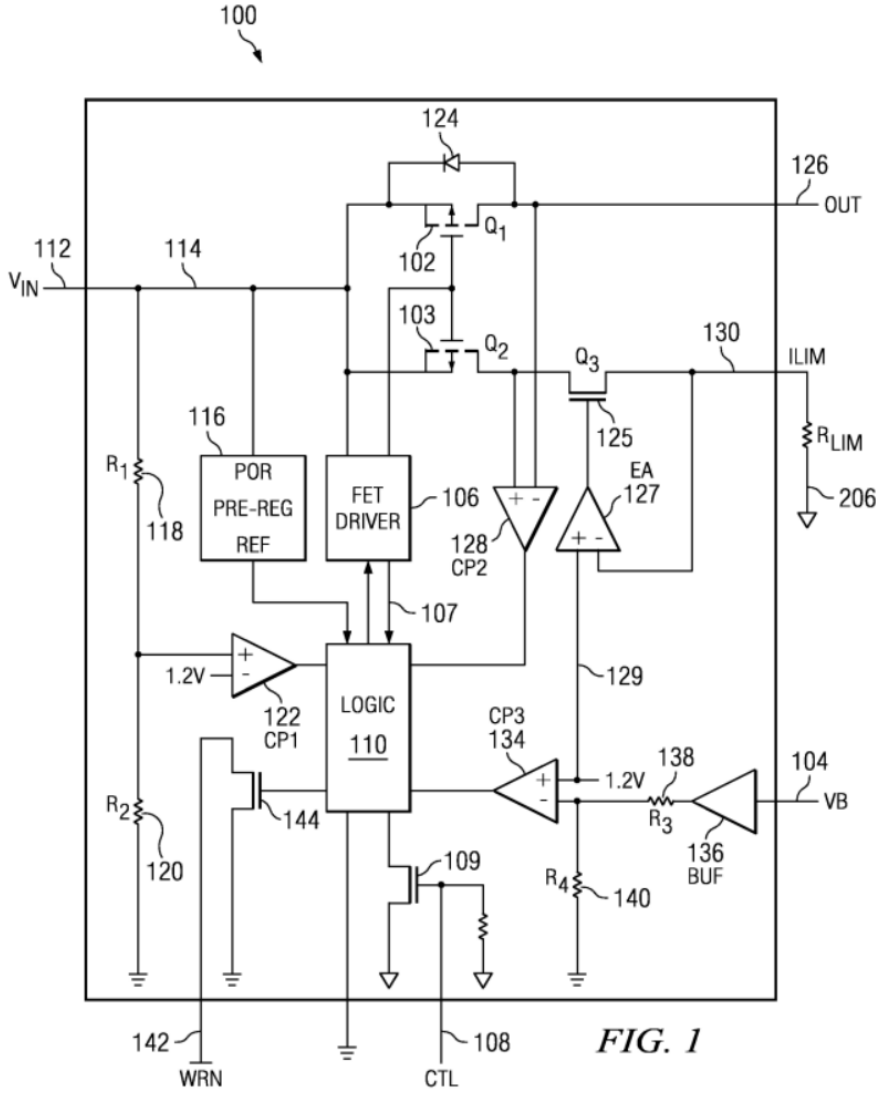

FIG. 1

Figure 1 illustrates IC 100 that "protects three possible failure mechanisms in a charging system: input over voltage (the voltage input to the overall system), battery over voltage and charge current over current." Ex. 1008, 2:17–18, 2:32–34, 2:39–42, Fig. 1. "When any of the above three failure mechanisms occur, the IC 100 turns off an internal p-channel MOSFET 102 to remove power from the charging system." *Id.* at 2:42–45.

As an example, IC 100 provides over-voltage protection "through a battery voltage monitoring pin VB 104." Ex. 1008, 2:59–60, Fig. 1; *see id.* at 4:65–66. "Comparator 134 monitors the VB pin 104 and issues an over voltage signal when the battery voltage" at the VB pin 104 exceeds a "battery over voltage protection (OVP) threshold." *Id.* at 4:66–5:2.

2. REASON TO COMBINE

Petitioner argues an ordinarily skilled artisan would have been motivated to combine Lai's teaching of an overcharge-protection circuit with Richardson's jump starter, to protect against dangerous overcharging conditions. Pet. 69. Petitioner argues "this could have been easily achieved" by replacing Richardson's diode 35 with Lai's switched overcharge-protection circuit. *Id.* (citing Ex. 1003 ¶ 174).

Dr. Wood testifies that an ordinarily skilled artisan "would have been motivated to utilize" Lai's battery-protection circuit to "protect against dangerous overcharging conditions in" Richardson's jump starter 10. Ex. 1003 ¶ 174. Dr. Wood explains that incorporating Lai's battery-protection circuit into Richardson's jump starter 10 "could have been easily achieved by replacing the diode 35 shown in Fig. 1 of Richardson with" Lai's battery-protection circuit. *Id.* According to Dr. Wood, this "combination would have provided the predictable result of preventing recharging of the jump starter batteries 22 from the vehicle battery 28 once the charge on the jump starter batteries 22 reaches an over voltage protection threshold (i.e., to prevent recharging of a normal voltage of the battery)." *Id.*

Patent Owner argues Richardson teaches away from Petitioner's proposed modification with Lai. PO Resp. 25–26. Specifically, Patent Owner argues that Richardson teaches that once the jump starter has

successfully started the vehicle, the vehicle's battery can be utilized to recharge the batteries and capacitors of the jump starter (*id.* (citing Ex. 1004 ¶ 7; Ex. 2001 ¶¶ 91, 98)), and that in order to modify Richardson with Lai's battery-protection circuit, a person of ordinary skill would have needed to remove Richardson's recharging feature. *Id.* at 26. Patent Owner further argues Lai is not analogous art, because it "discloses an integrated circuit with no connection to jump starters." *Id.*

Patent Owner further argues that Petitioner "relies on wholly generic motivations to combine or modify the asserted prior art" (PO Resp. 5), such as similarity of the references and safety. *Id.* at 5–13.

Having considered the evidence and arguments, we determine that the preponderance of the evidence favors Petitioner. Petitioner demonstrates that a person of ordinary skill would have had a reason to modify Richardson's jump starter with Lai's overcharge-protection circuit. Pet. 69. In particular, Petitioner shows that in order to protect against dangerous overcharging conditions in Richardson's jump starter, a person of ordinary skill would have replaced diode 35 in Richardson with a switched overcharge-protection circuit, as taught by Lai, with the predictable result of cutting off recharging of jump starter batteries 22 from vehicle battery 28 in the event an over voltage protection threshold is crossed. *See* Ex. 1003 ¶ 174.

Patent Owner's argument that Richardson teaches away is not persuasive. Richardson's teaching of recharging techniques supports the combination with Lai, rather than teaches away, because a system such as Richardson's that permits recharging would have a need for safety protection and excessive recharging prevention. Further, claim 11 does not

require preventing recharging in every situation, but rather only prevents recharging of "a normal voltage of the battery." Ex. 1001, 6:11–12. In any event, Richardson does not criticize, discredit or discourage investigation into preventing recharging. *See In re Fulton,* 391 F.3d 1195, 1201 (Fed. Cir. 2004) (prior art does not teach away from claimed subject matter merely by disclosing a different solution to a similar problem unless the prior art also criticizes, discredits, or otherwise discourages the solution claimed).

Patent Owner's argument that Lai is not analogous art is based on its assertion that "Lai simply discloses an integrated circuit with no connection to jump starters . . . . [or] automobiles more broadly, much less the field of automotive electrical systems." PO Resp. 26 (citing Ex. 1008, 1). Patent Owner does not apply the correct test for determining whether a reference is analogous art, i.e., (1) whether the reference is from the same field of endeavor, or (2) whether the reference is reasonably pertinent to the particular problem with which the invention is involved. *In re Clay*, 966 F.2d 656, 658–59 (Fed. Cir. 1992). Under that test, Lai clearly is pertinent to the problem of preventing battery overcharging, as discussed in section III.E.1 above. *See* Pet. 19–21 (citing Ex. 1008, 1:18–22, 2:32–48).

Patent Owner's arguments that Petitioner's motivation to combine "is an oversimplification" (PO Resp. 26) based on "mere similarities" (*id.* at 7), fail to address the Petition's specific reasoning for modifying Richardson in view of Lai. The Petition explains that a person of ordinary skill in the art would have understood that Lai "discloses a start control module (i.e., IC 100, p-channel MOSFET 102, and comparator 134) to prevent recharging of a normal voltage of a battery" through its overcharge-protection circuit (Pet. 69), and would have been motivated to use an overcharge-protection circuit

to protect against overcharging in Richardson's jump starter. *Id.* In view of the Petitioner's identification of the specific structures in Lai that would comprise a start control module, and explanation of how Lai's start control module would be added to Richardson's fast-charging system by replacing diode 35 in Figure 1 of Richardson (*see* Ex. 1003 ¶¶ 172–74), we do not agree with Patent Owner that Petitioner's proposed combination "merely adds Lai's circuit somewhere within [Richardson] to prevent overcharge." *See* PO Resp. 27.

Patent Owner's argument that this panel discredited Petitioner's argument based on similarity of references in a related IPR[10] is not persuasive because it mischaracterizes the Board's decision. Contrary to Patent Owner's assertion here, Patent Owner did not "successfully argue" in that case that mere similarity does not provide a motivation to combine the references. *See* PO Resp. 7. Rather, the Board disagreed with Patent Owner's assertion that the Petition in that case failed to show a sufficient reason to modify the prior art references, and the Board's statement that "common characteristics in the prior art do not constitute substantial evidence of a motivation to combine" was followed by the statement "Petitioner relies on more than just common characteristics to support its obviousness challenge." IPR2021-00777, Paper 22 at 34.

Similarly, here, Petitioner relies on more than just common characteristics to support its obviousness challenge. As discussed above, Petitioner identifies specific structures in each reference that support the combination, and its challenge is not based on a mere ability to combine the

[10] *Noco Co. v. Pilot, Inc.,* IPR2021-00777, Paper 22 (PTAB Oct. 3, 2022).

references. Petitioner also demonstrates that Richardson and Lai share the goal of creating safe charging devices. *E.g.*, Pet. 66–69; Ex. 1004 ¶¶ 5, 7; Ex. 1008, 1:39–41; Ex. 1003 ¶¶ 170–171. Further, we disagree with Patent Owner's assertion that Petitioner's reliance on safety is an insufficient motivation for combining Richardson and Lai. Patent Owner's argument (*see* PO Resp. 9) does not point to any particular shortcoming in Petitioner's analysis or dispute that both references share the goal of safety. Consistent with the analytical framework set forth in *KSR*, Petitioner provides a good reason (i.e., safety) to modify Richardson's jump starter with the known option of Lai. *KSR*, 550 U.S. at 421. Accordingly, we disagree with Patent Owner's assertion that Petitioner fails to show that a skilled artisan would have a reason to modify Richardson.

Patent Owner further argues that Petitioner's rationale for combining the references fails to consider the cost of potentially more expensive, "unneeded" components, such as MOSFET switches, which "would have made the simple jump starter disclosed more expensive without any clear benefit to devices that were already designed to address known safety issues." PO Resp. 9, 11. We do not find this argument persuasive for several reasons. Notably, Patent Owner's arguments concerning objective indicia of nonobviousness (*see* section III.D.1) tout failure of other manufacturers to produce a safe-enough product, and the safety of Patent Owner's commercial product as a significant contributor to its success. *See* PO Resp. 17–18. The conflict between these arguments undercuts their persuasiveness, and Patent Owner does not attempt to harmonize them. Further, Patent Owner's argument as to the cost of electronic components is attorney argument, predominantly unsupported by evidence and lacking in

detail as to specific costs, and thus fails to demonstrate why Petitioner's proposed addition of safety features by combining the references, would be cost prohibitive. Patent Owner also criticizes Dr. Wood's testimony concerning MOSFET switches, for stating that they are the most common choice, and ignoring that Petitioner's products use relays rather than MOSFETs. PO Resp. 13 (citing Ex. 1003 ¶ 161; Ex. 2002, 2). Patent Owner does not address, however, that Dr. Wood does provide reasons for choosing a MOSFET-based switch over a relay, such as size, ruggedness, and reliability (Ex. 1003 ¶ 161). Patent Owner's failure for the most part to cite evidence, and uneven treatment of the evidence it does address, does not support its argument as to the cost of MOSFETs.

In any event, while cost may be factored into a rationale for modifying or combining prior art, *KSR* does not require that a combination is the best option, but only that it would be a suitable option. *See Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023) (explaining that *KSR*'s "known-technique" rationale does not require a showing "that a combination is the *best* option, only that it be a *suitable* option.").

For the foregoing reasons, we find that Petitioner has established that it would have been obvious to a skilled artisan to combine the teachings of Richardson and Lai.

3. Differences Between the Claimed Invention and the Prior Art

Petitioner asserts that Richardson discloses "a fast charging function for quickly recharging the jump starter batteries 22 using the vehicle battery," i.e., with diode 35 "connected across the contact 34 to charge the capacitors 21 and jump starter batteries 22 from the vehicle charging system

28." Pet. 66–67 (quoting Ex. 1004 ¶ 55). Petitioner relies on Lai's disclosure that Li-ion batteries are sensitive to overcharge, a safety hazard, as evidence that a person of ordinary skill in the art would have been motivated to add an overcharge-protection circuit to Richardson's fast-charging system. *Id.* at 67 (citing Ex. 1008, 1:34–36, 39–41). Petitioner asserts that Lai discloses an over-current, over-voltage, and over-charge "protection circuit for use with a battery charging system (e.g., such as the fast-charging system in Richardson)." *Id.* at 67 (citing Ex. 1008, 1:18–22, 2:32–48).

Petitioner contends that Lai's comparator 134 provides over-voltage protection that "issues an over voltage signal when the battery voltage" at VB pin 104 exceeds a "battery over voltage protection (OVP) threshold" such that "IC 100 turns off an internal p-channel MOSFET 102 to remove power from the charging system." Pet. 67–69 (quoting Ex. 1008, 2:42–45, 4:65–5:2). According to Petitioner, comparator 134, IC 100, and p-channel MOSFET 102 together correspond to claim 11's "start control module" and "prevent recharging of a normal voltage of a battery" as required by claim 11. *Id.* at 69.

Patent Owner does not dispute that the elements of Lai's Figure 1 as identified by Petitioner disclose a start control module. *See generally* PO Resp.

Based on Petitioner's undisputed showing, we find that the combination of Richardson and Lai discloses all elements of claim 11.

4. CONCLUSION

For the reasons discussed above, the combined disclosures in Richardson and Lai teach or suggest all elements of claim 11, and an

ordinarily skilled artisan would have been motivated to combine the teachings of Richardson and Lai with a reasonable expectation of success. Therefore, Petitioner has shown by a preponderance of the evidence that claim 11 is unpatentable under § 103 as obvious over Richardson and Lai.

F. Alleged Obviousness over Richardson and Tracey: Claims 16 and 17

Claim 16 depends from claim 4 and additionally requires "a voltage back-flow protection." Ex. 1001, 6:22–23. Claim 17 depends from claim 16 and additionally requires "the voltage back-flow protection is for an abnormal load." Ex. 1001, 6:24–25. Petitioner contends that claims 16 and 17 are unpatentable under § 103 as obvious over Richardson and Tracey. *See* Pet. 69–70.

1. OVERVIEW OF TRACEY (EXHIBIT 1007)

Tracey is an international patent application publication titled "A Jump Starter," filed on December 14, 2011, and published on June 21, 2012. Ex. 1007, codes (12), (22), (43), (54). Tracey states that the invention relates "to a jump starter system for a battery, especially a vehicle battery." *Id.* at 1:7.[11]

Tracey describes problems with jump starters "comprising a lead acid battery within a battery housing and leads for extending from the battery housing to the terminal of" a depleted battery. Ex. 1007, 1:21–22. Specifically, "[s]uch units are costly, bulky, and heavy, and can generally only be used for large scale commercial applications." *Id.* at 1:22–23. Further, if "the unit is not used for some time," the "battery charge diminishes so that it is not effective when required." *Id.* at 1:24–25. Hence,

[11] We cite to the page numbers printed on the published application of Exhibit 1007, as in the Petition.

Tracey endeavors to provide a jump starter that "will address these issues." *Id.* at 1:30–31; *see id.* at code (57).

More specifically, Tracey discloses a jump-starter control circuit that "protects from voltage mismatch, reverse polarity, short circuit, over-discharge, and over-use." Ex. 1007, 6:28–29, Fig. 10. The control circuit includes "power-switching and over-discharge elements" as well as reverse-blocking elements. *Id.* at 7:9–11, 7:22–24, Fig. 10. The control circuit "prevent[s] damage from events such as accidental shorting of the clips." *Id.* at code (57); *see id.* at 4:9–11, 8:10–14, 8:26–29.

According to Tracey, the "following are advantageous aspects of the invention":

- "Jump starter product protection from misuse";
- "Battery protection";
- "Passive safety";
- "No possibility of damage through operator error such as short circuit etc."; and
- "Solid state switching."

Ex. 1007, 9:8–19.

Tracey's Figure 10 (reproduced below) depicts a circuit diagram for a jump-starter control circuit:

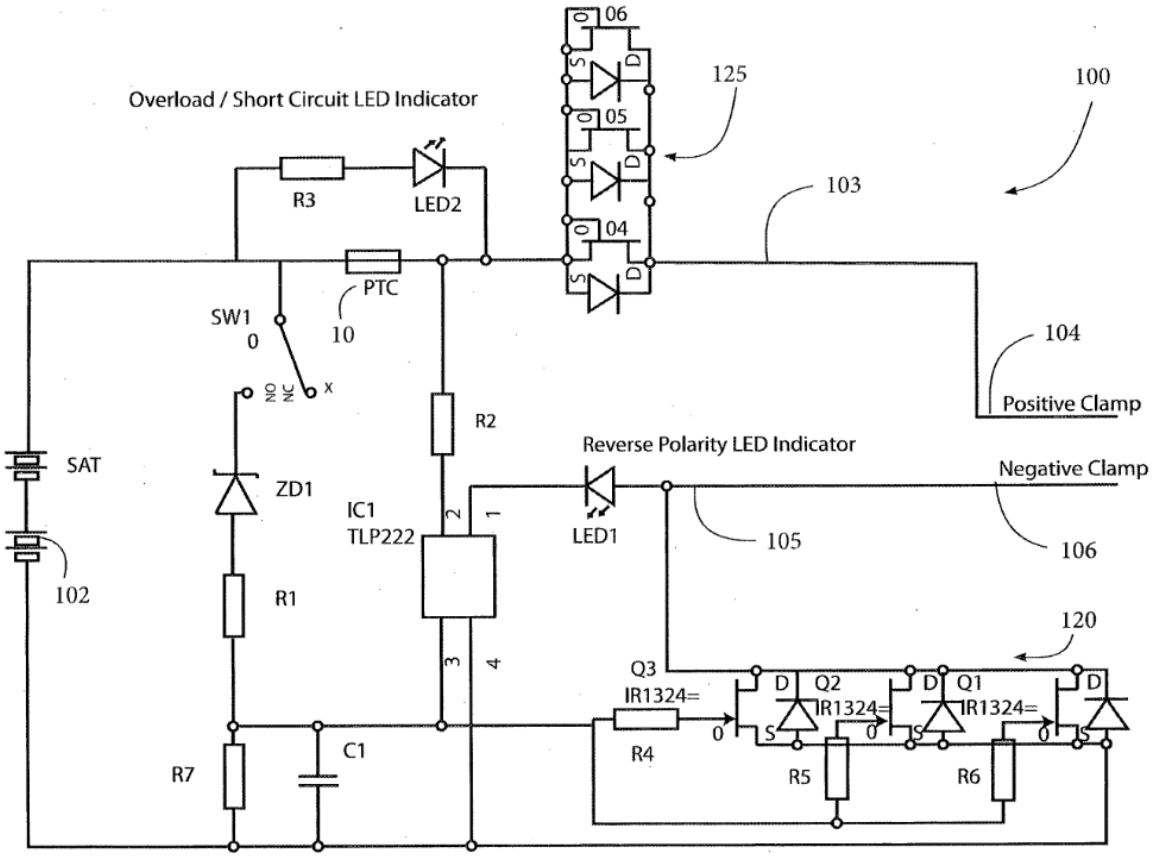

Fig.10

Figure 10 illustrates control circuit 100 comprising "batteries 102, a positive lead 103 with a clamp conductor 104, and a negative lead 105 with a clamp conductor 106." Ex. 1007, 6:18–19, Fig. 10.

Control circuit 100 includes switch SW1, Zener diode ZD1, resistor R1, and "MOSFETS (or alternates) Q1, Q2 and Q3" that comprise the "power-switching and over-discharge elements." Ex. 1007, 7:8–11, Fig. 10. Control circuit 100 also includes "MOSFETS (or alternates) Q4, Q5 and Q6" connected to "the positive supply lead 103." *Id.* at 7:22–23, Fig. 10 (items 04, 05, and 06 identified by reference numeral 125).

Devices Q4, Q5, and Q6 "are connected in such a way as to utilise their intrinsic diodes for the purposes of reverse blocking of current." Ex. 1007, 7:23–24. Specifically, the "gate to source is short circuited, thus holding the devices in a permanent OFF state." *Id.* at 7:24–25. If the jump starter connects to "a vehicle with a greater voltage than the unit is intended for" or the vehicle alternator attempts to return charge, "the intrinsic diodes in Q4, Q5 and Q6 will become reverse biased" and "no current may flow." *Id.* at 7:25–27, 7:30–33. Hence, control circuit 100 "protects the jump-starter's internal battery 102 from potentially dangerous overcharge conditions." *Id.* at 7:27–28.

2. REASON TO COMBINE

Petitioner argues "to the extent that Richardson may not expressly disclose the use of a voltage back-flow protection circuit to prevent back-flow from the vehicle battery to the jump starter battery in case of an abnormal load," an ordinarily skilled artisan would have been motivated to combine Tracey's teaching of a voltage back-flow protection circuit with Richardson's jump starter, to protect against dangerous overcharging conditions. Pet. 69–70. Dr. Wood testifies that an ordinarily skilled artisan would have been motivated to combine Tracey's back-flow protection circuit 125 between the vehicle battery and jump-starter battery in Richardson's system, because "it was well known in the field that reverse current flow from a vehicle battery to a jump starter battery can cause unsafe conditions, especially when the vehicle battery has a higher voltage than the jump starter is intended for (*i.e.,* an abnormal load)." Ex. 1003 ¶ 176. Further, the combination of Tracey and Richardson would have had the predictable result of protecting against unsafe conditions caused by

connecting Richardson's jump starter to a vehicle with an abnormally high voltage load. *Id.*

Patent Owner argues Richardson teaches away from Petitioner's proposed combination with Tracey. PO Resp. 20–21. Specifically, Patent Owner argues that Richardson encourages permitting power to flow backward from the vehicle to the jump starter, because of its recharging feature. *Id.* at 21 (citing Ex. 1004 ¶ 7; Ex. 2001 ¶ 55, 58). Patent Owner further argues Petitioner's rationale for combining Richardson and Tracey is conclusory and unsupported "in the prior art or [any] other contemporary evidence" (*id.* at 22) and relies on generic motivations to combine, such as similarity of the references and safety (*id.* at 5–13).

Having considered the evidence and arguments, we determine that the preponderance of the evidence favors Petitioner. Petitioner demonstrates that a person of ordinary skill would have had a reason to combine Richardson's jump starter with Tracey's back-flow protection circuit. Pet. 69–70. In particular, Petitioner shows that in order to protect against unsafe conditions when the vehicle battery has a higher voltage than the jump starter is intended for (*i.e.*, an abnormal load), which was a well-known problem in the art, a person of ordinary skill would have combined a back-flow protection circuit with Richardson's jump starter. *See* Ex. 1003 ¶¶ 19–120, 176.

Tracey's teaching of a voltage back-flow protection circuit supports Petitioner's combination. Tracey teaches that the positive lead 103 of its jump starter circuit 100 is connected to a trio of MOSFETS Q4, Q5, and Q6 that "are connected in such a way as to utilize their intrinsic diodes for the purposes of reverse blocking of current." Ex. 1007, 7:22–24, Fig. 10. As to

the diodes, Tracey teaches the diodes become reverse biased and block current flow "should the jump starter circuit 100 be connected to a vehicle with a greater voltage than the unit is intended for," which protects internal battery 102 from potentially dangerous overcharge conditions. *Id.* at 7:26–28. Tracey's teaching (*id.*) provides evidence that a person of ordinary skill in the art would have had a reason to add a voltage back-flow protection feature to Richardson's jump starter. Petitioner's combination of Richardson and Tracey fits within the obviousness scenarios discussed in *KSR*. *See, e.g.*, 550 U.S. at 417 (stating that "when a patent 'simply arranges old elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious," quoting *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976)).

Patent Owner's argument that Richardson teaches away from protecting against voltage back-flow (PO Resp. 21) is not persuasive for the same reasons discussed in section III.E.2 *supra*. Additionally, claims 16 and 17 do not require voltage back-flow protection in every circumstance; claim 17 expressly states that voltage back-flow protection is "for an abnormal load." Ex. 1001, 6:25.

The record does not support Patent Owner's argument that Petitioner's rationale for combining Richardson and Tracey is conclusory. Contrary to Patent Owner's argument, the Petition describes how Tracey supports a person of ordinary skill having knowledge of unsafe conditions when the vehicle battery has a higher voltage than that for which the jump starter is intended (Pet. 42–43) and how the combination would have had a predictable result (*id.* at 70).

As to Patent Owner's additional arguments that the rationale for combining references is insufficient (*see* PO Resp. 5–13), we find them unpersuasive for the reasons discussed in section III.E.2.

For the foregoing reasons, we find that Petitioner has established that it would have been obvious to combine the teachings of Richardson and Tracey.

3. Differences Between the Claimed Invention and the Prior Art

Petitioner contends that Tracey discloses "a voltage back-flow protection" circuit comprising "a trio of 'MOSFETS (or alternatives) Q4, Q5 and Q6'" that "are connected in such a way as to utilise their intrinsic diodes for the purposes of reverse blocking of current." Pet. 42–43 (quoting Ex. 1007, 7:22–24). Petitioner further relies on the following disclosure of Tracey: "Should the jump starter circuit 100 be connected to a vehicle with a greater voltage than the unit is intended for, the diodes become reverse biased and no current may flow. This feature protects the jump-starter's internal battery 102 from potentially dangerous overcharge conditions." *Id.* (quoting Ex. 1007, 7:25–28).

Patent Owner does not dispute that the elements of Tracey identified by Petitioner disclose a voltage back-flow protection circuit. *See generally* PO Resp.

Based on Petitioner's undisputed showing, we find that the combination of Richardson and Tracey discloses all elements of claims 16 and 17.

4. CONCLUSION

For the reasons discussed above, the combined disclosures in Richardson and Tracey teach or suggest all elements of claim 16 and 17, and an ordinarily skilled artisan would have been motivated to combine the teachings of Richardson and Tracey with a reasonable expectation of success. Therefore, Petitioner has shown by a preponderance of the evidence that claim 16 and 17 are unpatentable under § 103 as obvious over Richardson and Tracey.

G. Alleged Obviousness over Richardson, Krieger, and Baxter: Claim 23

Claim 23 depends from claim 21 and additionally requires that "the plurality of MOSFETs are connected in a series-parallel topology." Ex. 1001, 6:36–37. Petitioner contends that claim 23 is unpatentable under § 103 as obvious over Richardson, Krieger, and Baxter. *See* Pet. 73–74.

1. OVERVIEW OF KRIEGER (EXHIBIT 1005)

Krieger is a U.S. patent application publication titled "Microprocessor Controlled Booster Apparatus with Polarity Protection," filed on December 10, 2002, and published on July 8, 2004. Ex. 1005, codes (12), (22), (43), (54). Krieger describes "a booster device used for boosting a depleted battery" that includes a polarity-protection circuit for preventing current flow to the depleted battery "unless proper polarity is achieved." *Id.* ¶¶ 2, 10, 11, 28, Abstract.

Krieger describes problems with conventional booster devices. *See* Ex. 1005 ¶¶ 4–9. For example, Krieger explains that connecting a boosting battery's terminals to a depleted battery's terminals "can be very dangerous if the batteries are connected incorrectly." *Id.* ¶ 5. A "large current passes through the electric wires" even when "the two batteries are connected

correctly." *Id.* But when "the two batteries are connected erroneously, a current, which passes through the electric wires, is 10 to 20 times larger than the current existing on the electric wires when the batteries are correctly connected." *Id.* Further, an "incorrect connection may result in one or both of the batteries being short-circuited," and "in some cases, an explosion, fire and damage to the vehicle or to a person may result." *Id.*

To address those issues, Krieger discloses a booster device that "can be used to ensure that the connection of the two batteries is made correctly and in a safe manner." Ex. 1005 ¶¶ 6, 10. Krieger's Figure 1 (reproduced below) depicts a booster device including a polarity-protection circuit:

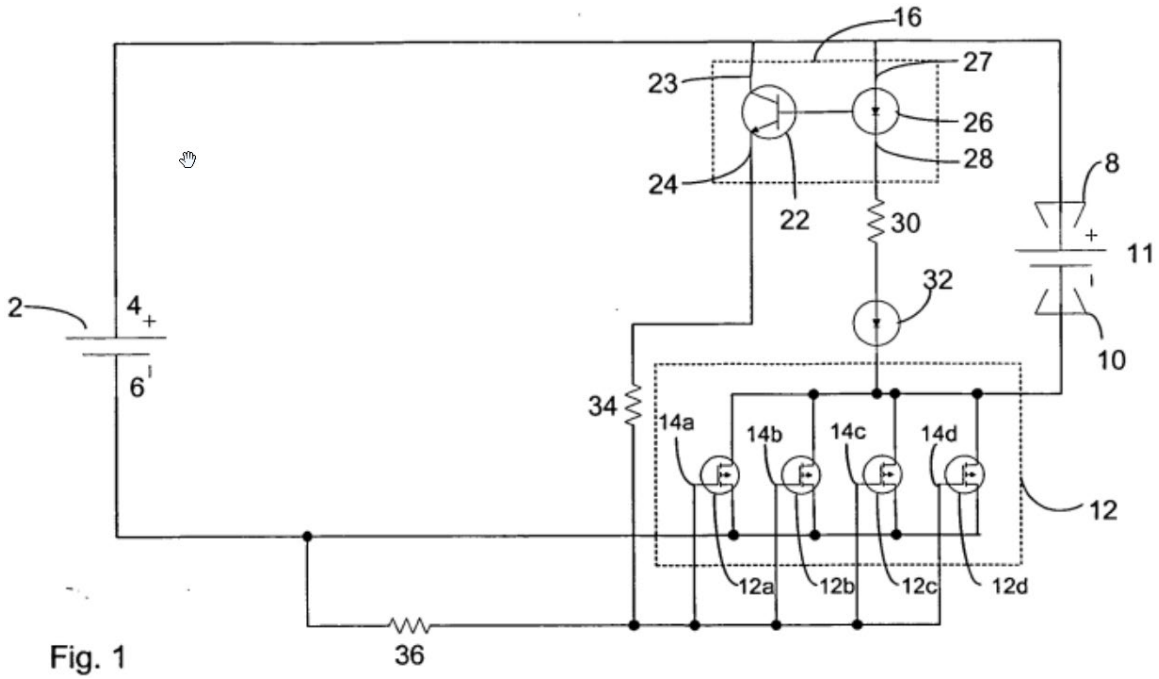

Fig. 1

Figure 1 illustrates a booster device including boosting battery 2 with positive terminal 4 and negative terminal 6, switch 12 comprising field-effect transistors 12a–12d, and polarity-sensing circuit (opto-isolator) 16 coupled to boosting battery 2 and depleted battery 11. Ex. 1005 ¶¶ 22, 28–31, Fig. 1.

"The positive terminal 4 of the boosting battery 2 is coupled to one of a pair of alligator clamps 8, 10 to be connected to" depleted battery 11 "via a wire or battery cable." Ex. 1005 ¶ 28, Fig. 1. "The negative terminal 6 of the boosting battery 2 is connected to the other of the alligator clamps 8, 10 to be connected to" depleted battery 11 "via a wire or battery cable." *Id.* ¶ 28, Fig. 1.

Switch 12 is "activated to complete a boosting circuit between the boosting battery 2 and the depleted battery 11" by polarity-sensing circuit (opto-isolator) 16 "only when a correct polarity connection between the batteries is attained." Ex. 1005 ¶¶ 29, 31. Polarity-sensing circuit (opto-isolator) 16 "senses the polarity of the connection between the boosting battery 2 and the depleted battery 11 and provides a signal indicating the state of the connection" to switch 12. *Id.* ¶ 31.

Preferably, switch 12 is "a solid state device, such as a transistor, diode, field effect transistor (FET), etc." Ex. 1005 ¶ 30. Figure 1 depicts switch 12 as "a number [of] FETs 12a–12d connected in parallel with each other." *Id.* ¶ 30, Fig. 1.

Polarity-sensing circuit (opto-isolator) 16 includes phototransistor 22 and light emitting diode (LED) 26. Ex. 1005 ¶ 32, Fig. 1. "The opto-isolator 16 only turns on when it is properly biased as a result of a correct polarity connection being made between the boosting battery 2 and the depleted battery 11." *Id.* ¶ 33.

Krieger's Figure 5 (reproduced below) depicts a microprocessor-controlled jump-starter system:

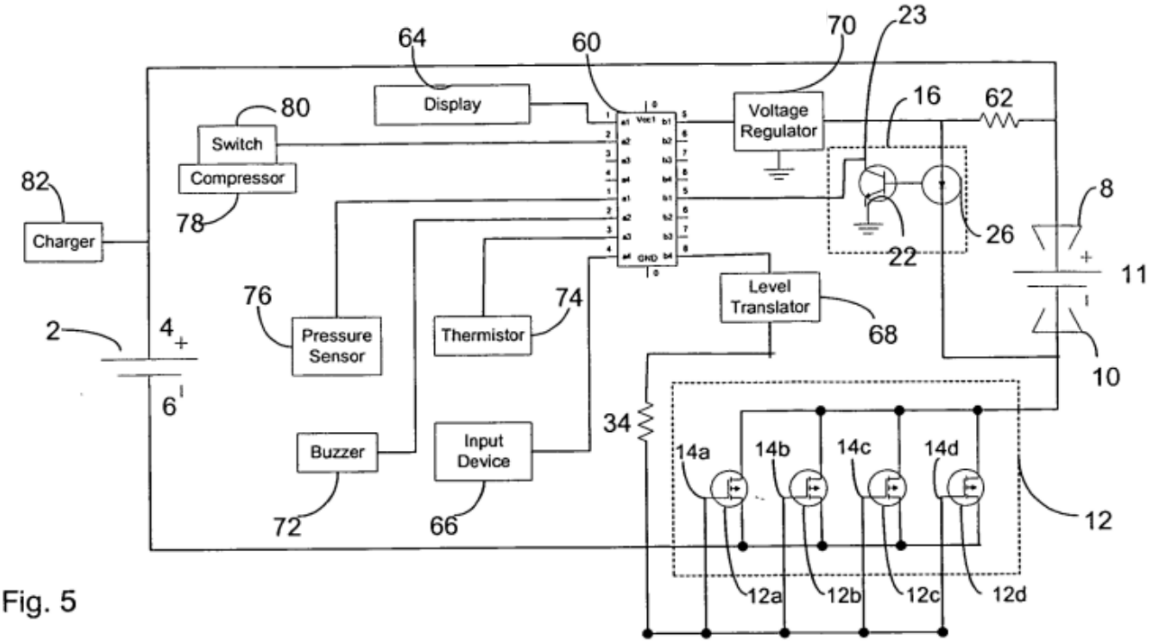

Fig. 5

Figure 5 illustrates a jump-starter system including boosting battery 2 with positive terminal 4 and negative terminal 6, switch 12 comprising field-effect transistors 12a–12d, opto-isolator 16, microprocessor 60, display 64, and voltage regulator 70. Ex. 1005 ¶¶ 26, 28, 43–46, Fig. 5.

Microprocessor 60 may "perform essentially all of the control functions needed for operation of the jump starter." Ex. 1005 ¶ 43. With "a feedback circuit or other means," microprocessor 60 may monitor (1) "the voltage and/or current being supplied to the depleted battery 11 from the booster battery 2" and (2) "the voltage and/or current of the battery 11." *Id.* ¶ 44. By doing so, microprocessor 60 may detect "short circuits or other faults." *Id.* "A resistive divider may be used to provide the voltage and current measurements to the microprocessor's A/D input." *Id.* Further, microprocessor 60 receives a "low voltage power supply," e.g., 5 volts, from boosting battery 2 via voltage regulator 70. *Id.* ¶ 46, Fig. 5.

Voltage regulator 70 is "coupled to the boosting battery 2 and the depleted battery 11 for detecting their charge levels." Ex. 1005 ¶ 52, Fig. 5. Voltage regulator 70 "produces a voltage proportional to the voltage of the boosting battery 2." *Id.* ¶ 53. Microprocessor 60 detects "when the voltage of the boosting battery 2 falls below a predetermined level, for example, about 80% of its rated value." *Id.* Voltage regulator 70 also "produces a voltage proportional to the voltage of the depleted battery 11." *Id.* ¶ 54. Microprocessor 60 "receives this signal from" voltage regulator 70 and "determines and displays the voltage of the depleted battery 11 on display 64." *Id.*

2. OVERVIEW OF BAXTER (EXHIBIT 1006)

Baxter is a U.S. patent application publication titled "Low-Voltage Connection with Safety Circuit and Method for Determining Proper Connection Polarity," that was filed on March 24, 2010, and published on July 8, 2010. Ex. 1006, codes (12), (22), (43), (54). Baxter states that the invention relates "to batteries providing certain safety features." *Id.* ¶ 3; *see id.* at code (57).

Baxter explains that jumper cables "commonly used to connect two low-voltage (e.g. battery-powered) systems temporarily" may "result in personal injury and equipment damage." Ex. 1006 ¶ 5. For example, when "jump starting a car with" a depleted battery "using a car with a good battery," a "spark may be created." *Id.* If "the spark is in the vicinity of hydrogen gas commonly generated by car batteries, the spark can ignite the hydrogen gas to explosive effect." *Id.* Further, "connecting a jumper cable set backward (i.e. with polarity of one of the battery connections reversed) can also cause injury or damage." *Id.*

To address those issues, Baxter discloses "a safety circuit for use in low-voltage systems that improves safety." Ex. 1006 ¶¶ 7, 25, code (57). The safety circuit "leaves the battery disconnected from the low-voltage system until it determines that it is safe to make a connection." *Id.* ¶¶ 7, 25, code (57). The safety circuit may implement a method for detecting the "proper polarity of the connections between the battery and the low-voltage system." *Id.* ¶¶ 7, 25, code (57).

The safety circuit may use "one or more high-current transistors as a switch to connect the two low-voltage systems." Ex. 1006 ¶¶ 10, 28; *see id.* ¶ 36. The "one or more transistors are controlled by the safety circuit or control circuit that detects the condition at each end of the connection cable or cables." *Id.* ¶¶ 10, 28; *see id.* ¶ 36.

Baxter's Figure 7 (reproduced below) depicts a circuit diagram for a safety circuit:

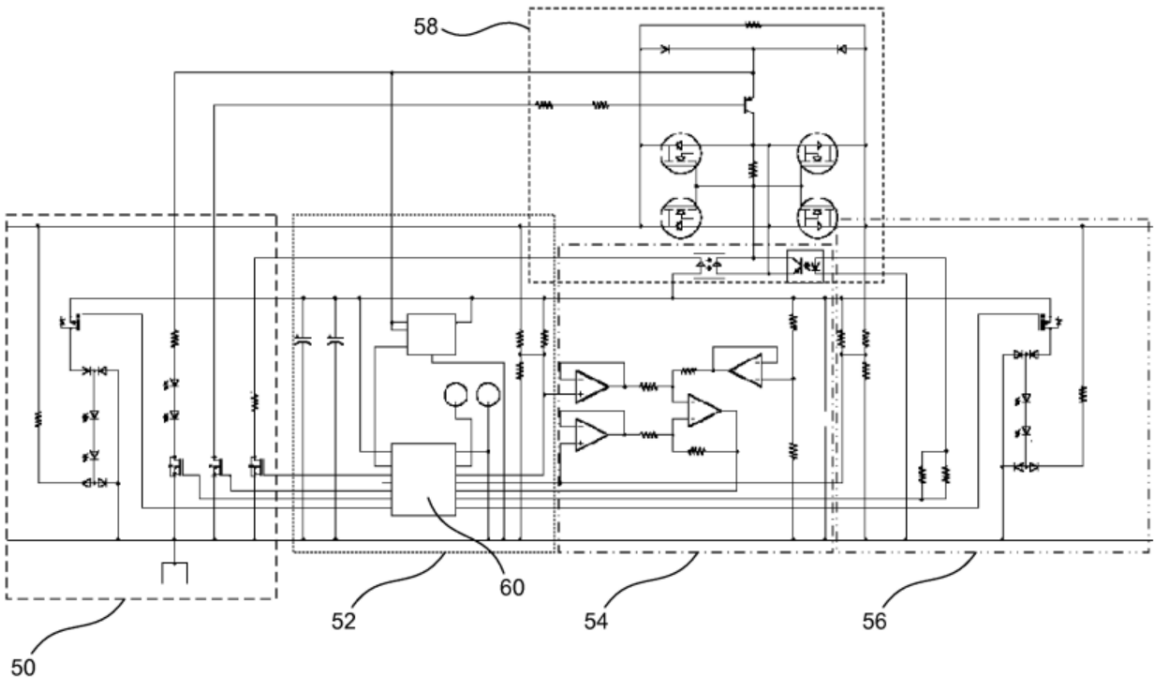

FIG. 7

Figure 7 illustrates a safety circuit comprising microcontroller 60 and other components arranged in various areas as follows:

- area 50 depicted in more detail in Figure 8;
- area 52 depicted in more detail in Figure 9;
- area 54 depicted in more detail in Figure 10;
- area 56 depicted in more detail in Figure 11; and
- area 58 depicted in more detail in Figure 12.

Ex. 1006 ¶¶ 18–19, 58, Figs. 7–12.

Baxter's Figure 12 (reproduced below) depicts in more detail area 58 in Figure 7's safety circuit:

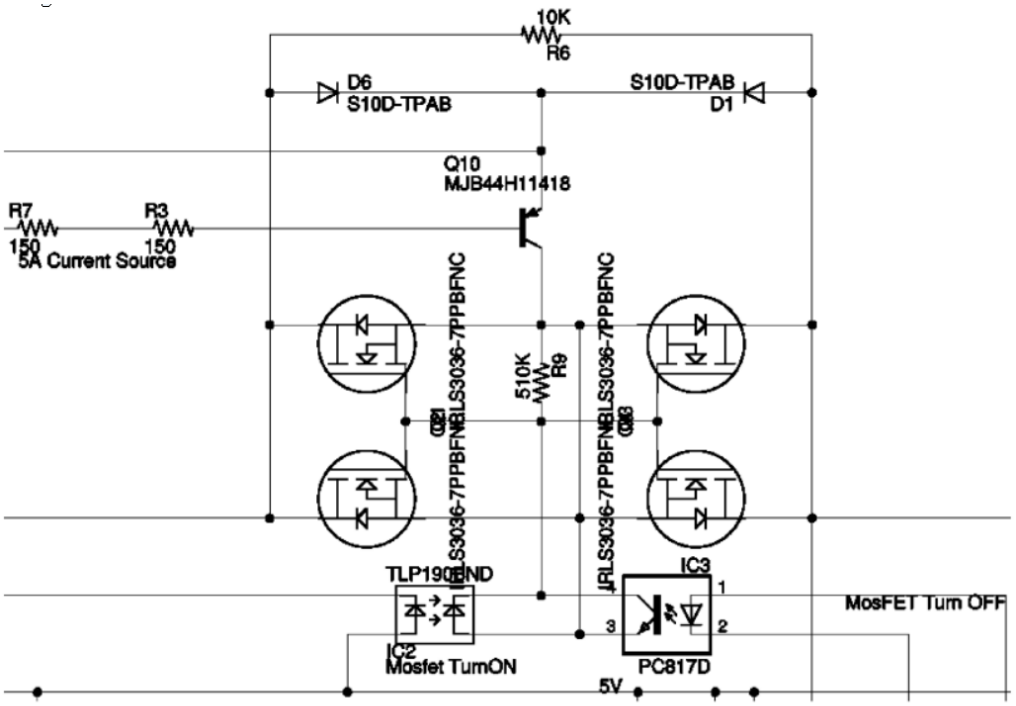

FIG. 12

Figure 12 illustrates area 58 encompassing the following components: IC2, IC3, D1, D6, R3, R6, R7, R9, Q10, and four metal-oxide-semiconductor field-effect transistors (MOSFETs). Ex. 1006 ¶ 58, Fig. 12; *see* Ex. 1003 ¶ 113.

3. ANALYSIS

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Baxter's, Krieger's, and Richardson's teachings. *See* Pet. 73–74. According to Petitioner, Baxter discloses a safety circuit for jump starting a battery that detects when the battery is connected with a reversed polarity; Baxter's safety circuit leaves the battery disconnected until it determines that it is safe to make a connection. *Id.* at 39 (citing Ex. 1006 ¶¶ 7–10, 25–26). Further, Baxter uses "one or more high-current transistors as a switch" to make the connection to the battery when it determines that no unsafe condition exists. *Id.* at 39–40 (citing Ex. 1006 ¶ 28, Figs. 7, 12). Petitioner explains that Baxter's series FET connection as shown in Figures 7 and 12 of Baxter blocks reverse current flow, and would have motivated a person of ordinary skill in the art "to utilize a pair of series connected MOSFETs, as disclosed by Baxter, for each of the parallel-connected FETs 12a–12d in Krieger's switch 12" to yield "the desirable and predictable result of preventing reverse current flow from the automobile battery 11 to the boosting battery 2 in Krieger's jump starter." *Id.* at 41 (citing Ex. 1003 ¶ 117).

Petitioner provides detailed analysis showing where it contends the references teach a plurality of MOSFETS connected in parallel and operating as a switch (Pet. 39–40, 72–73) and explains why a person of ordinary skill in the art would have been motivated to combine Richardson, Krieger, and Baxter. *Id.*; Ex. 1003 ¶¶ 115–117, 177–179, 182.

Patent Owner does not separately argue the patentability of claim 23 in view of this challenge. *See generally* PO Resp. Patent Owner's arguments with regard to the insufficiency of Petitioner's showing of a

reason to combine the references (*see* PO Resp. 5–13) are not persuasive, for the reasons stated in section III.E.2 above.

Based on Petitioner's showing, we find that the combination of references discloses all of the elements of claim 23 and that a person of ordinary skill in the art would have been motivated to combine the teachings of Richardson, Krieger, and Baxter with a reasonable expectation of success as set forth by Petitioner.

We therefore conclude that Petitioner has shown by a preponderance of the evidence that claim 23 is unpatentable under § 103 as obvious over the combination of Richardson, Krieger, and Baxter.

H. Alleged Obviousness over Krieger, or Combinations of Krieger, Baxter, Tracey, and Richardson

Petitioner contends that (1) claims 1, 2, 4–7, 12–14, and 18–22 are unpatentable under § 103 as obvious over Krieger; (2) claim 23 is unpatentable under § 103 as obvious over Krieger and Baxter; (3) claims 16 and 17 are unpatentable under § 103 as obvious over Krieger and Tracey; and (4) claims 13, 14, and 18–22 are unpatentable under § 103 as obvious over Richardson and Krieger. *See* Pet. 6–7, 21–43, 70–73.

For the reasons discussed above, Petitioner has shown that claims 1–24 of the '673 patent are unpatentable, by a preponderance of the evidence. We have, thus, addressed all of the challenged claims. *See* 35 U.S.C. § 318(a) (requiring the Board to "issue a final written decision with respect to the patentability of any patent claim challenged by the petitioner and any new claim added under section 316(d)"); *see also SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner "is entitled to a final written decision addressing all of the claims it has challenged").

Accordingly, we need not and do not decide whether Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable based on other combinations of references as set forth in Grounds 1–3 and 7 of the Petition. *Cf. In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009) (not reaching other grounds of unpatentability after affirming the anticipation ground); *see also Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (agreeing that the Board "need not address issues that are not necessary to the resolution of the proceeding").

IV. CONCLUSION

Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable as summarized below.[12]

[12] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding after the issuance of this Final Written 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 Owner of the 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).

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 4–7, 12–14, 18–22	103	Krieger[13]		
23	103	Krieger, Baxter[14]		
16, 17	103	Krieger, Tracey[15]		
1–10, 12–15, 18–22, 24	103	Richardson	1–10, 12–15, 18–22, 24	
11	103	Richardson, Lai	11	
16, 17	103	Richardson, Tracey	16, 17	
13, 14, 18–22	103	Richardson, Krieger[16]		

[13] In view of our determination that claims 1, 2, 4–7, 12–14, and 18–22 are unpatentable under § 103 as obvious over Richardson, we do not reach this challenge to patentability.
[14] In view of our determination that claim 23 is unpatentable under § 103 as obvious over Richardson, Krieger, and Baxter, we do not reach this challenge to patentability.
[15] In view of our determination that claims 16 and 17 are unpatentable under § 103 as obvious over Richardson and Tracey, we do not reach this challenge to patentability.
[16] In view of our determination that claims 13, 14, and 18–22 are unpatentable under § 103 as obvious over Richardson, we do not reach this challenge to patentability.

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
23	103	Richardson, Krieger, Baxter	23	
Overall Outcome			1–24	

V. ORDER

Accordingly, it is

ORDERED that claims 1–24 of the '673 patent are determined to be unpatentable;

FURTHER ORDERED that Petitioner's Motion to Enter Judgement (Paper 20) based on collateral estoppel and 37 C.F.R. § 42.73(d)(3) is dismissed as moot; and

FURTHER ORDERED that, because this is a Final Written Decision, the 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.

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