

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THE NOCO COMPANY, INC.,
Petitioner,

v.

PILOT, INC.,
Patent Owner.

IPR2022-01237
Patent 11,124,077 B2

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

AMUNDSON, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

The NOCO Company, Inc. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–24 in U.S. Patent No. 11,124,077 B2 (Exhibit 1001, “the ’077 patent”) under 35 U.S.C. §§ 311–319. Paper 1 (“Pet.”). Pilot, Inc. (“Patent Owner”) did not file a Preliminary Response.

Under 37 C.F.R. § 42.4(a), we have authority to determine whether to institute an *inter partes* review. We may institute an *inter partes* review only if “the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). The “reasonable likelihood” standard is “a higher standard than mere notice pleading” but “lower than the ‘preponderance’ standard to prevail in a final written decision.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

After considering the Petition and the evidence of record, and for the reasons explained below, we determine that Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims. Thus, we institute an *inter partes* review of claims 1–24 in the ’077 patent on all challenges included in the Petition.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 74. Patent Owner identifies itself as the real party in interest. Paper 3, 2. The parties do not raise any issue about real parties in interest.

B. Related Matters

Petitioner and Patent Owner identify the following civil action as a related matter involving the '077 patent: *Pilot, Inc. v. The NOCO Company, Inc.*, No. 2:22-cv-00389-PHX-SRB (D. Ariz. filed Mar. 14, 2022). Pet. 74; Paper 3, 2.

C. The '077 Patent (Exhibit 1001)

The '077 patent, titled “Automobile Charger,” issued on September 21, 2021, from an application filed on April 21, 2021. Ex. 1001, codes (22), (45), (54). The patent identifies that application as the latest in a series of continuation applications that began with an application filed on December 12, 2014. *Id.* at 1:5–15, code (63). The patent claims priority to an application filed in China on April 28, 2014. *Id.* at 1:14–16. The patent states that the disclosure “relates to an automobile charging device,” in particular, “a novel automobile charger with a safe power supply charging quickly.” *Id.* at 1:21–23; *see id.* at code (57).

The '077 patent describes problems with conventional automobile chargers. *See* Ex. 1001, 1:24–34. 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 1:28–34. The patent purports to address those problems with “a novel automobile charger with the safe power supply charging quickly.” *Id.* at 1:34–38, 1:42–45; *see id.* at 2:31–58.

The '077 patent's Figure 1 (reproduced below) depicts a block diagram for an automobile charger:

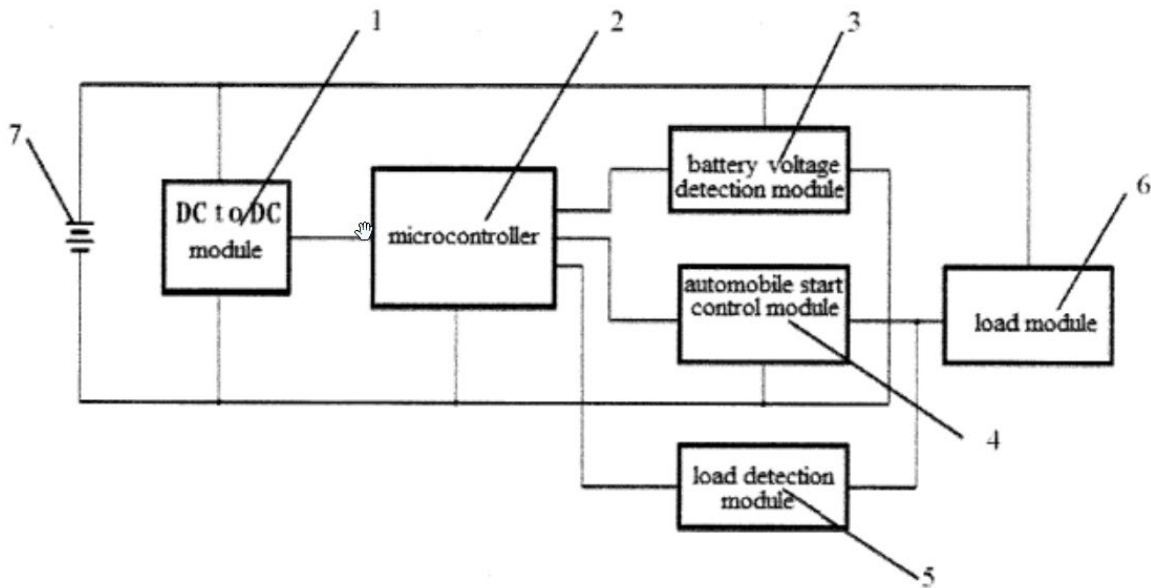


Figure 1

Figure 1 illustrates an automobile charger including the following components:

- (1) DC-to-DC module 1;
- (2) microcontroller 2;
- (3) battery voltage detection module 3;
- (4) automobile start control module 4;
- (5) load detection module 5;
- (6) load module 6; and
- (7) direct current power supply 7.

Ex. 1001, 2:62–63, 2:66–3:2, 3:15–35, Fig. 1.

The DC-to-DC module “provides a stable voltage for the microcontroller.” Ex. 1001, 2:1–3, 4:13–14. The microcontroller “collects relevant data to conduct the corresponding control.” *Id.* at 2:2–4, 4:14–15. The battery voltage detection module “conducts the measurement of” the power-supply battery’s voltage and “provides protection” for the power-supply battery to “prevent damages caused by the discharging of the direct current power supply.” *Id.* at 2:4–5, 2:16–19, 4:15–17. The automobile start control module “conducts the power supply or the power outage for the load module” and corresponds to an electronic switch controlled by the microcontroller. *Id.* at 2:5–8, 2:29–30, 4:18–20, 4:42. The load detection module “detects whether the load module is correctly connected” and “prevents improper operations of the user.” *Id.* at 2:8–10, 2:20–22, 4:20–22. The load module “comprises the automobile storage battery and the automobile engine.” *Id.* at 3:32–34.

Additionally, the microcontroller “determines whether the automobile storage battery is connected with the automobile engine through the load detection module.” Ex. 1001, 4:23–25. The automobile start control module is “automatically activated and the battery starts to supply power to the load module when the load is correctly connected.” *Id.* at 4:26–28. The automobile start control module is “automatically deactivated and the battery stops supplying power to the load module when assuming that the load is not connected or the positive and negative polarities are reversely connected.” *Id.* at 4:28–32.

The automobile charger includes a standby mode where “the microcontroller closes all outputs when the battery voltage is lower than 9V.” Ex. 1001, 4:32–34; *see id.* at 2:23–26. The automobile charger

“recovers the normal operation only when the battery voltage is larger than 10V.” *Id.* at 4:34–35; *see id.* at 2:23–28.

An automobile engine “will generate the normal voltage to recharge the battery after the automobile starts.” Ex. 1001, 4:36–37. But the automobile start control module is “deactivated immediately once the recharging voltage is larger than the voltage before that battery starts the power supply, to protect the battery from damages caused by charging with the normal voltage.” *Id.* at 4:37–41.

The '077 patent's Figure 2 (reproduced below) depicts a circuit diagram for an automobile charger:

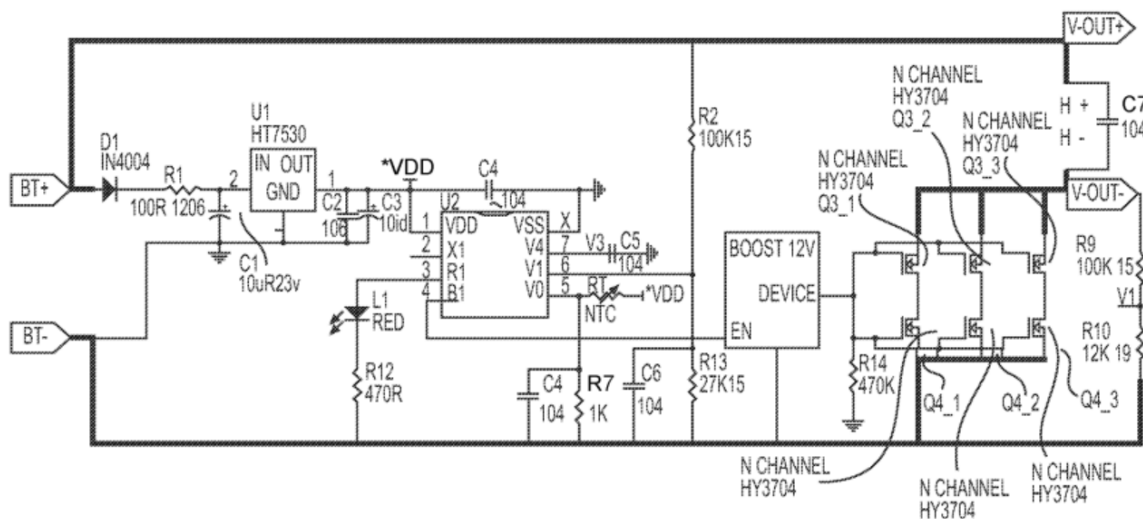


Figure 2

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, 3:36–38, Fig. 2. As another example, the battery voltage detection module in Figure 2 comprises “resistors R2, R13 and capacitor C6.” *Id.* at 4:7–8, Fig. 2. As yet another example, the load detection module in Figure 2 comprises “capacitor C7, resistors R9, 10, a capacitor C6 and a resistor R13.” *Id.* at 3:67–4:2, 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 2:12–14, 2:29–30, 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 independent apparatus claim 1 and claims 2–24 that depend directly or indirectly from claim 1. Pet. 6, 21–73.

Claim 1 exemplifies the challenged claims and reads as follows (with formatting added for clarity and with numbers and letters added for reference purposes):¹

1. [1p] A jumpstarter comprising:
 - [1(a)(i)] a battery connected to a voltage regulator,
 - [1(a)(ii)] the battery capable of supplying power, via the voltage regulator, to at least a microcontroller,
 - [1(a)(iii)] the battery also capable of supplying power to an automobile battery when the battery has at least a predetermined voltage;

¹ We use the same numbers and letters that Petitioner uses to identify the claim language. *See* Pet. 21–29.

[1(b)] a load detector circuit, connected to the microcontroller, to detect when the jumpstarter is correctly connected to the automobile battery;

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

[1(d)] 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 charging current to the automobile battery.

Ex. 1001, 5:11–27.

E. The Asserted References

For its challenges, Petitioner relies on the following references:

Name	Reference	Exhibit
Richardson	US 2013/0154543 A1, published June 20, 2013 (based on an application filed February 15, 2013)	1004
Krieger	US 2004/0130298 A1, published July 8, 2004 (based on an application filed December 10, 2002)	1005
Baxter	US 2010/0173182 A1, published July 8, 2010 (based on an application filed March 24, 2010)	1006
Tracey	WO 2012/080996 A1, published June 21, 2012 (based on an application filed December 14, 2011)	1007
Lai	US 8,232,772 B2, issued July 31, 2012 (based on an application filed May 27, 2008)	1008

Pet. 6, 21–73.

Petitioner asserts that each reference qualifies as prior art for the '077 patent “under at least 35 U.S.C. § 102(a)(1) (AIA).” Pet. 7, 10, 16–17, 19.

F. The Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–7, 9–11, 18–20	103	Krieger
8	103	Krieger, Baxter
22, 23	103	Krieger, Tracey
1–7, 9–16, 18–21, 24	103	Richardson
17	103	Richardson, Lai
3–7, 19, 20	103	Richardson, Krieger
8	103	Richardson, Krieger, Baxter
22, 23	103	Richardson, Tracey

Pet. 6, 21–73.

G. Testimonial Evidence

To support its challenges, Petitioner relies on the declaration of Jonathan R. Wood, Ph.D. (Exhibit 1003, “Wood Decl.”). Dr. Wood states, “I have 54 years of experience in power electronics and analog circuits, including battery systems.” Ex. 1003 ¶ 5. Dr. Wood also states, “I hold a Ph.D in Electrical Engineering from the Massachusetts Institute of Technology (1973), an M.E. in Electrical Engineering from the University of Auckland (1969), and a B.E. in Electrical Engineering from the University of Auckland (1968).” *Id.*

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.² *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).

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.

² The record does not include evidence or argument regarding objective indicia of nonobviousness.

2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner asserts that 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 ¶ 45.

Based on the current record and for purposes of analysis, we accept Petitioner’s description of an ordinarily skilled artisan as consistent with the ’077 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) (2022). 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.

Based on the current record, we determine that no claim term requires an explicit construction to decide whether Petitioner satisfies the “reasonable likelihood” standard for instituting trial. “[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).

D. Alleged Obviousness over Krieger: Claims 1–7, 9–11, and 18–20

Petitioner contends that claims 1–7, 9–11, and 18–20 are unpatentable under § 103 as obvious over Krieger. *See* Pet. 6, 21–39. Below, we provide an overview of Krieger, and then we consider the obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that Krieger teaches the subject matter of claims 1–7, 9–11, and 18–20.

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 states that the invention relates “to a booster device used for boosting a depleted battery,” and more particularly “to microprocessor control of the booster apparatus and a polarity protection circuit.” *Id.* ¶ 2; *see id.* at code (57). The polarity-protection circuit prevents current flow to a depleted battery “unless proper polarity is achieved.” *Id.* ¶ 10, code (57).

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:

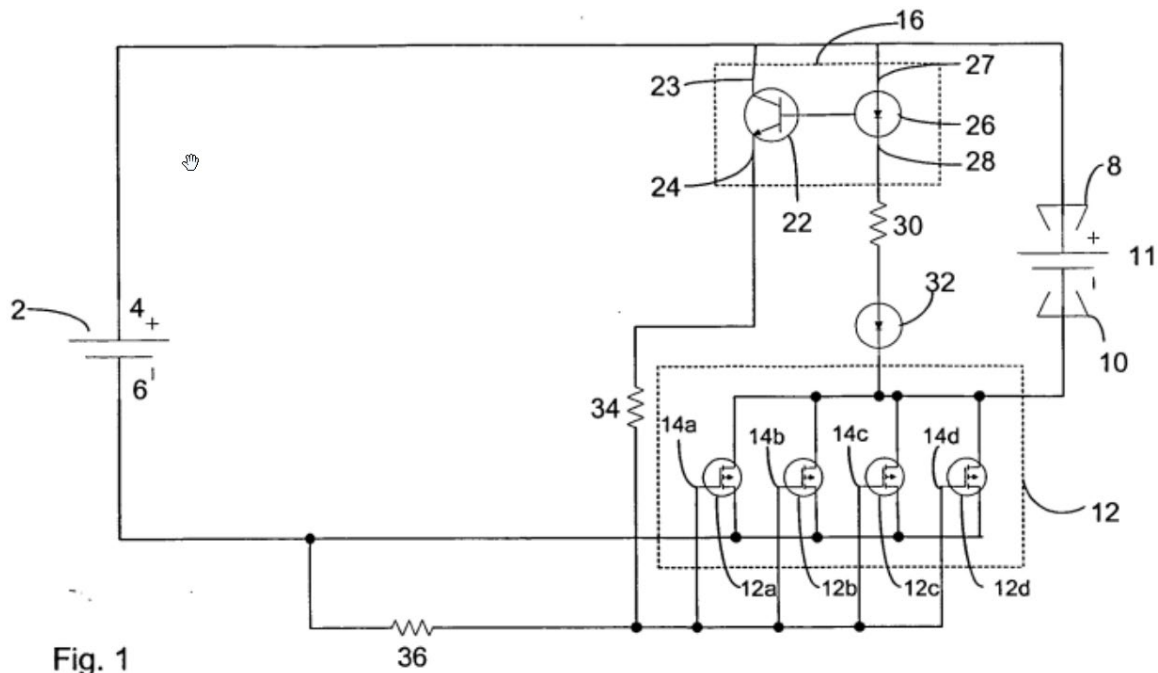


Figure 1 illustrates a booster device including boosting battery 2 with positive terminal 4 and negative terminal 6, switch 12 comprising field-effect transistors 12a–12d, and polarity-sensing circuit (opto-isolator) 16 coupled to boosting battery 2 and depleted battery 11. Ex. 1005 ¶¶ 22, 28–31, Fig.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

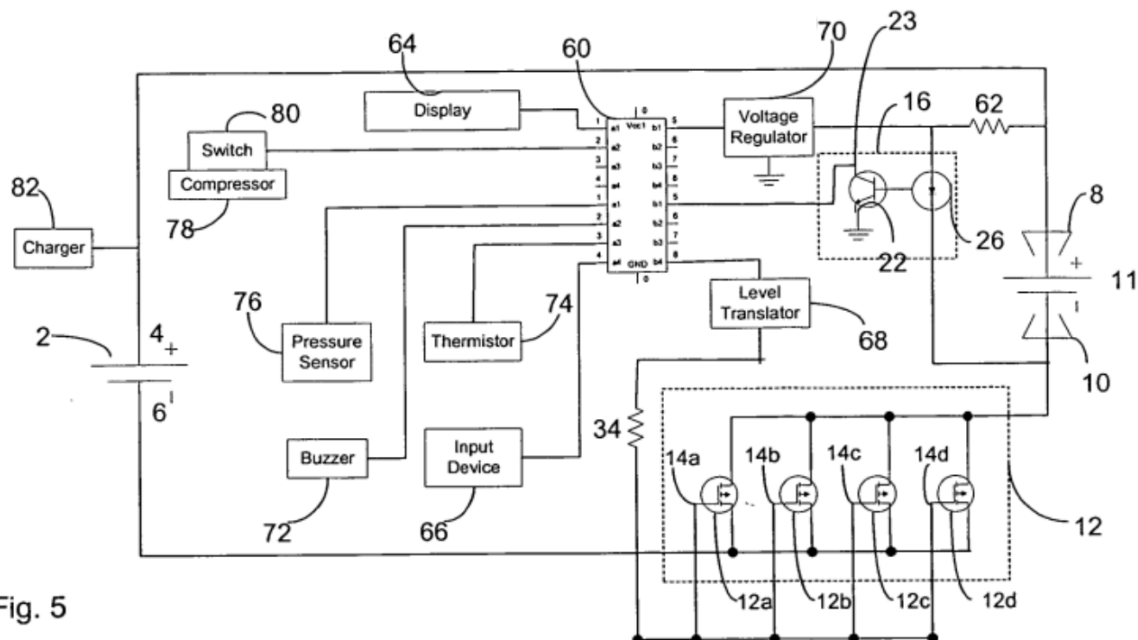


Figure 5 illustrates a jump-starter system including boosting battery 2 with positive terminal 4 and negative terminal 6, switch 12 comprising field-effect transistors 12a–12d, opto-isolator 16, microprocessor 60, display 64, and voltage regulator 70. Ex. 1005 ¶¶ 26, 28, 43–46, Fig. 5.

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. INDEPENDENT CLAIM 1

(a) Preamble

Claim 1 recites “[a] jumpstarter.” Ex. 1001, 5:11.

Petitioner contends that Krieger discloses claim 1’s preamble because Krieger discloses a microprocessor-controlled jump-starter system and Krieger’s Figure 5 depicts that system. Pet. 21 (quoting Ex. 1005 ¶ 43).

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 Petitioner establishes sufficiently for purposes of institution that Krieger discloses claim 1’s preamble. See Pet. 21; Ex. 1003 ¶¶ 49, 74. Specifically, Krieger discloses a microprocessor-controlled jump-starter system. Ex. 1005 ¶ 43, Fig. 5; see Ex. 1003 ¶¶ 49, 74. Krieger explains that the microprocessor may “perform essentially all of the control functions needed for operation of the jump starter.” Ex. 1005 ¶ 43; see Ex. 1003 ¶ 50.

(b) Limitation 1(a)(i)

Claim 1 recites “a battery connected to a voltage regulator.” Ex. 1001, 5:12.

Petitioner contends that Krieger discloses limitation 1(a)(i) because Krieger’s microprocessor-controlled jump-starter system includes voltage regulator 70 coupled to boosting battery 2 through resistor 62. Pet. 22 (citing Ex. 1005 ¶ 52, Fig. 5).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger discloses limitation 1(a)(i). See Pet. 22; Ex. 1003 ¶ 75.

(c) Limitation 1(a)(ii)

Claim 1 recites “the battery capable of supplying power, via the voltage regulator, to at least a microcontroller.” Ex. 1001, 5:12–14.

Petitioner contends that Krieger discloses limitation 1(a)(ii) because the voltage regulator in Krieger’s microprocessor-controlled jump-starter system supplies the microprocessor with a “low voltage power supply (e.g., 5 volts) from battery 2.” Pet. 22–23 (emphasis omitted) (citing Ex. 1005 ¶ 46, Fig. 5).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger discloses limitation 1(a)(ii). *See* Pet. 22–23; Ex. 1003 ¶ 76.

(d) Limitation 1(a)(iii)

Claim 1 recites “the battery also capable of supplying power to an automobile battery when the battery has at least a predetermined voltage.” Ex. 1001, 5:14–16.

Petitioner contends that Krieger discloses limitation 1(a)(iii) because the boosting battery in Krieger’s microprocessor-controlled jump-starter system is “coupled to a pair of alligator clamps 8, 10 to be connected to” an automobile battery requiring charging. Pet. 23–24 (citing Ex. 1005 ¶ 28, Fig. 5). Petitioner also contends that Krieger discloses:

- (1) monitoring the boosting battery “to detect when the battery falls below a predetermined voltage needed for supplying power to” the automobile battery; and
- (2) notifying the operator when the boosting battery “is low and needs to be recharged,” e.g., when the microprocessor detects that “the boosting battery

has fallen below ‘a predetermined level, for example, about 80% of its rated value.’”

Id. at 24 (quoting Ex. 1005 ¶ 53) (citing Ex. 1005 ¶ 44).

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 boosting battery is above the ‘predetermined level.’” Pet. 24 (emphasis omitted).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger discloses limitation 1(a)(iii). *See* Pet. 23–25; Ex. 1003 ¶¶ 77–80.

(e) Limitation 1(b)

Claim 1 recites “a load detector circuit, connected to the microcontroller, to detect when the jumpstarter is correctly connected to the automobile battery.” Ex. 1001, 5:17–19.

Petitioner contends that Krieger discloses limitation 1(b) because Krieger’s microprocessor-controlled jump-starter system includes “a feedback circuit or other means” for permitting the microprocessor to monitor “the voltage and/or current” of the automobile battery. Pet. 26 (quoting Ex. 1005 ¶ 44). Petitioner contends that Krieger discloses using “[a] resistive divider” to “provide the voltage and current measurements to the microprocessor’s A/D input.” *Id.* (alteration by Petitioner) (quoting Ex. 1005 ¶ 44). Petitioner also contends that the microprocessor uses “the monitored voltage and/or current” to detect both (1) “that the automobile battery is connected” and (2) “that the positive and negative polarities of the

automobile battery are not reversed,” i.e., “that the jumpstarter is ‘correctly connected to the automobile battery.’” *Id.*

Further, Petitioner asserts that “a feedback circuit” according to Krieger corresponds to “a load detector circuit” according to limitation 1(b). Pet. 26.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger discloses limitation 1(b). *See* Pet. 25–27; Ex. 1003 ¶¶ 81–83.

(f) Limitation 1(c)

Claim 1 recites “the microcontroller generating, when the jumpstarter is correctly connected to the automobile battery, an output signal.” Ex. 1001, 5:20–22.

Petitioner contends that Krieger discloses limitation 1(c) because the microprocessor in Krieger’s microprocessor-controlled jump-starter system:

- (1) controls switch 12 “to supply power from the boosting battery 2 to the depleted automobile battery 11 when the microprocessor determines that the automobile battery is ‘correctly connected’”;
- (2) “provides output signals to activate the switch 12 into a conducting state”; and
- (3) “can deactivate switch 12 to terminate the jump starting process when a fault is detected.”

Pet. 27 (quoting Ex. 1005 ¶ 45).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger discloses limitation 1(c). *See* Pet. 27–28; Ex. 1003 ¶ 84.

(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 charging current to the automobile battery.” Ex. 1001, 5:23–27.

Petitioner contends that Krieger discloses limitation 1(d) because Krieger’s microprocessor-controlled jump-starter system includes FET-based switch 12 that the microprocessor activates “to complete a boosting circuit between the boosting battery 2 and the depleted battery 11.” Pet. 28–29 (quoting Ex. 1005 ¶ 29). Further, Petitioner asserts that “the switch may include ‘a number [of] FETs 12a–12d connected in parallel with each other.’” *Id.* at 28 (alteration by Petitioner) (quoting Ex. 1005 ¶ 30).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger discloses limitation 1(d). *See* Pet. 28–29; Ex. 1003 ¶ 85.

(h) Preliminary Conclusion About Obviousness

As discussed above, Petitioner’s analysis explains how Krieger teaches claim 1’s subject matter. *See supra* §§ III.D.2(a)–(g). Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claim 1 unpatentable under § 103 as obvious over Krieger.

3. DEPENDENT CLAIMS 2–7, 9–11, AND 18–20

Claims 2–7, 9–11, and 18–20 depend directly or indirectly from claim 1. Ex. 1001, 5:28–40, 6:1–9, 6:25–31.

For claims 2–7, 9–11, and 18–20, Petitioner’s analysis explains how Krieger teaches each claim’s subject matter. *See* Pet. 29–39. Dr. Wood’s testimony supports Petitioner’s analysis. *See* Ex. 1003 ¶¶ 86–111.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Krieger teaches the subject matter of claims 2–7, 9–11, and 18–20. *See* Pet. 29–39; Ex. 1003 ¶¶ 86–111. Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claims 2–7, 9–11, and 18–20 unpatentable under § 103 as obvious over Krieger.

E. Alleged Obviousness over Krieger and Baxter: Claim 8

Petitioner contends that claim 8 is unpatentable under § 103 as obvious over Krieger and Baxter. *See* Pet. 6, 39–41. Above, we provided an overview of Krieger. *See supra* § III.D.1. Below, we provide an overview of Baxter, and then we consider the obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Krieger and Baxter teach claim 8’s subject matter.

1. 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,” 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:

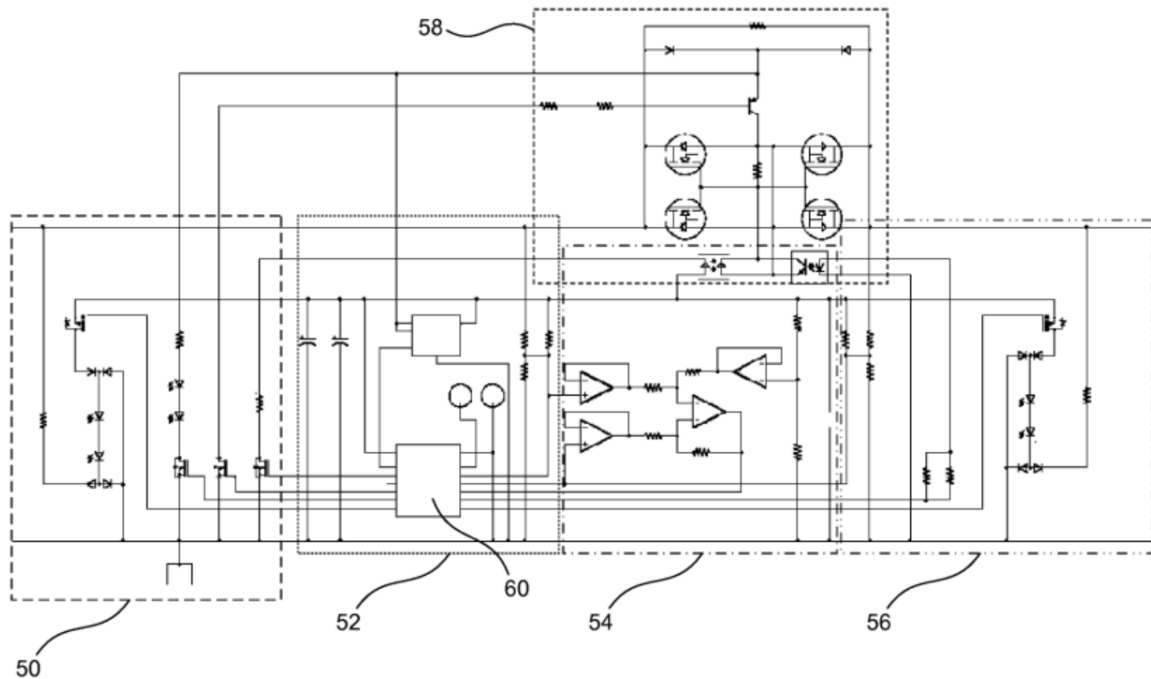


FIG. 7

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:

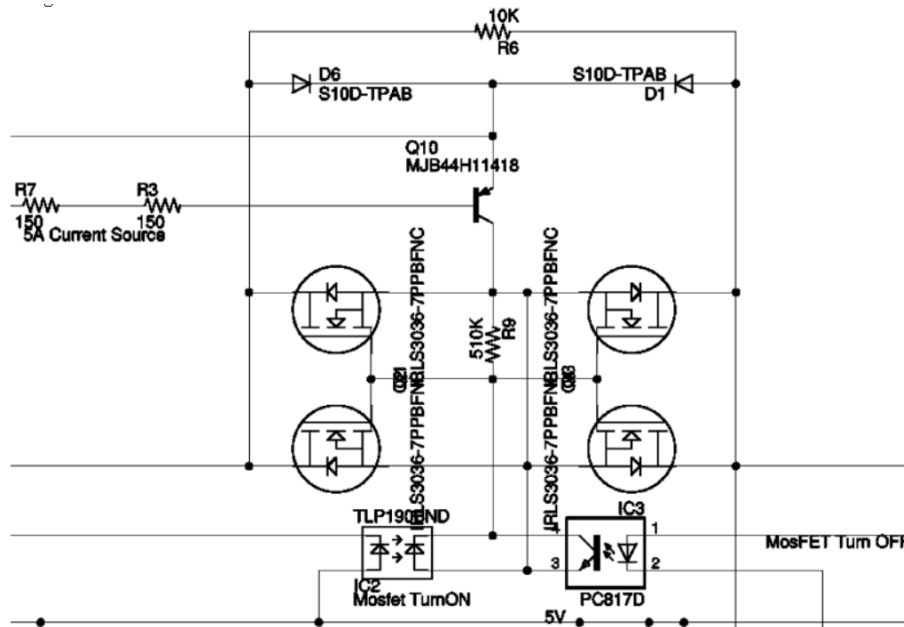


FIG. 12

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.

2. DIFFERENCES BETWEEN THE CLAIMED INVENTION AND THE PRIOR ART

Claim 8 depends indirectly from claim 1 and specifies that “the plurality of MOSFETs [comprising the switching circuitry] are connected in a series-parallel topology.” Ex. 1001, 5:41–42.

Petitioner contends that Krieger discloses “a MOSFET-based switch 12 that includes ‘a number [of] FETs 12a–12d connected in parallel with each other.’” Pet. 39 (alteration by Petitioner) (quoting Ex. 1005 ¶ 30). Petitioner contends that Baxter discloses:

- (1) “a safety circuit for jump starting a battery” that (a) “detects when the battery is connected with a reversed polarity” and (b) “leaves the battery disconnected until it determines that it is safe to make a connection”;
- (2) “using ‘one or more high-current transistors as a switch’”; and
- (3) “using MOSFETS connected in a series-parallel topology.”

Pet. 39–40 (quoting Ex. 1006 ¶ 28) (citing Ex. 1006 ¶¶ 7–10, 25–26, Fig. 7).

To support its contentions, Petitioner provides a highlighted version of Baxter's Figure 12 as reproduced below (Pet. 41):

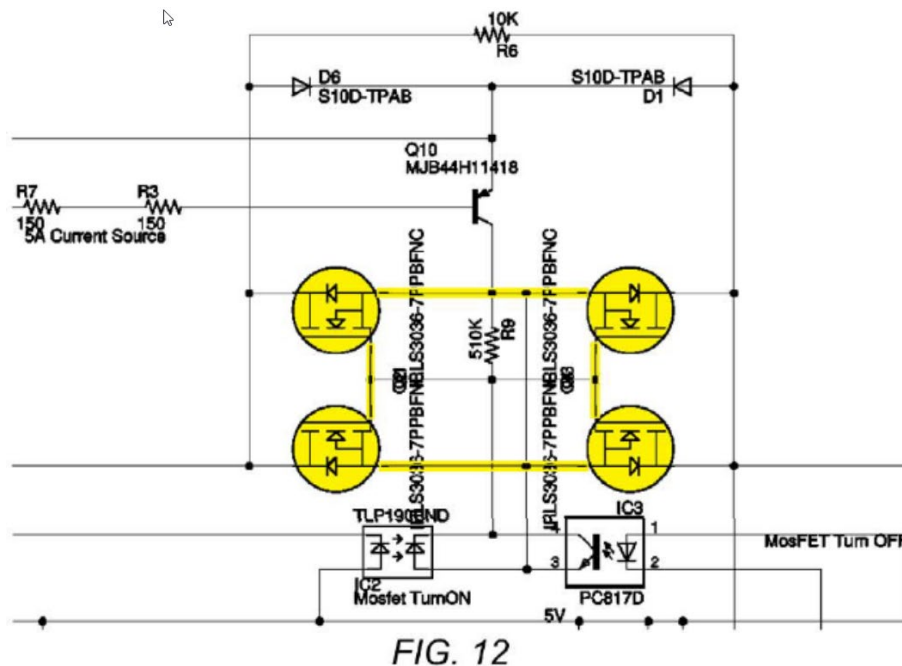


Figure 12 illustrates area 58 encompassing the following components: IC2, IC3, D1, D6, R3, R6, R7, R9, Q10, and four MOSFETs. Ex. 1006 ¶ 58, Fig. 12; *see* Ex. 1003 ¶ 113. This highlighted version of Figure 12 includes yellow highlighting over the four MOSFETs and the connections between them. *See* Pet. 41; Ex. 1003 ¶ 113.

Dr. Wood testifies that Baxter's Figures 7 and 12 show "MOSFETS connected in a series-parallel topology." Ex. 1003 ¶ 113.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood's testimony, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Krieger and Baxter teach claim 8's subject matter. *See* Pet. 39–41; Ex. 1003 ¶¶ 112–113.

3. ALLEGED REASON FOR COMBINING THE TEACHINGS OF THE REFERENCES

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Baxter's teachings with Krieger's teachings. *See* Pet. 41. Additionally, Petitioner explains that combining those teachings would have yielded a predictable result. *Id.* Dr. Wood's testimony supports Petitioner's positions. *See* Ex. 1003 ¶ 114.

For instance, Dr. Wood testifies that an ordinarily skilled artisan "would have been motivated to utilize a series-parallel MOSFET switch" as shown in Baxter's Figures 7 and 12 in Krieger's MOSFET-based switch 12 because the skilled artisan would have understood that Baxter's series-parallel arrangement "blocks reverse current flow when the FETs are turned off" in contrast to "a single FET which always allows current flow in one direction, even when the FET is turned off." Ex. 1003 ¶ 114. Dr. Wood also testifies that an ordinarily skilled artisan would have been motivated "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. (emphases omitted).

Based on the current record, Petitioner establishes sufficiently for purposes of institution that an ordinarily skilled artisan would have had a reason, e.g., as articulated by Dr. Wood, to combine Baxter’s teachings with Krieger’s teachings. *See* Ex. 1003 ¶ 114.

4. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS

As discussed above, Petitioner’s analysis explains how the combined disclosures in Krieger and Baxter teach claim 8’s subject matter. *See supra* § III.E.2. Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Baxter’s teachings with Krieger’s teachings to achieve a predictable result. *See supra* § III.E.3. Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claim 8 unpatentable under § 103 as obvious over Krieger and Baxter.

F. Alleged Obviousness over Krieger and Tracey: Claims 22 and 23

Petitioner contends that claims 22 and 23 are unpatentable under § 103 as obvious over Krieger and Tracey. *See* Pet. 6, 42–44. Above, we provided an overview of Krieger. *See supra* § III.D.1. Below, we provide an overview of Tracey, and then we consider the obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Krieger and Tracey teach the subject matter of claims 22 and 23.

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 1.³

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. Specifically, “[s]uch units are costly, bulky, and heavy, and can generally only be used for large scale commercial applications.” *Id.* Further, if “the unit is not used for some time,” the “battery charge diminishes so that it is not effective when required.” *Id.* Hence, Tracey endeavors to provide a jump starter that “will address these issues.” *Id.*

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, Fig. 10. Among other things, the control circuit includes “power-switching and over-discharge elements” and reverse-blocking elements. *Id.* at 7, Fig. 10.

³ For Exhibit 1007 (Tracey), we follow Petitioner’s practice and cite to the page numbers appearing in the published application.

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

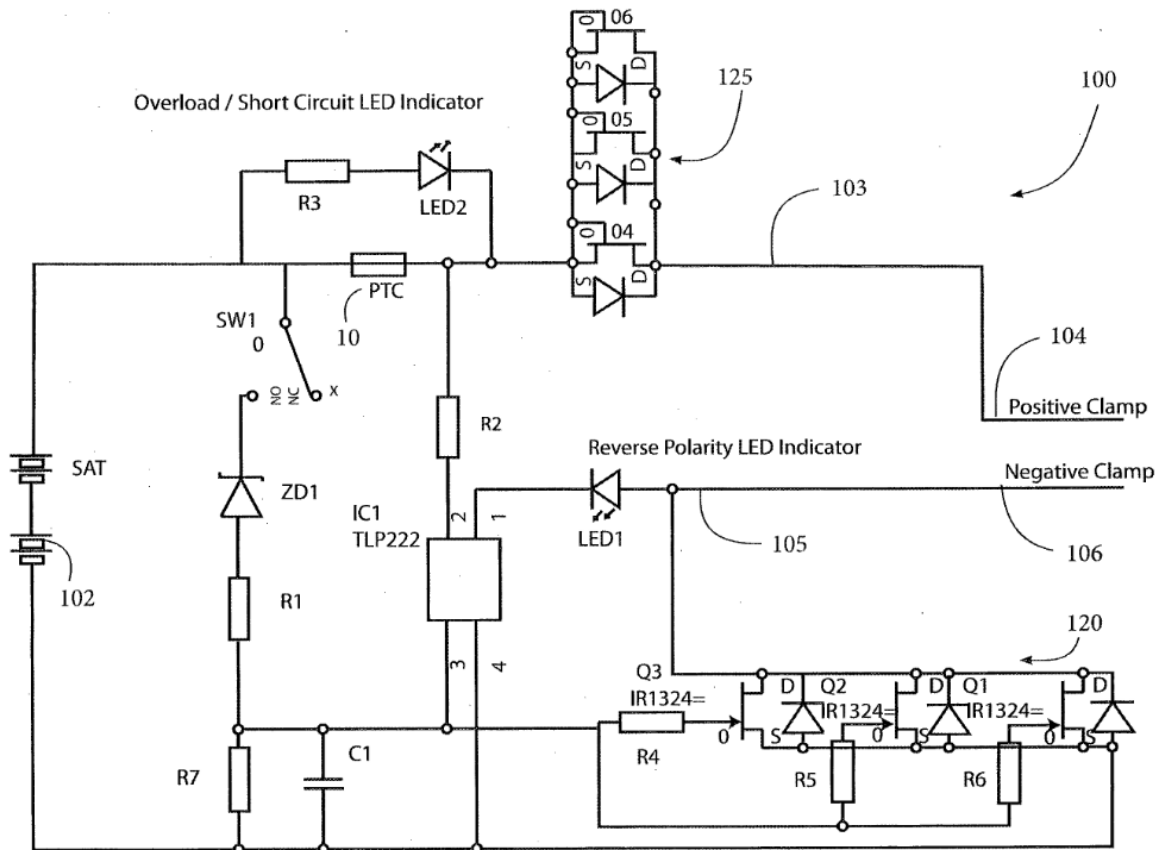


Fig.10

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, 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, Fig. 10. Control circuit 100 also includes “MOSFETS (or alternates) Q4, Q5 and Q6” connected to “the positive supply lead 103.” *Id.* at 7, 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. Specifically, the “gate to source is short circuited, thus holding the devices in a permanent OFF state.” *Id.* 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.* “This feature protects the jump-starter’s internal battery 102 from potentially dangerous overcharge conditions.” *Id.*

2. DIFFERENCES BETWEEN THE CLAIMED INVENTION AND THE PRIOR ART

Claim 22 depends directly from claim 1 and further requires “a voltage back-flow protection.” Ex. 1001, 6:35–36. Claim 23 depends from claim 22 and recites “wherein the voltage back-flow protection for an abnormal load.” *Id.* at 6:37–38.

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). Petitioner then quotes the following disclosure in 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.* at 43 (quoting Ex. 1007, 7).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood's testimony, Petitioner establishes sufficiently for purposes of institution that Tracey teaches the limitations in claims 22 and 23. *See* Pet. 42–43; Ex. 1003 ¶¶ 115–117.

3. ALLEGED REASON FOR COMBINING THE TEACHINGS OF THE REFERENCES

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Tracey's teachings with Krieger's teachings. *See* Pet. 43–44. Additionally, Petitioner explains that combining those teachings would have yielded a predictable result. *Id.* at 44. Dr. Wood's testimony supports Petitioner's positions. *See* Ex. 1003 ¶ 118.

For instance, Dr. Wood testifies that an ordinarily skilled artisan “would have been motivated to combine” Tracey's back-flow protection circuit with Krieger's jump-starter circuit to yield “the predictable result of protecting against unsafe conditions caused by connecting the jump starter to a vehicle with an abnormally high voltage load.” Ex. 1003 ¶ 118.

Based on the current record, Petitioner establishes sufficiently for purposes of institution that an ordinarily skilled artisan would have had a reason, e.g., as articulated by Dr. Wood, to combine Tracey's teachings with Krieger's teachings. *See* Ex. 1003 ¶ 118.

4. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS

As discussed above, Petitioner's analysis explains how Tracey teaches the limitations in claims 22 and 23. *See supra* § III.F.2. Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Tracey's teachings with Krieger's teachings to achieve a predictable result. *See supra*

§ III.F.3. Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claims 22 and 23 unpatentable under § 103 as obvious over Krieger and Tracey.

*G. Alleged Obviousness over Richardson:
Claims 1–7, 9–16, 18–21, and 24*

Petitioner contends that claims 1–7, 9–16, 18–21, and 24 are unpatentable under § 103 as obvious over Richardson in view of an ordinarily skilled artisan’s knowledge. *See* Pet. 6, 44–65. Below, we provide an overview of Richardson, and then we consider the obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that Richardson teaches the subject matter of claims 1–7, 9–16, 18–21, and 24.

1. 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 example, 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:

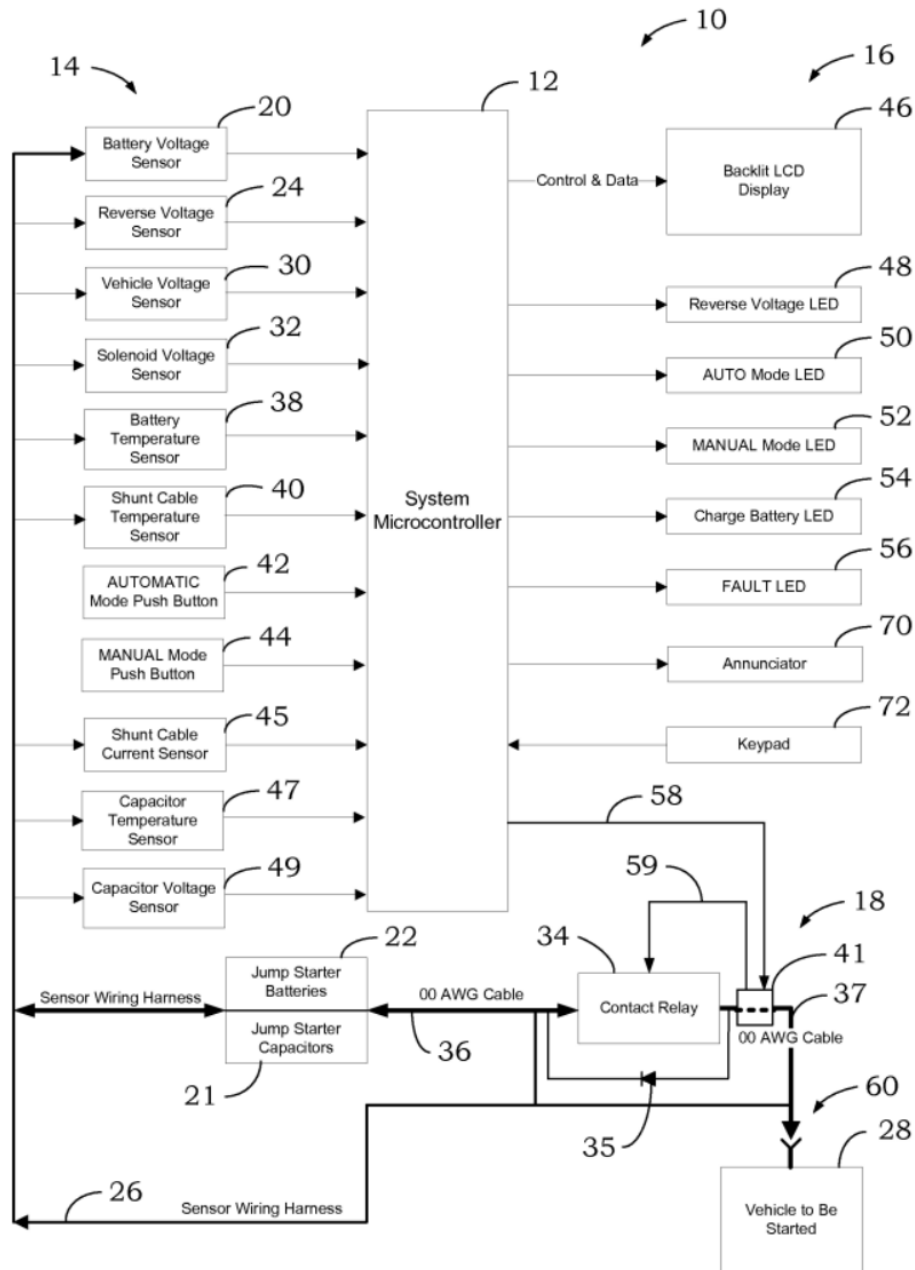


Fig. 1

Figure 1 illustrates jump starter 10 including microprocessor 12 that “receives inputs 14 and produces informational outputs 16 and control outputs 18.” Ex. 1004 ¶ 14, Fig. 1. 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 28” 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, 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.*

2. INDEPENDENT CLAIM 1

(a) Preamble

Claim 1 recites “[a] jumpstarter.” Ex. 1001, 5:11.

Petitioner contends that Richardson discloses 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*, 299 F.3d at 1346. We need not decide whether claim 1’s preamble limits the claim because Petitioner establishes sufficiently for purposes of institution that Richardson discloses claim 1’s preamble. *See* Pet. 44; Ex. 1003

¶¶ 56–58, 120. Specifically, Richardson discloses jump starter 10 including microprocessor 12 that “receives inputs 14 and produces informational outputs 16 and control outputs 18.” Ex. 1004 ¶ 14, Fig. 1; *see* Ex. 1003 ¶¶ 56–58, 120.

(b) Limitation 1(a)(i)

Claim 1 recites “a battery connected to a voltage regulator.”
Ex. 1001, 5:12.

Petitioner contends that Richardson discloses limitation 1(a)(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).

sufficiently for purposes of institution that Richardson discloses limitation 1(a)(i). *See* Pet. 45–46; Ex. 1003 ¶¶ 121–122.

(c) Limitation 1(a)(ii)

Claim 1 recites “the battery capable of supplying power, via the voltage regulator, to at least a microcontroller.” Ex. 1001, 5:12–14.

Petitioner contends that Richardson discloses limitation 1(a)(ii) because microprocessor 12 in Richardson’s microprocessor-controlled jump starter “is supplied with power (+5V) from the one or more batteries 22 via the voltage regulator (LM7805).” Pet. 47 (quoting Ex. 1004 ¶ 14).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Richardson discloses limitation 1(a)(ii). *See* Pet. 47; Ex. 1003 ¶ 123.

(d) Limitation 1(a)(iii)

Claim 1 recites “the battery also capable of supplying power to an automobile battery when the battery has at least a predetermined voltage.” Ex. 1001, 5:14–16.

Petitioner contends that Richardson discloses limitation 1(a)(iii) because Richardson’s microprocessor-controlled jump starter 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 (alterations by Petitioner) (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 below a value of twenty percent of the normal level, a charge battery LED 54 is illuminated”; and
- (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.”

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

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. 48–49 (emphasis omitted).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Richardson discloses limitation 1(a)(iii). *See* Pet. 47–49; Ex. 1003 ¶¶ 124–126.

(e) Limitation 1(b)

Claim 1 recites “a load detector circuit, connected to the microcontroller, to detect when the jumpstarter is correctly connected to the automobile battery.” Ex. 1001, 5:17–19.

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

- (1) “a reverse voltage sensor 24 connected to microprocessor 12 that monitors the polarity of the jumper cables connected to the vehicle battery”; and
- (2) “a vehicle voltage sensor 30 connected to microprocessor 12 that monitors the voltage of the vehicle battery to detect possible fault conditions such as a disconnected vehicle battery.”

Pet. 50 (citing Ex. 1004 ¶¶ 16, 20, 27, 36, 41).

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 28” and determines whether “the 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 jump starter cables has been disconnected” from “the vehicle’s battery or starter system.” *Id.* at 51 (quoting Ex. 1004 ¶¶ 16, 41).

According to Petitioner, an ordinarily skilled artisan “would have understood that the reverse voltage sensor 24 and vehicle voltage sensor 30 of Richardson are part of a ‘load detector circuit’ connected to” microprocessor 12 “to detect when the jump starter 10 is correctly connected to the automobile battery 28.” Pet. 52 (emphasis omitted) (citing Ex. 1003 ¶ 131).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Richardson discloses limitation 1(b). *See* Pet. 49–52; Ex. 1003 ¶¶ 127–131.

(f) Limitation 1(c)

Claim 1 recites “the microcontroller generating, when the jumpstarter is correctly connected to the automobile battery, an output signal.”

Ex. 1001, 5:20–22.

Petitioner contends that Richardson discloses limitation 1(c) 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 the following disclosure in Richardson about how the jump starter functions: “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.*

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that Richardson discloses limitation 1(c). *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 charging current to the automobile battery.” Ex. 1001, 5:23–27.

Petitioner contends that Richardson discloses 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).

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes

sufficiently for purposes of institution that Richardson discloses limitation 1(d). *See* Pet. 53–54; Ex. 1003 ¶¶ 133–134.

(h) Preliminary Conclusion About Obviousness

As discussed above, Petitioner’s analysis explains how, in view of an ordinarily skilled artisan’s knowledge, Richardson teaches claim 1’s subject matter. *See supra* §§ III.G.2(a)–(g). Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claim 1 unpatentable under § 103 as obvious over Richardson.

3. DEPENDENT CLAIMS 2–7, 9–16, 18–21, AND 24

Claims 2–7, 9–16, 18–21, and 24 depend directly or indirectly from claim 1. Ex. 1001, 5:28–40, 6:1–21, 6:25–34, 6:39–41.

For claims 2–7, 9–16, 18–21, and 24, Petitioner’s analysis explains how, in view of an ordinarily skilled artisan’s knowledge, Richardson teaches each claim’s subject matter. *See* Pet. 55–65. Dr. Wood’s testimony supports Petitioner’s analysis. *See* Ex. 1003 ¶¶ 135–163.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that, in view of an ordinarily skilled artisan’s knowledge, Richardson teaches the subject matter of claims 2–7, 9–16, 18–21, and 24. *See* Pet. 55–65; Ex. 1003 ¶¶ 135–163. Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claims 2–7, 9–16, 18–21, and 24 unpatentable under § 103 as obvious over Richardson.

H. Alleged Obviousness over Richardson and Lai: Claim 17

Petitioner contends that claim 17 is unpatentable under § 103 as obvious over Richardson and Lai. *See* Pet. 6, 65–68. Above, we provided

an overview of Richardson. *See supra* § III.G.1. Below, we provide an overview of Lai, and then we consider the obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Richardson and Lai teach claim 17's subject matter.

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:

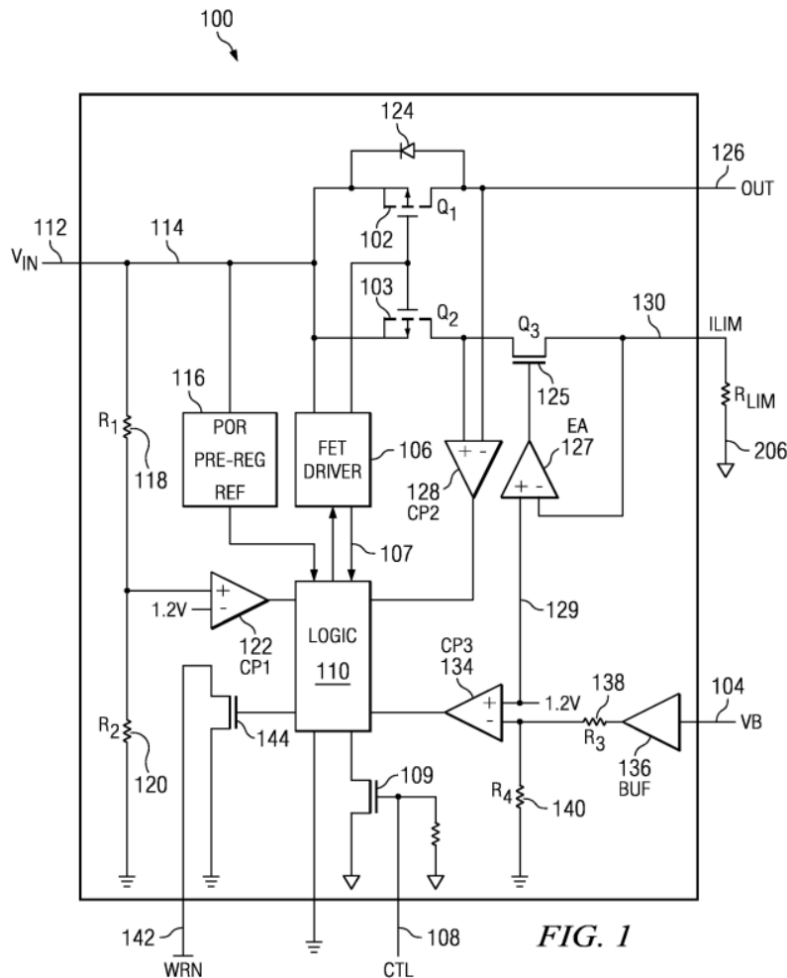


Figure 1 illustrates IC 100 that “protects three possible failure mechanisms in a charging system: input over voltage (the voltage input to the overall system), battery over voltage and charge current over current.” Ex. 1008, 2:17–18, 2:32–34, 2:39–42, Fig. 1. “When any of the above three failure mechanisms 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. DIFFERENCES BETWEEN THE CLAIMED INVENTION AND THE PRIOR ART

Claim 17 depends directly from claim 1 and further requires “a start control module to prevent recharging of a normal voltage of the battery.” Ex. 1001, 6:22–24.

According to Petitioner, “claim 17 requires that the ‘start control module’ prevents recharging of the internal jumpstarter battery (from the automobile battery) when the voltage of the jumpstarter battery is at ‘a normal voltage of the battery.’” Pet. 65–66 (citing Ex. 1001, 4:36–41; Ex. 1003 ¶ 164). To support its position, Petitioner quotes the following disclosure in the ’077 patent:

the automobile engine will generate the normal voltage to recharge the battery after the automobile starts, whereas the automobile start control module is deactivated immediately once the recharging voltage is larger than the voltage before that battery starts the power supply, to protect the battery from damages caused by charging with the normal voltage.

Id. at 65 (quoting Ex. 1001, 4:36–41).

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 (quoting Ex. 1004 ¶ 55). 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.* (emphases omitted).

In particular, Petitioner contends that Lai provides over-voltage protection with comparator 134 that “issues an over voltage signal when the battery voltage” at the 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. 67–68 (quoting Ex. 1008, 2:43–45, 4:65–5:2). According to Petitioner, IC 100, p-channel MOSFET 102, and comparator 134 “prevent recharging of a normal voltage of a battery” and correspond to claim 17’s “start control module.” *Id.* at 68.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Richardson and Lai teach claim 17’s subject matter. *See* Pet. 65–68; Ex. 1003 ¶¶ 164–167.

3. ALLEGED REASON FOR COMBINING THE TEACHINGS OF THE REFERENCES

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Lai’s teachings with Richardson’s teachings. *See* Pet. 68. Additionally, Petitioner explains that combining those teachings would have yielded a predictable result. *Id.* Dr. Wood’s testimony supports Petitioner’s positions. *See* Ex. 1003 ¶ 168.

For instance, 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. Ex. 1003 ¶ 168. Dr. Wood explains that incorporating Lai’s battery-protection circuit into Richardson’s jump starter “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.*

Based on the current record, Petitioner establishes sufficiently for purposes of institution that an ordinarily skilled artisan would have had a reason, e.g., as articulated by Dr. Wood, to combine Lai’s teachings with Richardson’s teachings. *See* Ex. 1003 ¶ 168.

4. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS

As discussed above, Petitioner’s analysis explains how the combined disclosures in Richardson and Lai teach claim 17’s subject matter. *See supra* § III.H.2. Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Lai’s teachings with Richardson’s teachings to achieve a predictable result. *See supra* § III.H.3. Hence, Petitioner demonstrates a reasonable likelihood of prevailing in proving claim 17 unpatentable under § 103 as obvious over Richardson and Lai.

I. Petitioner’s Additional Patentability Challenges

Petitioner presents additional patentability challenges as follows:

- that claims 3–7, 19, and 20 are unpatentable under § 103 as obvious over Richardson and Krieger;
- that claim 8 is unpatentable under § 103 as obvious over Richardson, Krieger, and Baxter; and

- that claims 22 and 23 are unpatentable under § 103 as obvious over Richardson and Tracey.⁴

See Pet. 6, 68–73.

For the additional patentability challenges, Petitioner’s analysis explains how the combined disclosures in the asserted references teach each claim’s subject matter. *See* Pet. 68–73. Further, Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine the teachings of the asserted references to achieve a predictable result. *See id.* at 69–73. Dr. Wood’s testimony supports Petitioner’s positions. *See* Ex. 1003 ¶¶ 169–176.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wood’s testimony, Petitioner establishes sufficiently for purposes of institution a reasonable likelihood of prevailing in proving the additionally challenged claims unpatentable under § 103 as obvious over the asserted references. *See* Pet. 68–73; Ex. 1003 ¶¶ 169–176.

IV. CONCLUSION

Based on Petitioner’s arguments and the evidence currently of record, we determine that there is a reasonable likelihood Petitioner would prevail with respect to at least one claim challenged in the Petition. Hence, we institute an *inter partes* review of all challenged claims on all challenges included in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018) (noting that the language of 35 U.S.C. § 314(b) “indicates a binary choice—either institute review or don’t”); *see also PGS Geophysical AS v.*

⁴ Although the heading for this patentability challenge references claim 17, the Petition does not address claim 17 when discussing the Richardson-Tracey combination. Pet. 68–69.

Iancu, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute as requiring “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

At this preliminary stage, we have not made a final determination about the patentability of any challenged claim, the construction of any claim term, phrase, or limitation, or any other legal or factual issue.

V. ORDER

Accordingly, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–24 in the ’077 patent is instituted on all challenges included in the Petition; and

FURTHER ORDERED that, according to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial that commences on the entry date of this Decision.

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For PETITIONER:

Joseph M. Sauer
Matthew W. Johnson
David B. Cochran
Marlee R Hartenstein
JONES DAY
jmsauer@jonesday.com
mwjohnson@jonesday.com
dcochran@jonesday.com
mhartenstein@jonesday.com

For PATENT OWNER:

Robert R. Brunelli
Jason H. Vick
Alex W. Ruge
SHERIDAN ROSS P.C.
rbrunelli@sheridanross.com
jvick@sheridanross.com
aruge@sheridanross.com
Pilot-NocoIPR-ServiceSR@sheridanross.com