UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THE NOCO COMPANY, INC., Petitioner,

v.

PILOT, INC., Patent Owner.

IPR2021-01235 Patent 10,328,806 B2

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 35 U.S.C. § 318

I. INTRODUCTION

A. Background

The Noco Company, Inc. ("Petitioner") filed a petition for an *inter partes* review (Paper 1 ("Pet.")) challenging claims 1–19 of U.S. Patent No. 10,046,653 B2 (Ex. 1001 ("the '806 patent")). Pilot Inc. ("Patent Owner") did not file a Preliminary Response.

On January 14, 2022, we instituted an *inter partes* review of claims 1– 19. Paper 6 ("Institution Decision" or "Inst. Dec."). After institution, Patent Owner did not file a response to the Petition. Petitioner filed a Reply in Support of Petition (Paper 8, "Reply"). Patent Owner did not file a surreply.

On September 2, 2022, Petitioner filed a Statement Regarding Oral Argument (Paper 9). Petitioner stated that it did not believe oral argument was necessary, in view of the lack of response to the Petition by Patent Owner. *Id*.

We have jurisdiction under 35 U.S.C. § 6. We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a). Based on the record before us, we conclude that Petitioner has shown, by a preponderance of the evidence, that claims 1–19 of the '806 patent are unpatentable.

B. Order to Show Cause

In view of Patent Owner's failure to file substantive papers in this proceeding, on October 18, 2022, we issued an Order to Show Cause why adverse judgment should not be entered against Patent Owner (Paper 11). Patent Owner's Response to the Order to Show Cause (Paper 12, "Response") stated that it "does not request adverse judgment against itself." Response 3. Patent Owner instead requested that we issue a Final Written

Decision. *Id.* Patent Owner further included the following statement concerning the merits of the Petition:

The Petition in this case suffers from the same issues as the Petition in IPR2021-00777 concerning related Patent 10,046,653 B2. Specifically, Petitioner fails to present competent evidence of unpatentability, including failing to present viable reasons to combine the prior art references to support its obviousness grounds. Because the Petition fails to meet the Petitioner's burden and because the claims at issue require a "boost device" not needed or used in combination with contemporary MOSFET devices, Patent Owner elected not to file a complete response.

Id. Petitioner filed a Reply to Patent Owner's Response to Show Cause

Order (Paper 13), in which Petitioner stated

[T]he Board would be justified in interpreting Patent Owner's inaction as a request for adverse judgment via abandonment consistent with 37 C.F.R. § 42.73(b)(4). A finding of abandonment is further confirmed by Patent Owner's statement that the claims at issue are not practiced in contemporary devices.

Paper 13, 1.

Having considered the parties' arguments as to whether adverse judgment should be entered against Patent Owner, we determine not to enter adverse judgment based on an abandonment of the contest by Patent Owner under 37 C.F.R. § 42.73(b)(4). In light of Patent Owner's statement regarding the merits of the Petition and its unequivocal statement that it is not seeking adverse judgment (*see* Response 3), we do not construe Patent Owner's actions as an abandonment of the contest. *See Apple Inc. v. Zipit Wireless, Inc.*, IPR2021-01124, Paper 14 (Dec. 21, 2022) (vacating entry of adverse judgment upon determination it was not sufficiently clear that Patent Owner intended to abandon the contest) (precedential).

Although we have considered Patent Owner's Response to the Order to Show Cause for the purpose of our determination whether to enter adverse judgment, Patent Owner's statement in the Response regarding the merits of the Petition is conclusory and untimely with regard to our evaluation of the merits of the Petition. *See* Paper 7 (Scheduling Order) 8, 11 (setting April 8, 2022 as the deadline for Patent Owner's response to the Petition). Accordingly, for the purpose of evaluating the merits of Petitioner's challenges in the Petition, we decline to consider Patent Owner's statement.

C. Related Matters

Petitioner identifies the following litigations involving the '806 patent: (1) *Pilot, Inc. v. The NOCO Company, Inc.*, No. 2:20-cv-01452 (D. Ariz.); (2) *Pilot, Inc. v. GOOLOO Technology LLC and Shenzhen GOOLOO E-Commerce Co., Ltd.*, No. 2:19-cv-09485 (C.D. Cal.); (3) *Pilot, Inc. v. Aukey Technology Co., Ltd. and Shenzhen Aukey E-Business Co., Ltd.*, No. 2:19-cv-09486 (C.D. Cal.); (4) *Pilot, Inc. vs. Schumacher Electric Corporation*, No. 3:19-cv-01676-N (N.D. Tex.); and (5) *Pilot, Inc. v. Baccus Global, LLC*, No. 9:21-cv-81009 (S.D. Fla.). Pet. 1–2. Petitioner states action (1) is stayed and a count asserting infringement of the '806 patent was dismissed without prejudice, actions (2)–(4) were dismissed without prejudice, and action (5) is pending. *Id.*

Patent Owner identifies two additional actions involving the '806 patent: (1) *Pilot, Inc. v. Battery-Biz, Inc.*, No. 2:20-cv-10207 (C.D. Cal.); and (2) *Pilot, Inc. v. The Duracell Company*, 1:20-cv-004054 (N.D. Ill.). Paper 4, 1. Patent Owner states both actions were dismissed without prejudice. *Id.* As discussed above, Patent Owner also identifies IPR2021-00777 as concerning related Patent 10,046,653 B2. Response 3.

D. The '806 Patent

The '806 patent, titled "Automobile Charger," is directed to "a novel automobile charger with a safe power supply charging quickly." Ex. 1001, codes (45), (54), 1:18–19. The '806 patent explains that prior-art automobile charging devices, i.e., devices for jump starting vehicles, suffered from various problems, including an inability to automatically detect whether a load (e.g., an automobile storage battery) is connected, whether an automobile engine or storage battery has a reverse current, and whether the battery state is suitable for heavy power generation. Ex. 1001, 1:24–29. The '806 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 2:24, 2:59-62, 3:26-28.

The '806 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, 4:11–16, 4:20–22. 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 power supply 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 3:9–17. 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 4:16–18. 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 4:20–29.

The '806 patent further explains that the automobile start control module conducts the power supply for the load module through the microcontroller (Ex.1001, 2:1–4), which collects relevant data to conduct the corresponding control (*id.* at 1:66–67). 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 2:17–22.

The '806 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, or 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, 2:7–40.

E. Illustrative Claim

Petitioner challenges claims 1–19 of the '806 patent. Pet. 1. Claims 1 and 16 are independent claims. Ex. 1001, claims 1–19 (5:8–6:51).

Claims 2–15 depend from claim 1. Id. Claims 17–19 depend from claim 16.

Id. Claim 1, reproduced below, recites a "charging device" as follows.

1. A charging device, comprising:

a battery connected to a voltage regulator, the battery supplying a charging current;

a battery voltage detector, connected to a microcontroller, to detect a voltage of an automobile battery when the charging device is connected to an automobile;

a load detector, connected to the microcontroller, to detect when the charging device is connected to the automobile battery;

the microcontroller generating, when the charging device is connected to the automobile battery, an output signal based on a detected voltage of the automotive battery;

switching circuitry including a plurality of MOSFETs to selectively connect a negative terminal of the battery to the

automobile battery when the microcontroller generates the output signal; and

a boost device for boosting a gate voltage of the plurality of MOSFETs.

Id. at 5:8-25.

F. Instituted Grounds of Unpatentability

We instituted *inter partes* review on the following grounds of

unpatentability, which are all the grounds presented in the Petition. Pet. 14.

Ground	Challenged Claim(s)	35 U.S.C. ¹	Reference(s)/Basis
No.			
1	16–19	§ 102	Baxter ²
2	1, 2, 4–6, 9–14	§ 103	Baxter, Krieger ³
3	16	§ 102	Richardson ⁴
4	1-7, 9-15, 17-19	§ 103	Richardson, Krieger
5	8	§ 103	Richardson, Krieger,
			George ⁵

Petitioner relies on a declaration from Alex Z. Kattamis, Ph.D. Ex. 1008.

II. ANALYSIS

A. Legal Standards

"In an [inter partes review], the petitioner has the burden from the

onset to show with particularity why the patent it challenges is

¹ The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the '806 Patent issued from an application filed after March 16, 2013, we apply the AIA versions of the statutory bases for unpatentability.

² US 2010/0173182 A1 to Baxter et al., published July 8, 2010 (Ex. 1003).

³ US 7,345,450 B2 to Krieger et al., issued Mar. 18, 2008 (Ex. 1004).

⁴ US 2009/0174362 A1 to Richardson et al., published July 9, 2009 (Ex. 1005).

⁵ US 6,803,743 B2 to George et al., issued Oct. 12, 2004 (Ex. 1006).

unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. Inc., v. Union Oil Co.,* 814 F.2d 628, 631 (Fed. Cir. 1987); *see also Finisar Corp. v. DirecTV Grp, Inc.,* 523 F.3d 1323, 1334 (Fed. Cir. 2008) (to anticipate a patent claim under 35 U.S.C. § 102, "a single prior art reference must expressly or inherently disclose each claim limitation"). Moreover, "[b]ecause the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements 'arranged as in the claim." *Net MoneyIN, Inc. v. VeriSign, Inc.,* 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.,* 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

Whether a reference anticipates is assessed from the perspective of one of ordinary skill in the art. *See Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368 (Fed. Cir. 2003) ("'[T]he dispositive question regarding anticipation [i]s whether one skilled in the art would reasonably understand or infer from the [prior art reference's] teaching' that every claim element was disclosed in that single reference." (alterations in original)

(quoting *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991))). Additionally, "[u]nder the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates." *MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999) (citation omitted); *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349–50 (Fed. Cir. 2002).

A claim is unpatentable under 35 U.S.C. § 103 "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 (2018). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when present, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To show obviousness, it is not enough to merely show that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). "This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–19 (2007). On the other hand, an obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of

ordinary skill in the art would employ." *KSR*, 550 U.S. at 418; *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007).

B. Level of Ordinary Skill in the Art

Factors pertinent to a determination of the level of ordinary skill in the art include "(1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field." *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.*

Petitioner argues a person of ordinary skill in the art at the time of the invention "would have had an undergraduate degree in electrical engineering (or equivalent subject) together with two or three years of experience in automotive electrical systems industry." Pet. 12 (citing Ex. 1008 ¶ 13).

In light of the record before us, we adopt Petitioner's proposal regarding the level of ordinary skill in the art. Based on our review of the '806 patent and the prior art of record, we determine that the definition offered by Petitioner comports with the qualifications a person would have needed to understand and implement the teachings of the '806 patent and the prior art.

C. Claim Construction

In an *inter partes* review, we construe claim terms according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2022). Under *Phillips*, claim

terms are afforded "their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312. "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313. "Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.*

Petitioner argues that "most of the terms can be given their ordinary meaning, or in any event the ordinary meaning they would have to a person of ordinary skill in the art ... of automobile chargers and jump starters." Pet. 15 (citing Ex. 1008 ¶ 31). Petitioner further argues that the term "recharging level" which appears in dependent claims 7 and 8 should be interpreted to mean "the level of the first battery after it is connected to the load." *Id.* (citing Ex. 1008 ¶ 33).

1. "recharging level"

Petitioner argues that the term "recharging level" in claims 7 and 8 refers to the voltage level of the jump starter battery (i.e., the "first battery" in claims 7 and 8) after a jump start operation has begun. Pet. 15. In support of its argument, Petitioner and Dr. Kattamis direct us to a portion of the Specification discussing the automobile engine generating "abnormal voltage to recharge the direct current power supply after the automobile starts." *Id.*; Ex. 1008 ¶ 33 (citing Ex. 1001, 4:43–50). In view of this, Petitioner contends the term "recharging level" should be interpreted to mean "the level of the first battery after it is connected to the load." Pet. 15.

Having considered Petitioner's undisputed argument, we note that claims 7 and 8 recite a "recharging voltage level" rather than a "recharging

level," as Petitioner argues. Ex. 1001, 5:53, 58. We determine that Petitioner's omission of "voltage" is immaterial, and further that Petitioner's construction is consistent with the plain language of the claim and supported by the Specification. Ex. 1001, 4:43–50. In view of this, we construe the term "recharging level" to mean "the level of the first battery after it is connected to the load."

We determine that we do not need to expressly construe any other terms for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.")).

D. Claims 1–7, 9–15, and 17–19: Obviousness Based on Richardson and Krieger

Petitioner argues that claims 1–7, 9–15, and 17–19 are obvious over Richardson and Krieger. Pet. 43–62.

1. Richardson (Ex. 1005)

Richardson is titled "Method and Apparatus for Providing Supplemental Power to an Engine." Ex. 1005, code (54). Richardson describes "a portable power source for a motor vehicle" that "provide[s] supplemental power to start internal combustion and turbine engines." *Id.* ¶ 1. Generally speaking:

[Richardson's] invention monitors the voltage of the battery of the vehicle to be jump started and the current delivered by the jump starter batteries to determine if a proper connection has been established and to provide fault monitoring. For safety purposes, only if the proper polarity is detected can the system operate. The voltage is monitored to

> determine open circuit, disconnected conductive clamps, shunt cable fault, and solenoid fault conditions. The current through the shunt cable is monitored to determine if there is a battery explosion risk, and for excessive current conditions presenting an overheating condition, which may result in fire. The system includes an internal battery to provide the power to the battery of the vehicle to be jump started. Once the vehicle is started, the unit automatically electrically disconnects from the vehicle's battery.

Id. ¶ 6.

Richardson's Figures 2A–2D are "schematic[s] of the portable power source, control circuit and sensors of the . . . invention." Ex. 1005 ¶ 8. Dr. Kattamis's Declaration provides a composite of Figures $2A-2D^6$ in annotated schematic Figure K–9, reproduced below.

⁶ Richardson's Figures 2A–2D are partial schematics of the same circuit; each Figure is a quadrant of the circuit and labels the circuit terminals to indicate where any given terminal constitutes another terminal of the other three figures. When pieced together, the Figures are located as follows: Figure 2A at upper left; Figure 2B at lower left; Figure 2C at upper right; and Figure 2D at lower right.



Ex. 1008 ¶ 166. Figure K–9 shows Richardson's Figures 2A and 2C in their entirety in the upper half of the figure. Figure K–9 shows partial versions of Richardson's Figures 2B and 2D in the lower half of the figure.

Richardson describes that its portable power source includes microprocessor 12, jump-starter batteries 22, battery voltage sensor 20, reverse voltage sensor 24, vehicle voltage sensor 30, and contact relay 34. Ex. 1005 ¶¶ 11–12. In this configuration:

A battery voltage sensor 20 monitors the voltage level of one or more jump starter batteries 22. A reverse voltage sensor 24 monitors the polarity of the jumper cables on line 26 which are connected to the vehicle's electrical system 28. A vehicle voltage sensor 30 monitors the voltage on line 37 (voltage of the vehicle). When the contacts are open, the solenoid voltage sensor 32 input to microprocessor 12 is used to measure the voltage of the jump starter batteries 22, which may be configured for various jump starter voltages. When the contacts are closed, the voltage difference between the batteries 22 and the contact relay 34 is used to measure the voltage drop across a temperature-and-resistance calibrated 00 AWG [American Wire Gauge] shunt cable 36 in order to calculate the current being delivered by the jump starter batteries 22 to the vehicle's electrical system 28.

Id. ¶ 12. Thus, generally speaking, microprocessor 12 receives inputs and produces informational and control outputs. *Id.* ¶¶ 11, 14, Figs. 2C–2D. The microprocessor closes contact relay 34 to connect jump-starter batteries 22 to the vehicle's electrical system and opens the contact relay to disconnect the jump-starter batteries. *Id.* ¶ 14, Figs. 2C–2D. When closed, the contact relay couples the positive pole of the jump-starter batteries to the positive pole (red clamp) of the vehicle's electrical system. *Id.* at Figs. 2A, 2C.

2. Krieger (Ex. 1004)

Krieger is titled "Microprocessor Controlled Booster Apparatus with Polarity Protection." Ex. 1004, code (54). Krieger describes "a booster device used for boosting a depleted battery" that prevents current flow to the depleted battery "unless proper polarity is achieved." *Id.* at 1:15–18, 2:21– 44, 5:11–13, Abstr.

Krieger's Figure 1 is reproduced below.



Figure 1 is a circuit schematic of the invention and depicts polarity-sensing circuit 16 and switch 12 connected to boosting battery 2 and depleted battery 11. *Id.* at 4:55–57, 5:11–52. "The switch 12 is activated to complete a boosting circuit between the boosting battery 2 and the depleted battery 11 only when a correct polarity connection between the batteries is attained." *Id.* at 5:23–26. The polarity-protection circuit preferably includes solid-state components rather than "mechanical or electro-mechanical devices, such as solenoids," and "[t]he switch 12 is preferabl[y] a solid state device, such as a transistor, diode, field effect transistor (FET), etc." *Id.* at 2:21–25, 2:60–61, 3:4–5, 5:34–35, 6:30–32. Krieger's Figure 1 depicts "the switch 12 as a number [of] FETs 12a–12d connected in parallel with each other." *Id.* at 5:35–37. "The switch 12 is activated by a polarity sensing circuit 16 to allow current flow from the boosting battery 2 to the depleted battery 11." *Id.* at 5:47–49.

In addition, Krieger discloses an embodiment with "microprocessor 60 . . . programmed to perform essentially all of the control functions needed

for operation of the jump starter" and "used to control the switch 12." *Id.* at 8:40–9:32. In particular, "[t]he output signals from the microprocessor 60 to control switch 12 are provided to control electrodes 14a-14d of transistors 12a-12d." *Id.* at 9:11–13.

Krieger describes a "solid state switch arranged in series" with the jumper cable that couples either (1) the boosting battery's positive pole to the depleted battery or (2) the boosting battery's negative pole to the depleted battery. *Id.* at 2:64–3:5. Krieger's Figure 1 provides more details and shows switch 12 arranged in series between the boosting battery's negative pole and the depleted battery's negative pole. *Id.* at Fig. 1. In other figures, Krieger also shows switch 12 arranged in series between the boosting battery's negative pole. *Id.* at Fig. 3–6.

Like Richardson, Krieger recognizes that improperly connecting jumper cables presents a danger and "one or both of the batteries may be damaged, and in some cases, an explosion, fire and damage to the vehicle or to a person may result." *Id.* at 1:27–51, 6:33–44.

3. Analysis

Claim 1

Petitioner contends that the preamble of claim 1 is not limiting, but even if it were treated as a limitation, Richardson teaches a charging device "[i]n the situation where the vehicle's battery is present but has a voltage of less than 10 volts, the jump starter will start to charge the vehicle's battery before any starting operation begins." Pet. 40 (quoting Ex. 1005 ¶ 41); *see also id.* at 44 (reasoning presented for claim 16).

Claim 1 recites "a battery connected to a voltage regulator, the battery supplying a charging current." Petitioner contends Richardson's disclosure of jump starter batteries 22 connected to the voltage regulator comprising integrated circuit LM7805, resistors, and capacitors, satisfies this limitation. Pet. 44 (citing Ex. 1008 ¶ 179).

Claim 1 next recites "a battery voltage detector, connected to a microcontroller, to detect a voltage of an automobile battery when the charging device is connected to an automobile." Petitioner contends Richardson teaches this limitation based on its disclosure of a battery voltage detector formed by the two resistors labeled as "battery level detector" in Figure K–9 (labeled "10.2K" and "3.40K" in Richardson Figure 2A) and these resistors are connected by terminal E to an ATmego644P microprocessor. Pet. 45 (citing Ex. 1008 ¶ 181).

Claim 1 next recites "a load detector, connected to the microcontroller, to detect when the charging device is connected to the automobile battery." Petitioner contends Richardson teaches this limitation based on its teaching of reverse voltage detector 24 that detects whether the load is correctly connected, and which is connected by terminal H to the ATmego644P microprocessor. Pet. 45–46 (citing Ex. 1008 ¶ 182).

Claim 1 next recites "the microcontroller generating, when the charging device is connected to the automobile battery, an output signal based on a detected voltage of the automotive battery." Petitioner contends Richardson teaches this limitation by disclosing that microprocessor 12 "includes several outputs 16 to provide information to the user and to control the application of power to the vehicle to be jump started" and one of these outputs is reverse voltage LED 48 "illuminated when the microprocessor 12

determines that a reverse voltage jumper cable voltage is detected by reverse voltage sensor 24." Pet. 46 (quoting Ex. 1005 \P 14; citing Ex. 1008 \P 185) (emphasis omitted).

Claim 1 next recites "switching circuitry including a plurality of MOSFETs to selectively connect a negative terminal of the battery to the automobile battery when the microcontroller generates the output signal." Petitioner contends Richardson teaches this limitation by disclosing "a solenoid and a [contact] relay are connected [by] the pin 01 of chip ULN2803 . . . to [an] output signal . . . generated by the microcontroller [12]." Pet. 47 (citing Ex. 1008 ¶ 188). Petitioner further contends contact relay control output 58 of microprocessor 12 controls contact relay 34 based upon the reverse polarity sensor 24 determining that the jump starter is correctly connected to the vehicle. *Id.* (citing Ex. 1005 ¶¶ 14, 20, Fig. 2C; Ex. 1008 ¶ 188, Fig. K–9). Petitioner acknowledges that Richardson does not disclose the solenoid and contact relay include a plurality of MOSFETs to selectively connect a negative terminal of the battery to the automobile battery when the microcontroller generates the output signal and relies on Krieger as teaching these limitations, as discussed below. *Id.* at 47–49.

As to the "MOSFETs" limitation, Petitioner contends Krieger discloses a polarity protection circuit for a battery booster device and that the protection circuit includes "a switch 12, which is preferably 'a solid state device, such as a transistor, diode, field effect transistor (FET), etc." Pet. 47 (quoting Ex. 1004, 5:34–35) (emphasis omitted). Petitioner further contends a MOSFET is a specific type of field effect transistor and thus a person of ordinary skill in the art would have understood a MOSFET as a type of device which may comprise Krieger's switch 12 and FETs 12a–12d

of the switch. *Id.* (citing Ex. 1008 ¶ 189). According to Petitioner, it would have been obvious to replace Richardson's solenoid and contact relay with a solid-state switch of MOSFETs in view of Krieger. *Id.* at 47–48. Petitioner further contends Krieger teaches it is preferable not to include mechanical or electro-mechanical devices, such as solenoids, in the polarity protection circuit. *Id.* (citing Ex. 1004, 2:23–25; Ex. 1008 ¶ 190).

As to the "negative terminal" limitation, Petitioner contends Krieger discloses the switch 12 connects to the negative terminal of the automobile battery, and teaches that "other locations of the switch in the boosting circuit are possible." Pet. 48 (citing Ex. 1004, 5:27-30, 5:32-33). Petitioner further contends a person of ordinary skill would have understood that the switching may be placed on either the positive or negative side of the connection between the jump starter batteries and the load and, because there are only two possible general locations to provide the switch, "it would have been obvious to try locating the switch on the negative side." Id. (citing Ex. 1008 ¶ 191). Petitioner also contends a person of ordinary skill would have been further motivated to locate the switch on the negative side because "when performing a jump start . . . there generally will be some arc or spark" and therefore "it is common in the automotive industry . . . to connect the negative terminals last . . . whenever the final connection is made" and "advisable to have this connection be made away from the automobile battery, usually to ground via the engine block." Id. at 49 (citing Ex. 1008 ¶ 192; Ex. 1007).

Claim 1 next recites "a boost device for boosting a gate voltage of the plurality of MOSFETs." Petitioner contends that Richardson teaches this limitation by disclosing a ULN2803 chip, which a person of ordinary skill in

the art would have recognized as a transistor array featuring high voltage outputs for switching inductive loads that would act as a boost device to increase the voltage used to trigger Richardson's switch circuitry to connect the charging device battery to the load. Pet. 49 (citing Ex. 1008 ¶ 194). Petitioner further contends it would have been obvious to replace Richardson's switch circuitry with a solid-state switch of MOSFETs, as discussed above, and that Krieger suggests a boost device for the substituted MOSFETs by disclosing a level translator 68 "translates the output voltage of [its] microprocessor 60 to the higher levels that are needed to operate transistors 12a–12d." *Id.* at 50 (quoting Ex. 1004, 9:21–23; citing Ex. 1008 ¶ 195) (emphasis omitted). Thus, Petitioner contends it would have been obvious to a person of ordinary skill in the art to use either Krieger's level translator or Richardson's ULN2803 as a boost device for boosting the gate voltage of the substituted MOSFETs. *Id.* (citing Ex. 1008 ¶ 195).

Having reviewed Petitioner's undisputed evidence and argument regarding claim 1, we find that Petitioner has demonstrated that Richardson and Krieger teach or suggest all of the limitations of claim 1, and that a person of ordinary skill in the art would have had reason to combine the teachings in the way Petitioner proposes and would have had a reasonable expectation of success in doing so. Accordingly, Petitioner has established by a preponderance of the evidence that claim 1 is obvious over the combination of Richardson and Krieger.

Claims 2-7, 9-15, and 17-19

Claims 2–7 and 9–15 depend directly from claim 1. Petitioner directs us to Richardson's and Krieger's disclosures corresponding to the additional limitations in claims 2–7 and 9–15. Pet. 50–60.

Claims 17–19 depend directly or indirectly from independent claim 16. As discussed below, we determine Petitioner has demonstrated by a preponderance of the evidence that Richardson anticipates claim 16. Petitioner directs us to Richardson's and Krieger's disclosures corresponding to the additional limitations in claims 17–19. Pet. 60–62.

Having reviewed the undisputed evidence and argument Petitioner presents regarding these claims, we find that Petitioner has demonstrated that Richardson and Krieger teach or suggest all of the limitations of claims 2-7, 9-15, and 17-19, and that a person of ordinary skill in the art would have had reason to combine the teachings in the way Petitioner proposes and would have had a reasonable expectation of success in doing so. Accordingly, Petitioner has established by a preponderance of the evidence that claims 2-7, 9-15, and 17-19 are obvious over the combination of Richardson and Krieger.

4. Conclusion

For all of the foregoing reasons, we determine Petitioner has demonstrated by a preponderance of the evidence that claims 1–7, 9–15, and 17–19 are unpatentable as obvious in view of Richardson and Krieger.

E. Claim 16 – Anticipation Based on Richardson

Petitioner argues that claim 16 is anticipated by Richardson. Pet. 39–43.

Petitioner contends that the preamble of claim 1 is not limiting, but even if it were treated as a limitation, Richardson discloses "a method for a device to charge an automobile battery" for the same reasons as discussed above for claim 1. Pet. 40.

Claim 16 recites "detecting a voltage level of a battery." Petitioner contends Richardson's disclosure of battery voltage sensor 20 formed by the two resistors labeled as "battery level detector" in Figure K–9 (labeled "10.2K" and "3.40K" in Richardson Figure 2A), that "monitors the voltage level of one or more jump starter batteries 22," satisfies this limitation. Pet. 40 (citing Ex. 1005 ¶ 12; Ex. 1008 ¶ 179).

Claim 16 next recites "detecting a connection and a type of connection between the battery and the automobile battery." Petitioner contends Richardson discloses this limitation based on reverse voltage detector 24 that detects whether a load is correctly connected and thus detects when the charging device is connected to the automobile battery. Pet. 41 (citing Ex. 1003, Fig. K-9; Ex. 1008 ¶ 166).

Claim 16 next recites "generating, by a microcontroller, an output signal based on the voltage level of the battery, the connection to the automobile battery and the type of connection of the automobile battery." Petitioner contends Richardson's disclosure of microprocessor 12 that "includes several outputs 16 to provide information to the user and to control the application of power to the vehicle to be jump started" satisfies this limitation because it describes that one of the outputs, reverse voltage LED 48, is "illuminated when the microprocessor 12 determines that a reverse voltage jumper cable voltage is detected by reverse voltage sensor 24." Pet. 42 (quoting Ex. 1003 ¶ 14; citing Ex. 1008 ¶ 168).

Claim 16 next recites "selectively connecting the battery to the automobile battery using the output signal." Petitioner contends Richardson's disclosure of switching circuitry comprising a solenoid and a relay, which are connected from the pin 01 of chip ULN2803 in response to

the output signal generated by microprocessor 12, satisfies this limitation. Pet. 42 (citing Ex. 1005 ¶ 14; Ex. 1008 ¶ 188). Petitioner further contends contact relay control output 58 of microprocessor 12 controls contact relay 34 based upon the reverse polarity sensor 24 determining that the jump starter is correctly connected to the vehicle. *Id.* at 43 (citing Ex. 1005 ¶¶ 14, 20, Fig. 2C; Ex. 1008 ¶ 171).

Claim 1 next recites "providing a low voltage protection to prevent damages caused by over discharging of the battery." Petitioner contends Richardson's disclosure that the microcontroller tests for the battery voltage being above a threshold (step 212) and for the cables being properly connected (step 214) satisfies this limitation because it prevents damages from an over-discharged battery. Pet. 43 (citing Ex. 1008 ¶ 172).

Having reviewed Petitioner's undisputed evidence and argument regarding claim 16, we find that Petitioner has demonstrated that Richardson discloses all of the limitations of claim 16. Accordingly, Petitioner has established by a preponderance of the evidence that Richardson anticipates claim 16.

F. Claim 8 – Obviousness Based on Richardson, Krieger, and George

Petitioner argues that claim 8 is obvious in view of Richardson, Krieger, and George. Pet. 62–64.

1. George (Ex. 1006)

George discloses a "jump start protection circuit having a normally open switch" and a controller that manipulates the switch between an open and closed position. Ex. 1006, code (57). The controller measures voltages at the battery and a jump start post, and moves the switch to a closed

position, thereby connecting the jump start post to the battery, when it detects acceptable jump start conditions. Ex. 1006, code (57). According to George, its circuit "provides protection against attempts to charge a battery with incorrect polarity connections and attempts to charge a battery from a potentially hazardous higher voltage power." Ex. 1006, code (57). George explains that one example of a condition that would cause its switch to open includes the voltage at the battery or jump start post exceeding a predefined range for a predefined period of time. Ex. 1006, 5:55–64.

2. Analysis

Claim 8 depends from claim 7, and requires that "the microcontroller generates the output signal to cause the switching circuitry to disconnect the battery from the automobile battery when the recharging voltage level of the batter is greater than a threshold."

Petitioner relies on its arguments and evidence demonstrating that the combination of Richardson and Krieger renders obvious claim 7, and acknowledges neither Richardson nor Krieger discloses that the switching circuitry will disconnect the batteries when the voltage of the battery is greater than a threshold. Pet. 63. Petitioner argues that George discloses its switch will be opened if the voltage of the power source is too high as compared to the vehicle battery. *Id.* (citing Ex. 1006, 5:64–6:2; Ex. 1008 ¶ 259). Petitioner further argues it would have been obvious to a person of ordinary skill to modify Richardson to open the contact relay when the voltage level detector detects a voltage higher than a given level, either in place of, or in addition to, Richardson's current sensing method, because it would simplify Richardson's circuit and reduce cost by avoiding the need

for current-sensing circuit elements, or it would provide redundancy for safety purposes. *Id.* (citing Ex. 1008 \P 260).

Having reviewed Petitioner's undisputed evidence and argument regarding claim 8, we find that Petitioner has demonstrated that the combination of Richardson, Krieger, and George teach or suggest all of the limitations of claim 8, and that a person of ordinary skill in the art would have had reason to combine the teachings and would have had a reasonable expectation of success in doing so. Accordingly, Petitioner has established by a preponderance of the evidence that claim 8 is obvious over the combination of Richardson, Krieger, and George.

In view of Petitioner's undisputed evidence demonstrating where the prior-art references teach or suggest each limitation in the challenged claims, and explaining why a person of ordinary skill in the art would have had reason to combine the prior-art references with a reasonable expectation of success, we find Petitioner has established, by a preponderance of the evidence, that claim 8 is unpatentable as obvious in view of Richardson, Krieger and George.

G. Petitioner's Remaining Patentability Challenges

Having determined that Petitioner establishes by a preponderance of the evidence that claims 1–7, 9–15, and 17–19 are unpatentable as obvious in view of Richardson and Krieger, that claim 16 is anticipated by Richardson, and that claim 8 is unpatentable as obvious in view of Richardson, Krieger, and George, we do not address Petitioner's additional grounds challenging claims 1, 2, 4–6, 9–14, and 16–19. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Boston*

Sci. Scimed, Inc. v. Cook Grp. Inc., 809 F. App'x 984, 990 (Fed. Cir. 2020) (nonprecedential) ("We agree that the Board need not address [alternative grounds] that are not necessary to the resolution of the proceeding.").

III. CONCLUSION

After reviewing the complete record developed during the course of the trial, we conclude that Petitioner has satisfied its burden of demonstrating, by a preponderance of the evidence, that claims 1–19 of the '806 patent are unpatentable.⁷

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that Petitioner established by a preponderance of the evidence that claims 1–19 of the '806 patent are unpatentable; and

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

In summary:

⁷ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claim(s)	35 U.S.C. §	References/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
16–19	102	Baxter ⁸		
1, 2, 4–6, 9–14	103	Baxter, Krieger		
16	102	Richardson	16	
1–7, 9–15, 17– 19	103	Richardson, Krieger	1–7, 9–15, 17–19	
8	103	Richardson, Krieger, George	8	
Overall Outcome			1–19	

⁸ As explained above, we do not reach this ground, or the ground involving Baxter and Krieger, in view of our determination that Petitioner has otherwise established claims 1–19 are unpatentable.

FOR PETITIONER:

William H. Oldach III Rex W. Miller, II VORYS, SATER, SEYMOUR AND PEASE LLP wholdach@vorys.com rwmiller@vorys.com

FOR PATENT OWNER:

Robert R. Brunelli Jason H. Vick SHERIDAN ROSS P.C. rbrunelli@sheridanross.com jvick@sheridanross.com

Alex W. Ruge BRADFORD, LTD. alex@apb-law.com