

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

The NOCO Company, Inc.
Petitioner

v.

Pilot, Inc.
Patent Owner

Case No. – Not Yet Assigned
U.S. Patent No. 11,124,077

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,124,077**

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I. INTRODUCTION

Petitioner The NOCO Company, Inc. (“Petitioner”) requests an *Inter Partes* Review (“IPR”) of claims 1-24 (the “Challenged Claims”) of U.S. Patent No. 11,124,077 (“the ’077 Patent”).

The ’077 Patent is a continuation of U.S. Patent No. 10,046,653 (“the ’653 Patent”), which is currently the subject of IPR2021-00777. The ’653 Patent is also the subject of a patent infringement lawsuit¹ filed against Petitioner, which has been stayed pending the outcome of IPR2021-00777. The application leading to the ’077 Patent was filed by Patent Owner two days after Petitioner moved to stay the lawsuit on the ’653 Patent, along with a request for Track One examination and an information disclosure statement (IDS) listing over 200 references. The ’077 Patent was allowed in less than three months with no rejections over the prior art, shortly after which the Patent Owner filed a second patent infringement lawsuit² against Petitioner in an attempt to circumvent the stay of the first litigation. But had the Examiner substantively considered the highly relevant *Krieger* or *Richardson* references that were buried within Patent Owner’s 200+ reference IDS, the overly broad claims of the ’077 Patent would

¹ *Pilot, Inc. v. The NOCO Company, Inc.*, Case No. 2:20-cv-01452-SRB (D. Ariz)

² *Pilot, Inc. v. The NOCO Company, Inc.*, Case No. 2:22-cv-00389 (D. Ariz)

not have been allowed.

II. SUMMARY OF THE '077 PATENT

A. Description of the '077 Patent's Alleged Invention

The '077 Patent generally relates to an automobile charging device that prevents operation when the charging electrodes are improperly connected to the automobile battery, such as with reverse polarity. *See* Ex. 1001 at 1:21-34; 42-45. An example of the automobile charging device is illustrated in Figure 1 of the '077 Patent, set forth below.

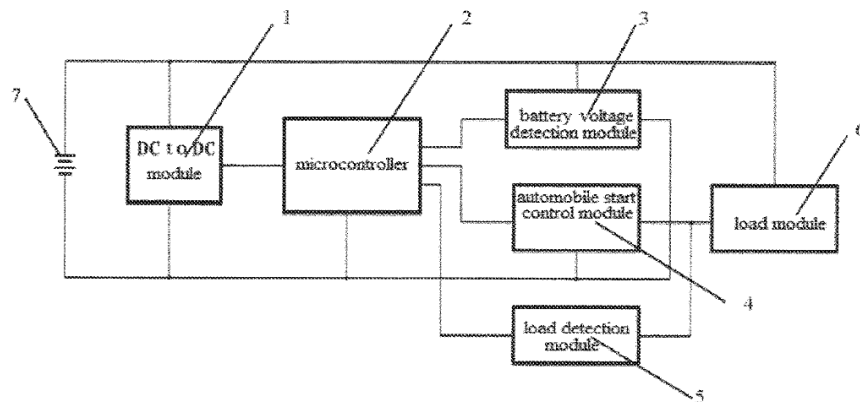


Figure 1

As shown in Fig. 1, the automobile charging device described in the '077 Patent includes a direct current power supply 7 (also referred to as a battery) that is used to supply charging current to a load module 6, which “comprises the automobile storage battery and the automobile engine.” *See id.* at 3:15-35; Fig. 1. The automobile charging device is controlled by a microcontroller 2, which collects data from a battery voltage detection module 3 and a load detection module 5 in order to control the supply of

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power to the load module 6 through an automobile start control module 4. *See id.* at 4:14-22; Fig. 1. Specifically, “[t]he battery voltage detection module [3] conducts the measurement of the batter[y] [7] voltage, and the automobile start control module [4] conducts the power supply or the power outage for the load module [6] through the microcontroller [2], wherein the load detection module [5] detects whether the load module [6] is correctly connected.” *Id.* at 4:16-22. The automobile charging device further includes a DC to DC module 1 that provides a “stable voltage” from the direct current power supply 7 to the microcontroller 2. *See id.* at 3:15-35; 4:14-16; Fig. 1.

The '077 Patent explains that the microcontroller 2 “determines whether the automobile storage battery is connected with the automobile engine through the load detection module [5]” and that “the automobile start control model [sic] is automatically activated and the battery [7] starts to supply power to the load module [6] when the load is correctly connected.” *Id.* at 4:23-28. Further, “the automobile start control model [sic] [4] is automatically deactivated and the battery [7] stops supplying power to the load module [6] when assuming that the load is not connected or the positive and negative polarities are reversely connected.” *Id.* at 4:28-32. The microcontroller 2 also causes the automobile charging device to enter a “standby mode” and “closes all outputs when the battery [7] voltage is lower than 9V,” and resumes normal operations “when the battery [7] voltage is larger than 10V.” *Id.* at 4:32-35.

See also, Ex. 1003 ¶¶ 34-44.

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B. Summary of the '077 Patent's Prosecution

U.S. Patent Application No. 17/236,260 (“the '260 Application”) was filed on April 21, 2021 and issued as the '077 Patent on September 21, 2021. *See* Ex. 1001. The '077 Patent claims priority through a series of continuations to U.S. Patent No. 9,525,297, filed on December 12, 2014, which claims the benefit of priority to Chinese Application No. 201420212173.5, filed on April 28, 2014.³ *See* Ex. 1001 at 1:5-17; *see also* Ex. 1002 at 215-222.

The '260 Application was filed with a Preliminary Amendment that cancelled claims 1-6, and added claims 7-30 that ultimately issued (without amendment) as claims 1-24 of the '077 Patent. *See* Ex. 1002 at 191-196. Prior to examination, the Patent Owner filed an information disclosure statement with the Patent Office listing over 200 patent and non-patent references, with no explanation of the relevance of any reference to the claims of the '260 Application. *See id.* at 156-185. A first Office Action was then issued on June 24, 2021, rejecting claims 7-30 of the '260 Application only for non-statutory (obviousness-type) double patenting over co-pending U.S. Application No. 17/131,113. *See id.* at 101-106. The Office Action did not apply or address any of

³ Petitioner does not concede that the claims of the '077 Patent are entitled to priority to any previously-filed application. However, because the prior art asserted herein predates the earliest-filed priority application claimed by the '077 Patent, the Board does not need to address the issue of priority.

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the over 200 references cited in the information disclosure statement. *See id.*

The Patent Owner filed a response to the first Office Action and a terminal disclaimer of U.S. Application No. 17/131,113 on June 28, 2021. *Id.* at 79-99. A Notice of Allowance was then issued by the Patent Office on July 12, 2021. *Id.* at 68-73.

C. A Person Having Ordinary Skill in the Art

A person having ordinary skill in the art (POSITA) at the time of the '077 Patent would have been a person having 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. Ex. 1003 ¶45.

III. REQUIREMENTS FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.104

A. Grounds for Standing Under 37 C.F.R. § 42.104(a)

Petitioner certifies that the '077 Patent is available for IPR and that the Petitioner is not barred or estopped from requesting IPR challenging the claims of the '077 Patent on the grounds identified herein.

B. Identification of Challenge Under 37 C.F.R. § 42.104(b) and Relief Requested

In view of the prior art and evidence presented, IPR of the Challenged Claims should be instituted and they should be found unpatentable and cancelled. 37 C.F.R. §

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42.104(b)(1-2).

Proposed Grounds of Unpatentability	Exhibits
Ground 1: U.S. Patent Application Pub. No. 2004/0130298 to Krieger, <i>et al.</i> (“ <i>Krieger</i> ”) renders claims 1-7, 9-11, and 18-20 obvious under 35 U.S.C. § 103.	Ex. 1005
Ground 2: <i>Krieger</i> in view of U.S. Patent Application Pub. No. 2010/0173182 to Baxter, <i>et al.</i> (“ <i>Baxter</i> ”) renders claim 8 obvious under 35 U.S.C. § 103.	Ex. 1005 Ex. 1006
Ground 3: <i>Krieger</i> in view of International (PCT) Application Publication No. WO 2012/080996A1 to Tracey, <i>et al.</i> (“ <i>Tracey</i> ”) renders claims 22, and 23 obvious under 35 U.S.C. § 103.	Ex. 1005 Ex. 1007
Ground 4: U.S. Patent Application Pub. No. 2013/0154543 to Richardson, <i>et al.</i> (“ <i>Richardson</i> ”) renders claims 1-7, 9-16, 18-21, and 24 obvious under 35 U.S.C. § 103.	Ex. 1004
Ground 5: <i>Richardson</i> in view of U.S. Patent No. 8,232,772 to Lai, <i>et al.</i> (“ <i>Lai</i> ”) renders claim 17 obvious under 35 U.S.C. § 103.	Ex. 1004 Ex. 1008
Ground 6: <i>Richardson</i> in view of <i>Tracey</i> renders claims 22 and 23 obvious under 35 U.S.C. § 103.	Ex. 1004 Ex. 1007
Ground 7: <i>Richardson</i> in view of <i>Krieger</i> renders claims 3-7, 19, and 20 obvious under 35 U.S.C. § 103.	Ex. 1004 Ex. 1005
Ground 8: <i>Richardson</i> in view of <i>Krieger</i> and <i>Baxter</i> renders claim 8 obvious under 35 U.S.C. § 103.	Ex. 1004 Ex. 1005 Ex. 1006

Section IV identifies where each element of the Challenged Claims is found in the prior art. 37 C.F.R. § 42.104(b)(4). The exhibit numbers of the supporting evidence relied upon to support the challenges are provided above and the relevance of the

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evidence to the challenges raised is provided in Section IV and further supported by the declaration of Dr. Jonathan Wood (Ex. 1003). 37 C.F.R. § 42.104(b)(5). Ex. 1001–Ex. 1012 are also attached.

C. Claim Construction under 37 C.F.R. § 42.104(b)(3)

In this proceeding, claims are interpreted under the same standard applied by Article III courts (*i.e.*, the *Phillips* standard). *See* 37 C.F.R. § 42.100(b); *see also* 83 Fed. Reg. 197 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). Under this standard, words in a claim are given their plain meaning, which is the meaning understood by a person of ordinary skill in the art in view of the patent and file history. *Phillips*, 415 F.3d 1303, 1312-13. All of the claim terms are given their plain meaning, as understood by the POSITA, unless indicated otherwise.

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Overview of the Prior Art

i. Krieger

Krieger was filed on December 10, 2002 and was published on July 8, 2004, and is prior art to the '077 Patent under at least 35 U.S.C. § 102(a)(1) (AIA).

Krieger describes “a booster device used for boosting a depleted battery and in particular to microprocessor control of the booster apparatus and a polarity protection circuit.” Ex. 1005 ¶ [0002]. “The polarity protection circuit is electrically connected to the battery to be charged (depleted battery) and to a boosting battery or other power

source.” *Id.* at ¶ [0010]. “The polarity protection circuit prevents current flow between the batteries unless proper polarity is achieved.” *Id.* An example of a microprocessor controlled jump starter system with polarity protection is illustrated in Fig. 5 of *Krieger*, set forth below. *Id.* at ¶ [0043].

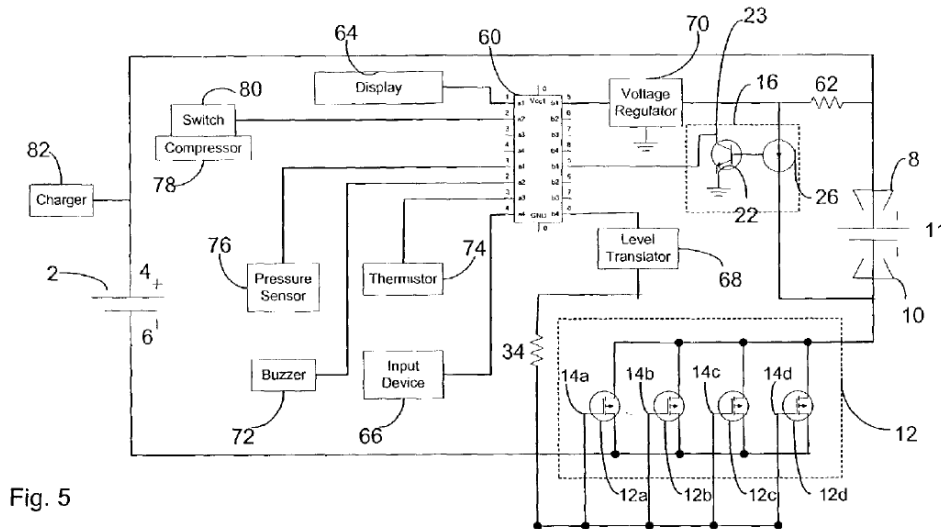


Fig. 5

Ex. 1005, Fig. 5.

Krieger explains that polarity detection may be performed by the microprocessor 60 using the opto-isolator 16 shown in Fig. 5. “Opto-isolator 16 is coupled to clamps 8, 10 [to be connected to the battery 11 to be charged] via resistor 62 such that LED 26 is forward biased when a correct polarity connection between the boosting battery 2 and the depleted battery 11 is made.” *Id.* at ¶ [0045]. “When forward biased, LED 26 turns on phototransistor 22.” *Id.* “When the phototransistor 22 is on, a first signal of a first voltage is present at the collector 23 and is sensed by the microprocessor 60.” *Id.* “When the phototransistor 22 is off, a second signal of a second voltage is present at

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the collector 23 and is sensed by the microprocessor 60.” *Id.* “The microprocessor 60 provides output signals to activate the switch 12 into a conducting state when it receives the first signal and provides an output signal to deactivate the switch 12 into a non-conducting state when it receives the second signal.” *Id.* Thus, “[i]f the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off.” *Id.* at ¶ [0047].

In addition, the “[m]icroprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected.” *Id.* at ¶ [0048]. “To perform the detection, the microprocessor 60 deactivates the switch 12 into a non-conducting state.” *Id.* “Via the feedback circuit or other means, the microprocessor detects whether clamps 8, 10 are connected to a battery.” *Id.* “If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting state.” *Id.* “If a battery is present, the jump starting process continues.” *Id.*

Krieger further explains that “[t]he microprocessor 60 can also be programmed to detect a bad battery or a battery whose voltage is too low to be jump started.” *Id.* at ¶ [0055]. “This type of fault may also be detected if there is no battery connected to clamps 8, 10 or a poor connection is made to the depleted battery 11 and the jump starter is activated.” *Id.* at ¶ [0056]. “When the fault occurs, the microprocessor 60 can be programmed to terminate the jump starting process and to display a suggestion to a user that the battery be reconditioned before jump starting is attempted or to check if the

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clamps 8, 10 are properly connected to the battery 11.” *Id.*

The microprocessor 60 in *Krieger* is also “programmed to detect when the voltage of the boosting battery 2 falls below a predetermined level, for example, about 80% of its rated value.” *Id.* at ¶ [0053].

See also, Ex. 1003 ¶¶ 47-54.

ii. Richardson

Richardson was filed on February 15, 2013 and published on June 20, 2013, and is prior art to the '077 Patent under at least 35 U.S.C. § 102 (a)(1) (AIA).

Richardson describes a portable power source for providing supplemental power to start internal combustion and turbine engines that “monitors the voltage of the battery of the vehicle to be jump started and 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 ¶¶ [0002], [0007]. *Richardson* explains that “[f]or safety purposes, only if the proper polarity is detected can the system operate.” *Id.* at ¶ [0007]. An example of *Richardson*’s portable power source (also referred to as a jump starter) is illustrated in Fig. 1, set forth below.

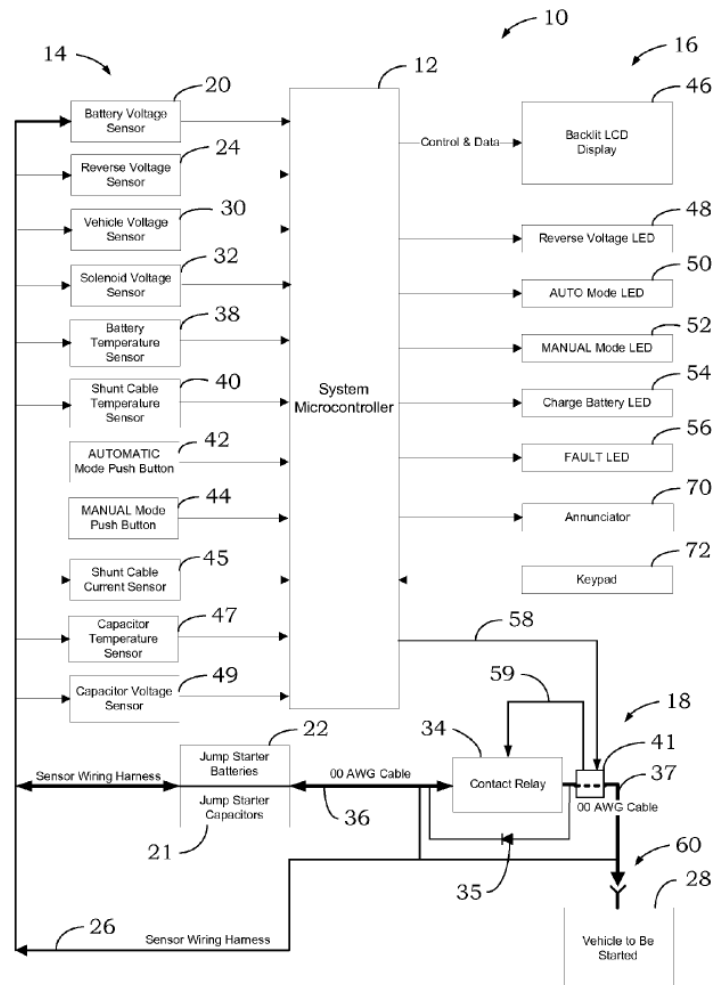


Fig. 1

Ex. 1004, Fig. 1.

The jump starter 10 shown in Fig. 1 of *Richardson* includes a “programmable microprocessor 12 which receives inputs 14 and produces informational outputs 16 and control outputs 18.” *Id.* at ¶ [0014]. The inputs 14 to the microprocessor 12 include inputs from a battery voltage sensor 20 that “monitors the voltage level of one or more jump starter batteries 22,” a reverse voltage sensor 20 that “monitors the polarity of the jumper cables on line 26 which are connected to the vehicle’s electrical

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system 28,” and a vehicle voltage sensor 30 that “monitors the voltage on line 37 (voltage of the vehicle).” *See id.* at ¶ [0016]. The outputs from the microprocessor are used “to provide information to the user and to control the application of power to the vehicle to be jump started.” *Id.* at ¶ [0020]. These outputs include a “contact relay control output 58” that operates a contact relay 34 to connect (or disconnect) jump starter capacitors 21 and batteries 22 with the “the starter system or batteries of the vehicle to be started 28.” *Id.* at ¶ [0021].

The operation of *Richardson’s* jump starter 10 is further described with reference to the circuit diagrams included at Figs. 2A-2D and the flow diagrams included at Figs. 3-9. As shown in Fig. 3, set forth below, once initialization and self-test operations are completed, *Richardson’s* jump starter system enters a main processing loop 210. *See id.* at ¶ [0023], Fig. 3.

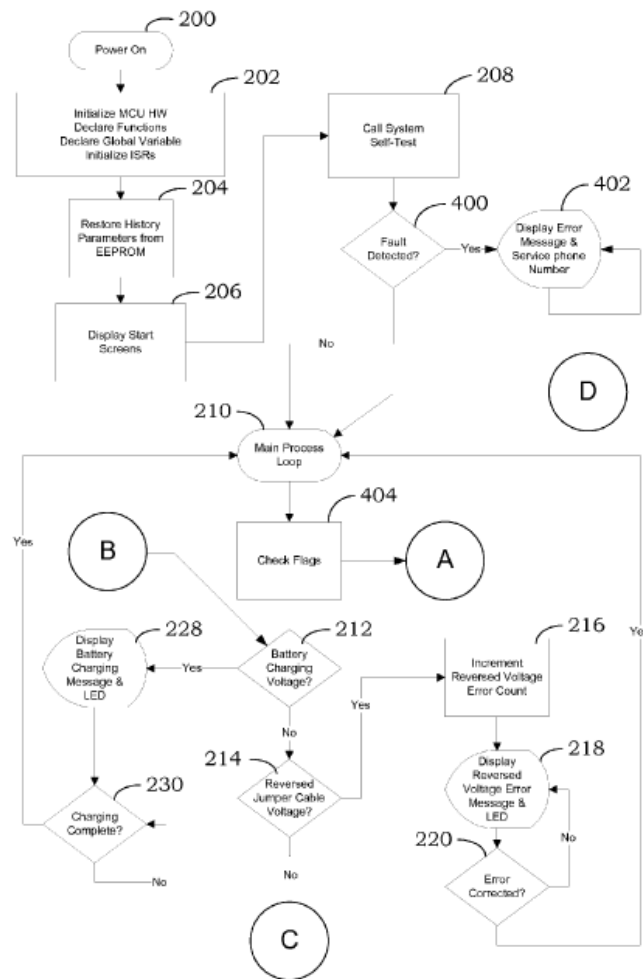


Fig. 3

Ex. 1004, Fig. 3.

During the main processing loop shown in Fig. 3, “once jumper cables 60 have been manually connected to the vehicle to be started 28, the voltage is measured by the reverse voltage sensor 24 to determine if the cables have been properly connected to the vehicle 214.” *Id.* at ¶ [0027]. “If the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and the batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag

is set and the event saved in non-volatile memory 216.” *Id.* “Any further jump starter action by the operator is ignored until the reverse polarity condition is corrected 220, at which point processing returns to the start of the main processing loop 210.” *Id.* “If the jumper cables 60 are not reverse connected 214, then the state of charge of the capacitors 21 and batteries 22 is determined 222,” as shown in Fig. 5 (set forth below). *Id.* at ¶ [0028].

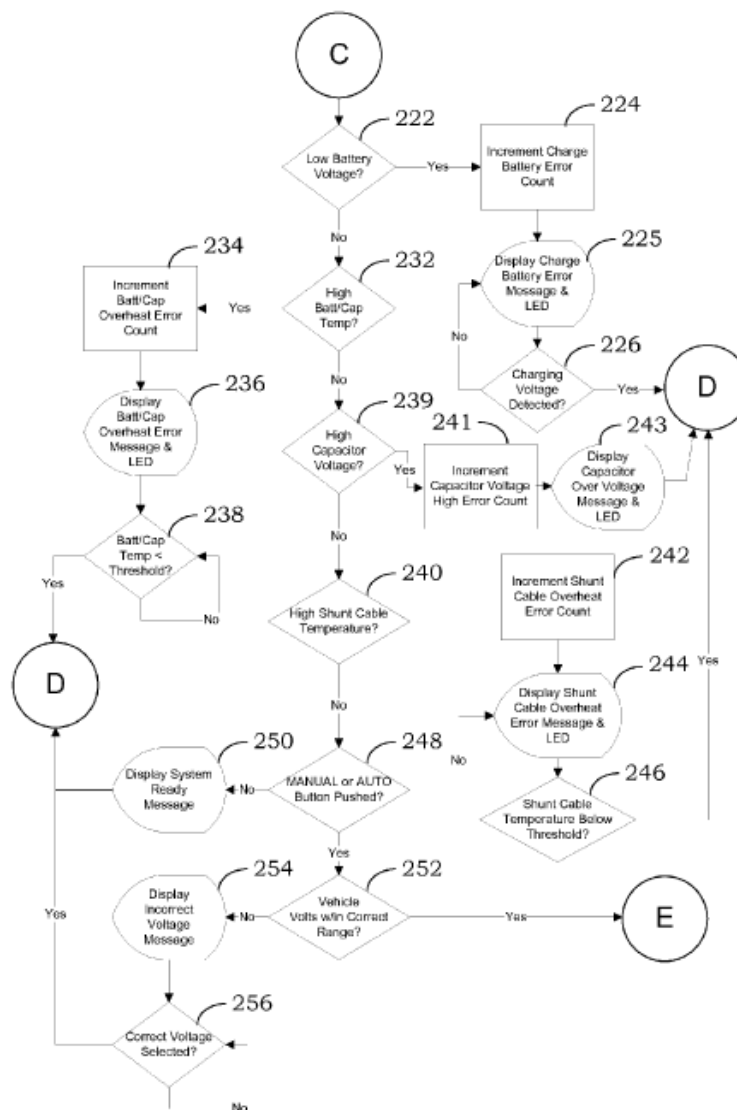


Fig. 5

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Ex. 1004, Fig. 5.

As illustrated in Fig. 5, “[i]f the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set and the event recorded in memory 224.” *Id.* “The system stays in this condition, which prohibits any further jump starter action by the operator until a charging voltage is detected 226, which is great enough to indicate that a battery charger (not shown) has been connected to the batteries 22.” *Id.*

After jump starting has been initiated by closing the contact relay 34 (at step 268 in Fig. 6), *Richardson’s* system “monitors all input sensors 14 and the current status of the jump starter for possible fault conditions,” as shown in Fig. 7 (set forth below). *Id.* at ¶¶ [0035], [0036]. “If the system detects an increase in the difference between the measured jump starter battery voltage 20 and the voltage measured 30 across the contact relay 34 indicating that one of the jump starter cables has been disconnected 302 from the vehicle’s battery or starter system 28 then a jumper cable unplugged error count is incremented 304, a ‘Jumper Cable Unplugged’ error message is displayed 306 on the LCD 46, the contact relay 34 is opened and the fault LED 56 is illuminated 290.” *Id.* at ¶ [0041].

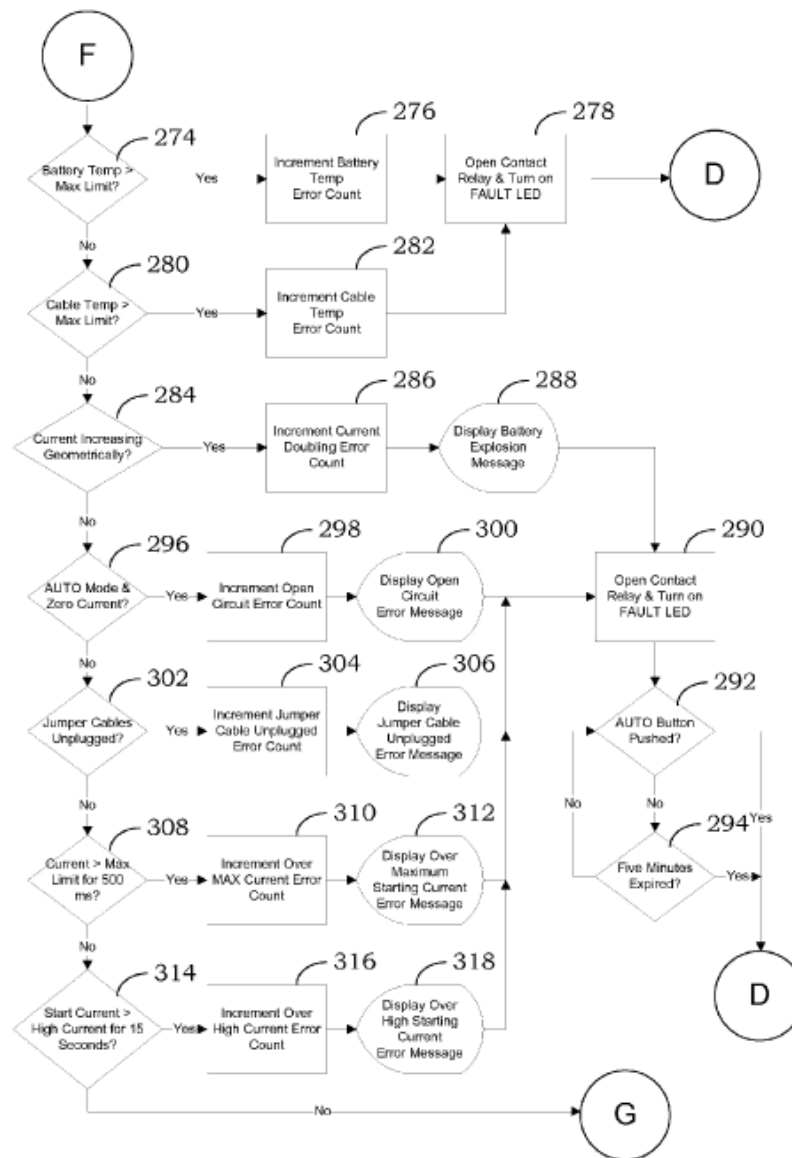


Fig. 7

Ex. 1004, Fig. 7. *See also*, Ex. 1003 ¶¶ 55-63.

iii. *Baxter*

Baxter was filed on March 24, 2010 and published on July 8, 2010, and is prior art to the '077 Patent under at least 35 U.S.C. § 102 (a)(1) (AIA).

Baxter describes a safety circuit for use in low-voltage systems, such as a circuit

for jump starting a battery. *See, e.g.*, Ex. 1006 ¶ [0007]. *Baxter* discloses a method “for detection of proper polarity of the connections between the battery and the low-voltage system.” *Id.* When the safety circuit of *Baxter* determines that no unsafe condition exists, a connection to the battery is made, for example using “one or more high-current transistors as a switch.” *Id.* at [0028]. An example of *Baxter*’s safety circuit is illustrated in Fig. 7, set forth below.

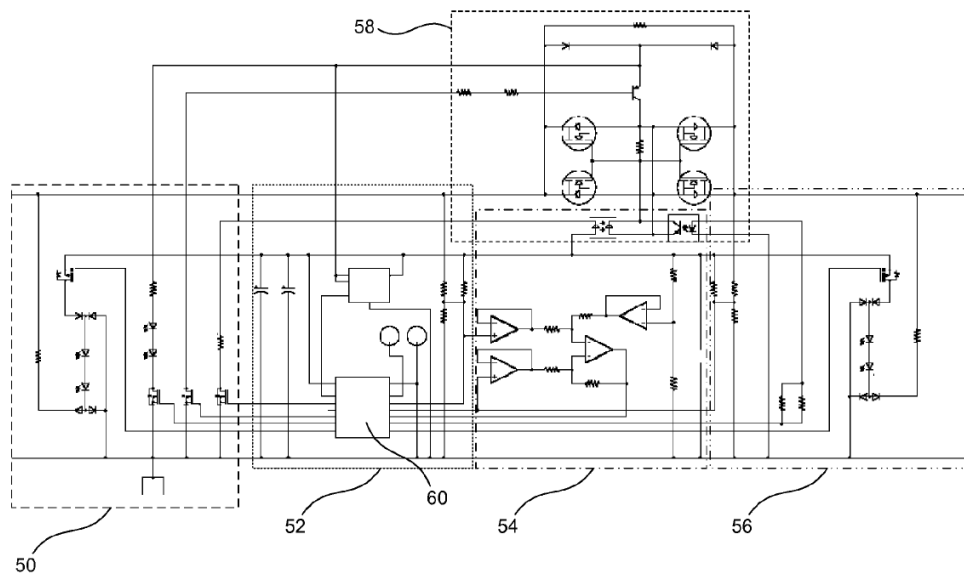


FIG. 7

Ex. 1006, Fig. 7. *See also*, Ex. 1003 ¶¶ 64-65.

iv. Tracey

Tracey was filed on December 14, 2011 and published on June 21, 2012, and is prior art to the '077 Patent under at least 35 U.S.C. § 102 (a)(1) (AIA).

Tracey describes a jump starter for a vehicle battery that “protects from voltage mismatch, reverse polarity, short circuit, over-discharge, and over-use.” *See, e.g.*, Ex.

1007 at 1:7; 6:28-29. *Tracey* also discloses that the jump starter may include a circuit for preventing current back-flow from the vehicle battery to the jump-starter's internal battery, as shown in Fig. 10.

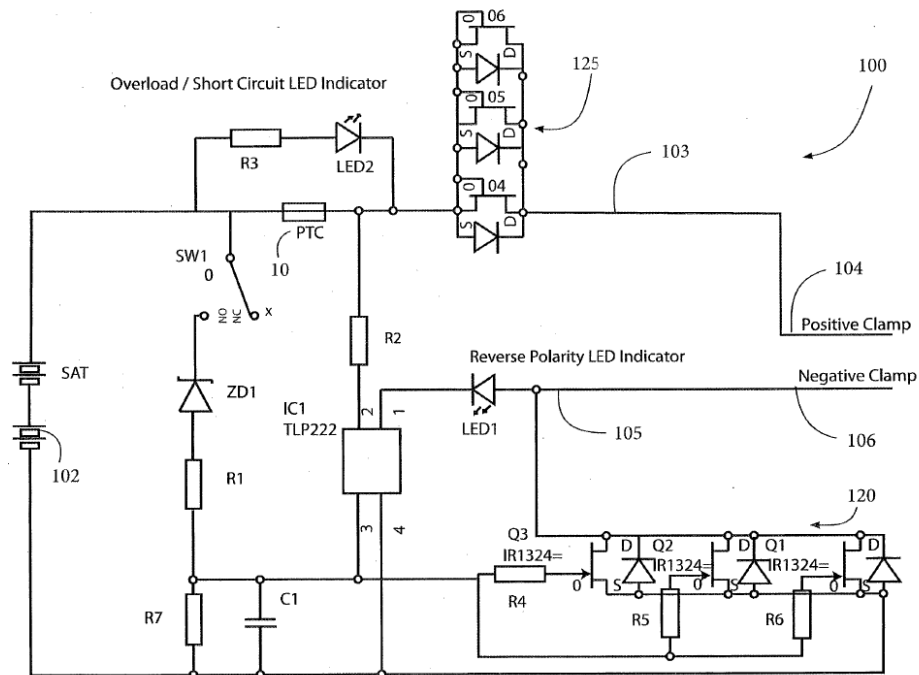


Fig.10

Ex. 1007, Fig. 10. Fig. 10 of *Tracey* shows an example of a jump starter circuit 100 that includes “batteries 102, a positive lead 103 with a clamp conductor 104, and a negative lead 105 with a clamp conductor 106.” *Id.* at p. 6:18-19. As shown at reference 125 in Fig. 10, the positive lead 103 of the jump starter circuit 100 is connected to a trio of “MOSFETS (or alternatives) Q4, Q5 and Q6.” *Id.* at 7: 22-23; Fig. 10. “These devices are connected in such a way as to utilize their intrinsic diodes for the purposes of reverse blocking of current.” *Id.* at 7:23-24. “Should the jump starter circuit 100 be connected to a vehicle with a greater voltage than the unit is

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intended for, the diodes become reverse biased and no current may flow.” *Id.* at 7:26-27. “This feature protects the jump-starter’s internal battery 102 from potentially dangerous overcharge conditions.” *Id.* at 7:27-28.

See also, Ex. 1003 ¶¶ 66-68.

v. *Lai*

Lai was filed on May 27, 2008 and issued on July 31, 2012, and is prior art to the ’077 Patent under at least 35 U.S.C. § 102 (a)(1) (AIA).

Lai describes an over voltage, over current and overcharge protection circuit for use with a battery charging system. *See, e.g.*, Ex. 1008, 1:18-22; 2:32-48. An example of *Lai*’s over voltage, over current and overcharge protection circuit 100 is shown in Fig. 1.

when the battery voltage exceeds an over voltage protection (OVP) threshold. *See id.* at 4:66-5:2.

See also, Ex. 1003 ¶¶ 69-71.

B. Ground 1: Krieger Renders Claims 1-7, 9-11, and 18-20 Obvious

As demonstrated below, claims 1-7, 9-11, and 18-20 would have been obvious over *Krieger*.

i. Claim 1

1[P] A jumpstarter, comprising:

To the extent that the preamble is limiting, *Krieger* discloses a jumpstarter. For example, Fig. 5 of *Krieger* (set forth below) discloses “an example of a microprocessor controlled jump starter system.” Ex. 1005 ¶ [0043].

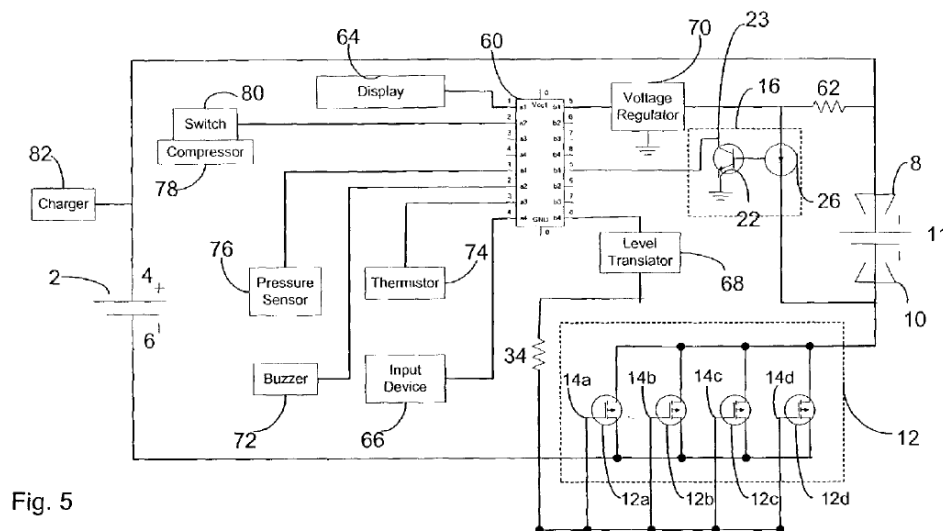


Fig. 5

Ex. 1005, Fig. 5.

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

Krieger discloses a battery connected to a voltage regulator. For example, as highlighted in Fig. 5 below, *Krieger* discloses a “voltage regulator 70” that is “coupled to the boosting battery 2.” See Ex. 1005 ¶ [0052] and Fig. 5 (showing the battery 2 connected to the voltage regulator 70 by resistor 62).



[1(a)(ii)] the battery capable of supplying power, via the voltage regulator, to at least a microprocessor,

-22-

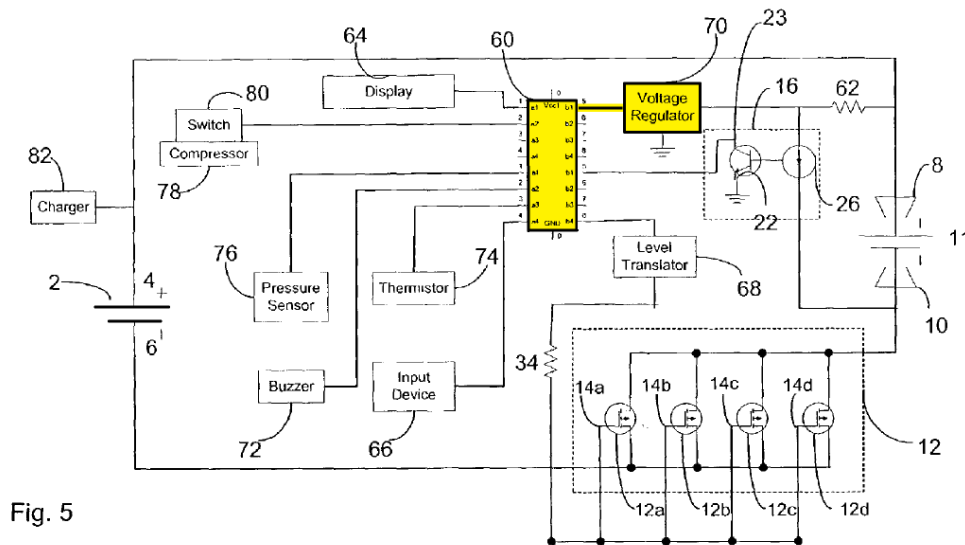


Fig. 5

Ex. 1005, Fig. 5 (with highlighting added).

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

Krieger also discloses that the battery is capable of supplying power to an automobile battery when the battery has at least a predetermined voltage. For example, as highlighted in Fig. 5 below, *Krieger* discloses that the boosting battery 2 is coupled to a pair of alligator clamps 8, 10 to be connected to a vehicle battery 11 to be charged. See Ex. 1005 ¶ [0028] and Fig. 5.

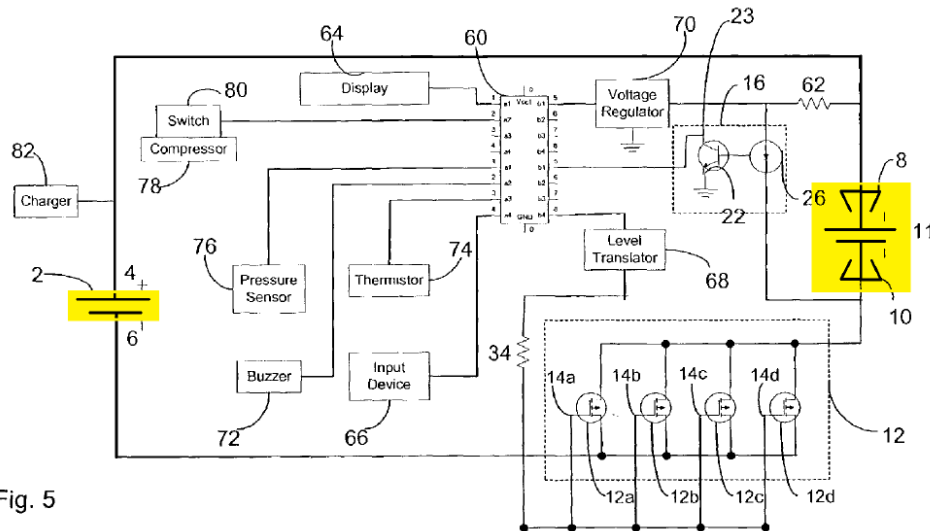


Fig. 5

Ex. 1005, Fig. 5 (with highlighted added). *Krieger* further discloses monitoring the boosting battery 2 to detect when the battery falls below a predetermined voltage needed for supplying power to the automobile battery. *See id.* at ¶ [0044] (“By way of a feedback circuit or other means, the microprocessor 60 can monitor the voltage and/or current being supplied to the depleted battery 11 from the booster battery 2”). *Krieger* explains that the jump starter notifies the operator when the boosting battery 2 is low and needs to be recharged when the microprocessor 60 detects that the boosting battery has fallen below “a predetermined level, for example, about 80% of its rated value.” *See id.* at ¶ [0053]. *Krieger* thus discloses that the boosting battery is “capable” of supplying power to an automobile battery when the battery has at least a predetermined voltage, *i.e.*, the boosting battery is above the “predetermined level.”

If the Board were to determine, however, that claim element 1(a)(iii) also requires that the jumpstarter prevent the boosting battery from supplying power to the

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automobile battery if the boosting battery does not have a predetermined voltage, this would have been obvious in view of the teachings of *Krieger* and the general knowledge in the field. *Krieger* discloses that the microprocessor may be programmed to terminate the jump starting process upon detection of a fault, such as a disconnected automobile battery. (See, e.g., Ex. 1005 ¶ [0056]). In view of *Krieger*'s disclosure, the POSITA would have understood that a boosting battery that has fallen below 80% of its rated value (*i.e.*, the predetermined level disclosed by *Krieger* at ¶ [0053]), is also a fault that should be corrected before the jump starting process proceeds. See Ex. 1003 ¶79 (explaining that a POSITA would know that lithium-ion batteries are prone to damage by over-discharging). The POSITA would therefore have been motivated to also program the microprocessor 60 of *Krieger* to prevent jump starting upon detecting that the boosting battery has fallen below the predetermined level suitable for jump starting the vehicle. *Id.*

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

The specification of the '077 Patent does not specifically explain what it means for the load detector circuit to detect when the jumpstarter is "correctly connected" to the automobile battery. But the specification of the '077 Patent explains that "the automobile start control model [sic] is automatically activated and the battery starts to supply power to the load model [sic] when the load is correctly connected," and that "the automobile start control model [sic] is automatically deactivated and the battery

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stops supplying power to the load module when assuming that the load is not connected or the positive and negative polarities are reversely connected.” Ex. 1001 at 4:26-33. Based on this disclosure, the POSITA would have understood that a detection that the jumpstarter is “correctly connected to the automobile battery” must at least include detecting that (1) the load (*i.e.*, automobile battery) is connected to the jumpstarter and (2) the positive and negative polarities of the load (*i.e.*, automobile battery) are not reversely connected. *See* Ex. 1003 ¶81. This is disclosed by *Krieger*.

For example, *Krieger* discloses that “[b]y way of a feedback circuit or other means, the microprocessor 60 can monitor... the voltage and/or current of the [automobile] battery 11,” and that “[a] resistive divider may be used to provide the voltage and current measurements to the microprocessor's A/D input.” Ex. 1005 ¶ [0044]. *Krieger* thus discloses a load detector circuit (*e.g.*, a feedback circuit such as a resistive divider) that is connected to the microcontroller (*i.e.*, the A/D input of microprocessor 60) in order to monitor the voltage and/or current being supplied to the automobile battery.

Krieger further discloses that the monitored voltage and/or current (*i.e.*, from the load detector circuit) is used by the microprocessor to detect both that the automobile battery is connected and 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.”) For example, *Krieger* discloses that switch 12 is

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controlled by the microprocessor 60 to supply power from the boosting battery 2 to the depleted automobile battery 11 (*see id.* at ¶ [0045]), and that “[i]f the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off” (*id.* at ¶ [0047]). *Krieger* also discloses that “[m]icroprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected.” *Id.* at ¶ [0048]. “If no battery is present, the switch 12 is placed in a non-conducting state” and “[i]f a battery is present, the jump starting process continues.” *Id.*; *see also id.* at ¶ [0056] (disclosing that if no battery is connected to clams 8, 10, the microprocessor 60 can be programmed to terminate the jump starting process).

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

Krieger discloses a microcontroller (*i.e.*, microprocessor 60) that generates an output signal when the jumpstarter is correctly connected to the automobile battery. As detailed above for claim element 1(b), *Krieger* discloses that switch 12 is controlled by the microprocessor 60 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.” *Krieger* further discloses that “[t]he microprocessor 60 provides output signals to activate the switch 12 into a conducting state” and also that “the microprocessor can deactivate switch 12 to terminate the jump starting process when a fault is detected.” Ex. 1005 ¶ [0045]. The output signal

generated by the microprocessor for controlling the switch 12 is further shown in Fig. 5, as highlighted below.

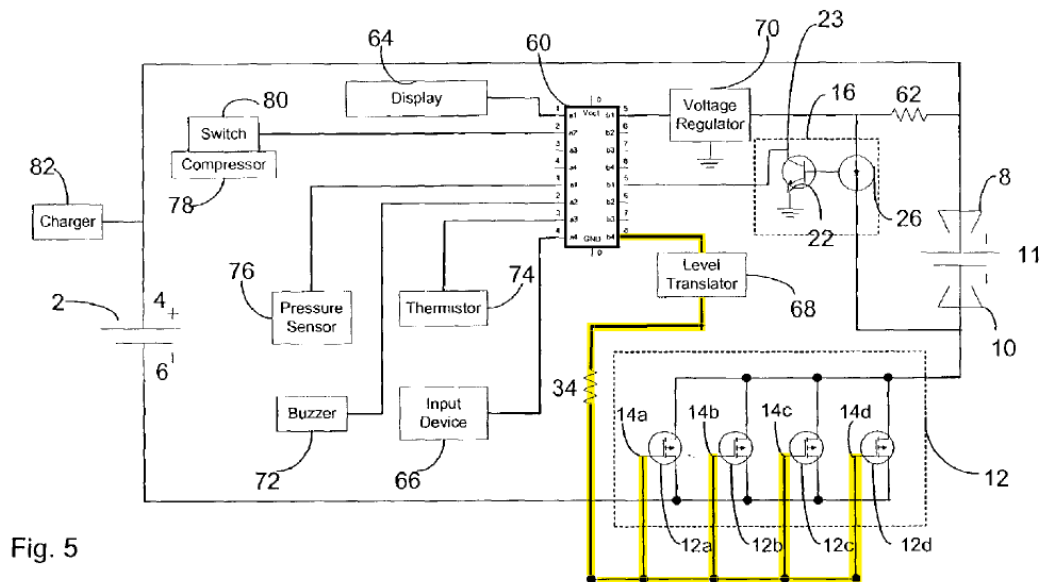


Fig. 5

Ex. 1005, Fig. 5 (with highlighting added).

[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.

Krieger discloses a FET-based switch (*i.e.*, switching circuitry) that includes at least one switch and connects the jump starter battery to the automobile battery when the microprocessor generates the output signal to supply charging current to the automobile battery. The FET-based switch 12 is shown in each of the embodiments of *Krieger*, including Fig. 5 as highlighted below. *Krieger* explains that “[t]he switch 12 is activated to complete a boosting circuit between the boosting battery 2 and the depleted battery 11” (*id.* at ¶ [0029]), and that the switch may include “a number [of] FETs 12a-12d connected in parallel with each other” (*id.* at ¶ [0030]), as shown for

example in Fig. 5 below. Further, as detailed above for claim elements 1(b) and 1(c), the switch 12 is controlled by an output from the microprocessor 60 (*i.e.*, a microcontroller) that causes the switch 12 to supply charging current from the jump starter battery 2 to the automobile battery 11 when the automobile battery is “correctly connected.”

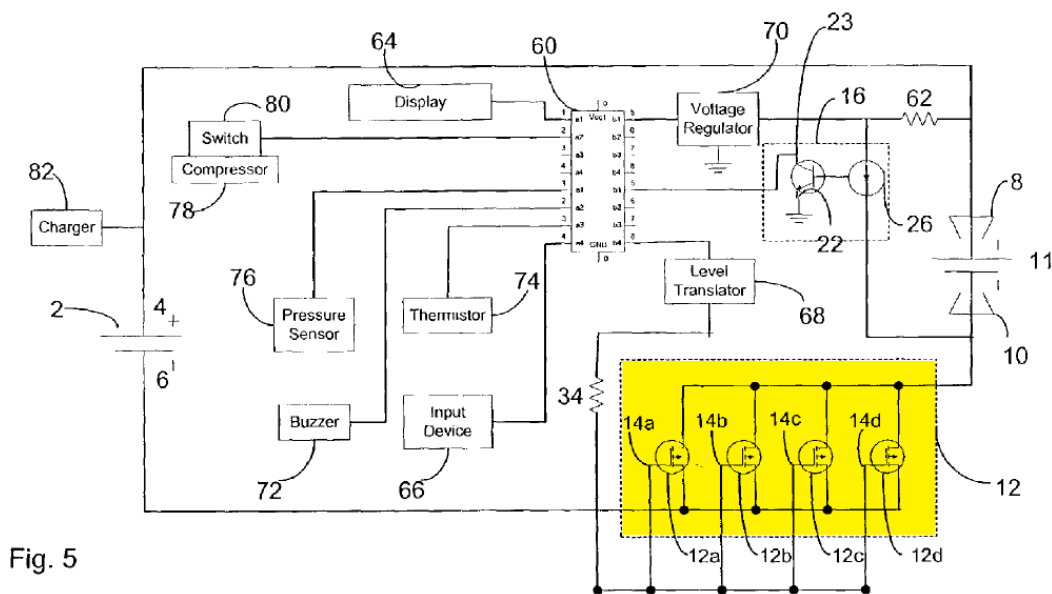


Fig. 5

Ex. 1005, Fig. 5 (with highlighting added).

For at least the above reasons, claim 1 is obvious over *Krieger*. See also, Ex. 1003 ¶¶ 73-85.

ii. Claim 2

Claim 2 depends from claim 1 and further recites, “a battery voltage detector circuit to detect a battery voltage of the battery.” This is disclosed by *Krieger*. For example, *Krieger* discloses that “[b]y way of a feedback circuit or other means, the

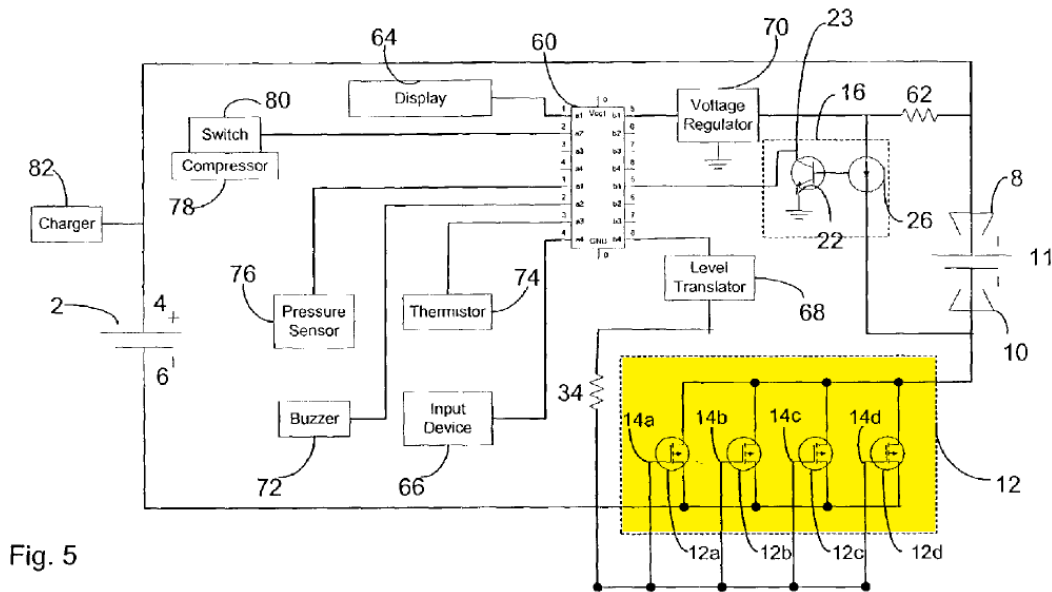
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microprocessor 60 can monitor the voltage and/or current being supplied to the depleted battery 11 from the booster battery 2” and that “[a] resistive divider may be used to provide the voltage and current measurements to the microprocessor's A/D input.” Ex. 1005 ¶ [0044]; *see also id.* at ¶ [0053] (disclosing that the microprocessor is programmed to detect when the voltage of the boosting battery 2 falls below a predetermined level). *Krieger* therefore discloses a battery voltage detector (*i.e.*, a feedback circuit such as a resistive divider coupled to the microprocessors A/D input) to detect a battery voltage of the battery (*i.e.*, booster battery 2). *See also*, Ex. 1003 ¶86.

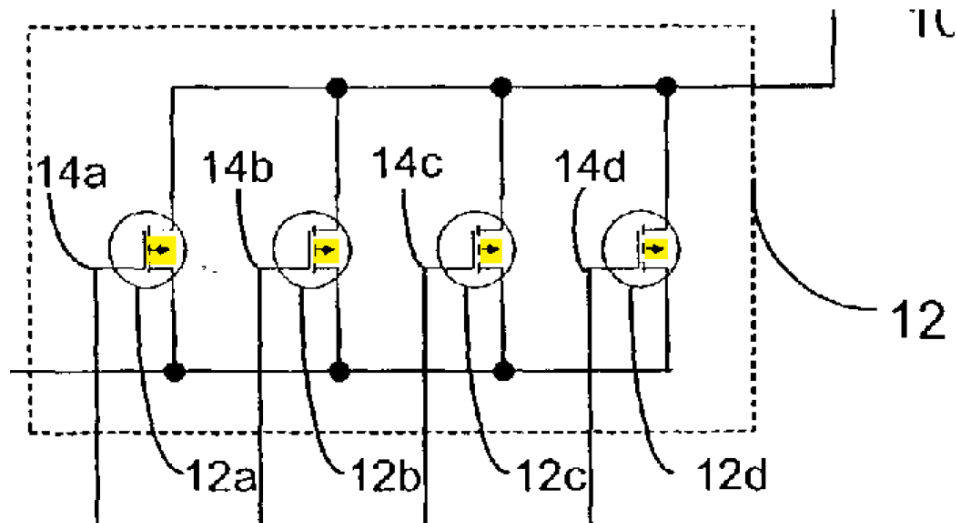
***iii.* Claim 3**

Claim 3 depends from claim 1 and further recites, “wherein the at least one switch is one or more MOSFETs.” This is disclosed by, or at least obvious in view of, *Krieger*.

As detailed above for claim element 1(d), *Krieger* discloses a FET-based switch 12 that includes “a number [of] FETs 12a-12d connected in parallel with each other” (*id.* at ¶ [0030]), as shown for example in Fig. 5 set forth below.



Ex. 1005, Fig. 5 (with highlighting added). *Krieger* specifies that the switch 12 may include field effect transistors (FETs). *Id.* at ¶ [0030]. Based on the diagram of the FETs included in Figs. 1-5 of *Krieger*, the POSITA would recognize that the FETs utilized by *Krieger* are MOSFETs. See Ex. 1003 ¶89. This is because the arrows on the FET diagrams (as highlighted below) indicate to the POSITA that the FETs are specifically MOSFETs. *Id.*



Ex. 1005, Fig. 5 (with highlighting added).

Further, even absent the arrows on the FET diagrams in Figs. 1-5, it would have been obvious to the POSITA, based on the common knowledge in the field, to utilize MOSFETs for the FET-based switch 12 shown in *Krieger*. See Ex. 1003 ¶90. The POSITA would have understood that MOSFETs were, and continue to be, the most common choice for switches in power circuitry, such as the jump starter device described in *Krieger*. *Id.* Further, *Krieger* specifies that “[t]he FETs 12a-12d are preferably high power, very low on-resistance types” (Ex. 1005 ¶ [0030]), which the POSITA would have recognized as characteristics of n-channel MOSFETs. *Id.*

iv. Claim 4

Claim 4 depends from claim 3 and further recites, “wherein the one or more MOSFETs are n-channel MOSFETs.” This is disclosed by, or at least obvious in view of, *Krieger*.

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As detailed above for claim 3, *Krieger* discloses a FET-based switch 12 that includes “a number [of] FETs 12a-12d connected in parallel with each other” (*id.* at ¶ [0030]), as shown for example in Fig. 5. *Krieger* specifies that “[t]he FETs 12a-12d are preferably high power, very low on-resistance types” (Ex. 1005 ¶ [0030]), which the POSITA would have recognized as characteristics of n-channel MOSFETs. Ex. 1003 ¶92. The POSITA would have further recognized that FETs 12a-12d, as shown in Fig. 5 of *Krieger*, are n-channel MOSFETs because the source terminals are coupled to the negative power rail to provide positive switching, which is characteristic of n-channel MOSFETs. *See id.*

Further, even if it were determined that *Krieger* does not expressly disclose the use of n-channel MOSFETs for the switching circuit 12, this would have been obvious to the POSITA based on the common knowledge in the field. *See* Ex. 1003 ¶93. First, the POSITA would have understood that MOSFETs were, and continue to be, the most common choice for switches in power circuitry, such as the jump starter device described in *Krieger*. *Id.* In addition, the POSITA would have also understood that n-channel MOSFETs are more commonly used in power switching applications because of the ease of manufacture of n-channel MOSFETs compared to p-channel MOSFETs. *Id.*

v. Claim 5

Claim 5 depends from claim 1 and further recites, “wherein there are a plurality

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of switches.” This is disclosed by *Krieger*. As detailed above for claim element 1(d), *Krieger* discloses a FET-based switch 12 that includes “a number [of] FETs 12a-12d connected in parallel with each other.” Ex. 1005 ¶ [0030]. *See also*, Ex. 1003 ¶94.

vi. Claim 6

Claim 6 depends from claim 1 and further recites, “wherein the at least one switch is a plurality of MOSFETs.” This is disclosed by, or at least obvious in view of, *Krieger* for the same reasons as detailed above for claim 3.

vii. Claim 7

Claim 7 depends from claim 6 and further recites, “wherein the plurality of MOSFETs are connected in parallel.” This is disclosed by *Krieger*. As detailed above for claim 3, *Krieger* discloses a MOSFET-based switch that includes “a number [of] FETs 12a-12d connected in parallel with each other.” Ex. 1005 ¶ [0030]. *See also*, Ex. 1003 ¶96.

viii. Claim 9

Claim 9 depends from claim 1 and further recites, “a load detector to detect a reverse polarity connection to the automobile battery.” This is disclosed by *Krieger*.

As detailed above for claim element 1(b), *Krieger* discloses a load detector circuit that is connected to a microcontroller (*i.e.*, the A/D input of microprocessor 60) in order to monitor the voltage and/or current being supplied to the automobile battery. *See supra* Section IV.B.i.1(b). *Krieger* further discloses that the monitored voltage and/or current is used by the microprocessor to detect that positive and negative polarities of

the automobile battery are not reversed. *See id.* For example, *Krieger* discloses that switch 12 is controlled by the microprocessor 60 to supply power from the boosting battery 2 to the depleted automobile battery 11 (*see* Ex. 1005 ¶ [0045]), and that “[i]f the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off” (*id.* at ¶ [0047]). *Krieger* therefore discloses a load detector to detect a reverse polarity connection to the automobile battery. *See also*, Ex. 1003 ¶¶ 97-98.

ix. Claim 10

Claim 10 depends from claim 1 and further recites, “wherein the microprocessor includes a standby mode where all outputs are closed.”

The ’077 Patent explains that “[i]n the standby mode, the microcontroller closes all outputs when the battery voltage is lower than 9V, and recovers the normal operation only when the battery voltage is larger than 10V.”⁴ Ex. 1001, 4:32-35. The ’077 Patent does not explain what it means to “close all outputs.” But the only “outputs” that are evident from the specification of the ’077 Patent are the charging voltage outputs (V-OUT+ and V-OUT-) shown in Figure 2. The claim phrase, “all outputs are closed,” should therefore be interpreted in the context of the ’077 Patent’s specification to mean

⁴ The ’077 Patent uses the term “closes” or “closed” to mean that the outputs are disconnected (in contrast to the more conventional use of the term “open” to describe a disconnected circuit). *See* Ex. 1003 ¶100.

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that the jumpstarter is prevented from supplying a charging voltage to the automobile battery.

Claim 10 should therefore be interpreted to require that the microprocessor includes a standby mode during which the jumpstarter is prevented from supplying a charging voltage to the automobile battery. This is disclosed by *Krieger*. For example, as detailed above, *Krieger* discloses standby modes during which the jump starter is prevented from supplying a charging voltage to the automobile battery because of a reverse polarity condition or because the automobile battery is disconnected from the jumpstarter. *See supra* Section IV.B.i.1(b); *see also*, Ex. 1005 ¶ [0047] (“If the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off”); *Id.* at ¶ [0048] (“If no battery is present, the switch 12 is placed in a non-conducting state, that is, all the FETs 12a-12d are placed in a non-conducting state”). *See also*, Ex. 1003 ¶¶ 99-101.

x. Claim 11

Claim 11 depends from claim 10 and further recites, “wherein the microprocessor closes all outputs when a voltage of the direct current power supply is lower than that of a state being able to supply power.” This is disclosed by, or at least obvious in view of, *Krieger*.

Krieger discloses that the microprocessor 60 monitors and detects when the jump starter battery 2 falls below a predetermined level needed to supply power to the vehicle

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battery 11. For example, *Krieger* discloses:

The microprocessor 60 is programmed to detect when the voltage of the boosting battery 2 falls below a predetermined level, for example, about 80% of its rated value. The buzzer 72 or other device can then be activated to indicate to the operator that the charge of the boosting battery 2 is low and that it should be recharged.

Ex. 1005 ¶ [0053]. If the Board were to determine, however, that *Krieger* does not explicitly disclose “closing all outputs” (*i.e.*, discontinuing charging of the vehicle battery) when the jump starter battery falls below the predetermined level, this would have been obvious to a POSITA in view of the common knowledge in the field. *Krieger* discloses that the microprocessor may be programmed to terminate the jump starting process upon detection of a fault, such as a disconnected automobile battery. (*See, e.g.*, Ex. 1005 ¶ [0056]). In view of *Krieger*’s disclosure, the POSITA would have understood that a boosting battery that has fallen below 80% of its rated value (*i.e.*, the predetermined level disclosed by *Krieger* at ¶ [0053]), is also a fault that should be corrected before the jump starting process proceeds. *See* Ex. 1003 ¶104 (explaining that a POSITA would know that lithium-ion batteries are prone to damage by over-discharging). The POSITA would therefore have been motivated to also program the microprocessor 60 of *Krieger* to terminate the jump starting process upon detecting that the boosting battery has fallen below the predetermined level suitable for jump starting the vehicle. *See* Ex. 1003 ¶105

***xi.* Claim 18**

Claim 18 depends from claim 1 and further recites, “a start control module to stop supplying battery power when there is no load.” This is disclosed by *Krieger*.

As detailed above for claim element 1(b), *Krieger* discloses that the microprocessor 60 monitors the voltage and/or current being supplied to the automobile battery and controls the switch 12 to terminate the jump starting process upon detecting that the automobile has been disconnected (*i.e.*, when there is not load). *See supra* Section IV.B.i.1(b); *see also*, Ex. 1005 ¶ [0048] (“Microprocessor 60 can be programmed to detect if clamps 8, 10 are connected to a battery or have been disconnected”); *id.* at ¶ [0056] (disclosing that if no battery is connected to clamps 8, 10, the microprocessor 60 can be programmed to terminate the jump starting process). *Krieger* therefore discloses a start control module (*i.e.*, the microprocessor 60 and/or switch 12) that is configured to stop supplying battery power when there is no load. *See* Ex. 1003 ¶¶ 106-107.

***xii.* Claim 19**

Claim 19 depends from claim 1 and further recites, “wherein the at least one switch switches a negative voltage.” This is disclosed by *Krieger*.

For example, *Krieger* discloses that the FET-based switch 12, as shown for example in Fig. 5, includes FETs 12a-12d that are “electrically connected to the negative terminal 6 of the boosting battery 2.” *See* Ex. 1005 ¶ [0032]; *see also*, Fig. 5.

See Ex. 1003 ¶¶ 108-109.

***xiii.* Claim 20**

Claim 20 depends from claim 1 and further recites, “wherein the at least one switch is connected to a negative battery terminal.” This is disclosed by *Krieger*.

For example, *Krieger* discloses that the FET-based switch 12, as shown for example in Fig. 5, includes FETs 12*a*-12*d* that are “electrically connected to the negative terminal 6 of the boosting battery 2.” *See* Ex. 1005 ¶ [0032]; *see also*, Fig. 5. *See* Ex. 1003 ¶¶ 110-111.

C. Ground 2: *Krieger* in view of *Baxter* Renders Claim 8 Obvious

Claim 8 depends from claim 6 and further recites, “wherein the plurality of MOSFETs are connected in a series-parallel topology.” As detailed above, claim 6 is obvious in view of *Krieger*, which discloses a MOSFET-based switch 12 that includes “a number [of] FETs 12*a*-12*d* connected in parallel with each other.” *See* Ex. 1005 ¶ [0030]; *see also supra* Sections IV.B.iii and vi. To the extent, however, that *Krieger* may not expressly disclose that the switch may be implemented using MOSFETs connected in a series-parallel topology, this would have been obvious to the POSITA in view of *Baxter*.

Similar to *Krieger*, *Baxter* discloses a safety circuit for jump starting a battery that detects when the battery is connected with a reversed polarity. *See, e.g.*, Ex. 1006 ¶¶ [0007]-[0010]. The safety circuit disclosed in *Baxter* leaves the battery disconnected

until it determines that it is safe to make a connection. *See, e.g., id.* at ¶¶ [0025]-[0026].

When the safety circuit of *Baxter* determines that no unsafe condition exists, a connection to the battery is made, for example using “one or more high-current transistors as a switch.” *See, e.g., id.* at ¶ [0028]. An example is shown in Figs. 7 and 12 of *Baxter* in which the high-current transistor-based switch is implemented using MOSFETS connected in a series-parallel topology, as highlighted below.

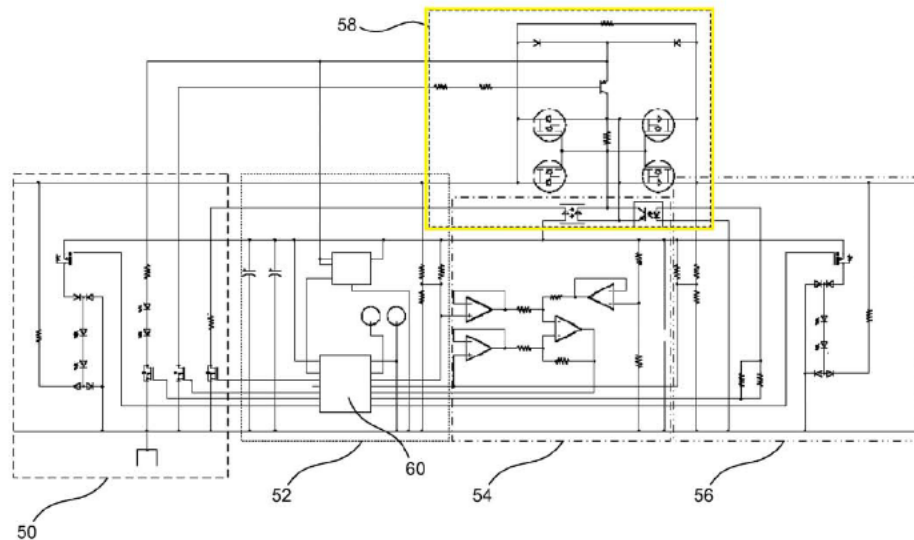


FIG. 7

Ex. 1006, Fig. 7 with highlighting added.

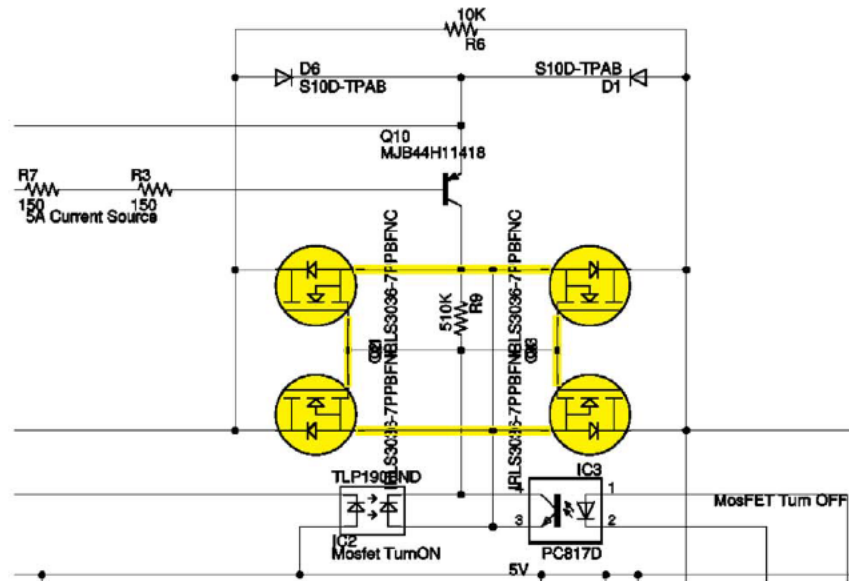


FIG. 12

Ex. 1006, Fig. 12 with highlighting added.

The POSITA would have been motivated to utilize a series-parallel MOSFET switch, as disclosed in *Baxter*, in the MOSFET-based switch 12 of *Krieger*. See Ex. 1003 ¶114. The POSITA would have understood that a series FET connection, as shown in Figs. 7 and 12 of *Baxter* blocks reverse current flow when the FETs are turned off (by contrast a single FET always allows current flow in one direction, even when the FET is turned off). *Id.* The POSITA would therefore have been motivated, based on the common knowledge in the field, 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. *Id.* This combination would have provided the desirable and predictable result of further preventing reverse current flow from the automobile battery 11 to the boosting battery 2 in *Krieger*'s jump starter. *Id.*

D. Ground 3: *Krieger* in view of *Tracey* Renders Claims 22 and 23 Obvious

Claim 22 depends from claim 1 and further recites “a voltage back-flow protection.” Claim 23 depends from claim 22 and recites, “wherein the voltage back-flow protection [is] for an abnormal load.” To the extent that *Krieger* may not expressly disclose the use of a voltage back-flow protection circuit to prevent back-flow from the vehicle battery to the jump starter battery in case of an abnormal load (*e.g.*, when the jump starter is connected to a vehicle battery having a higher voltage than the jump starter battery), this would have been obvious in view of *Tracey*.

Similar to *Krieger*, *Tracey* discloses a jump starter circuit that “protects from voltage mismatch, reverse polarity, short circuit, over-discharge, and over-use.” *See, e.g.*, Ex. 1007 at 6:28-29. To protect against voltage mismatch between the vehicle battery and the jump starter battery (*i.e.*, an abnormal load), *Tracey* discloses the use of a voltage back-flow protection circuit, as highlighted below in Fig. 10.

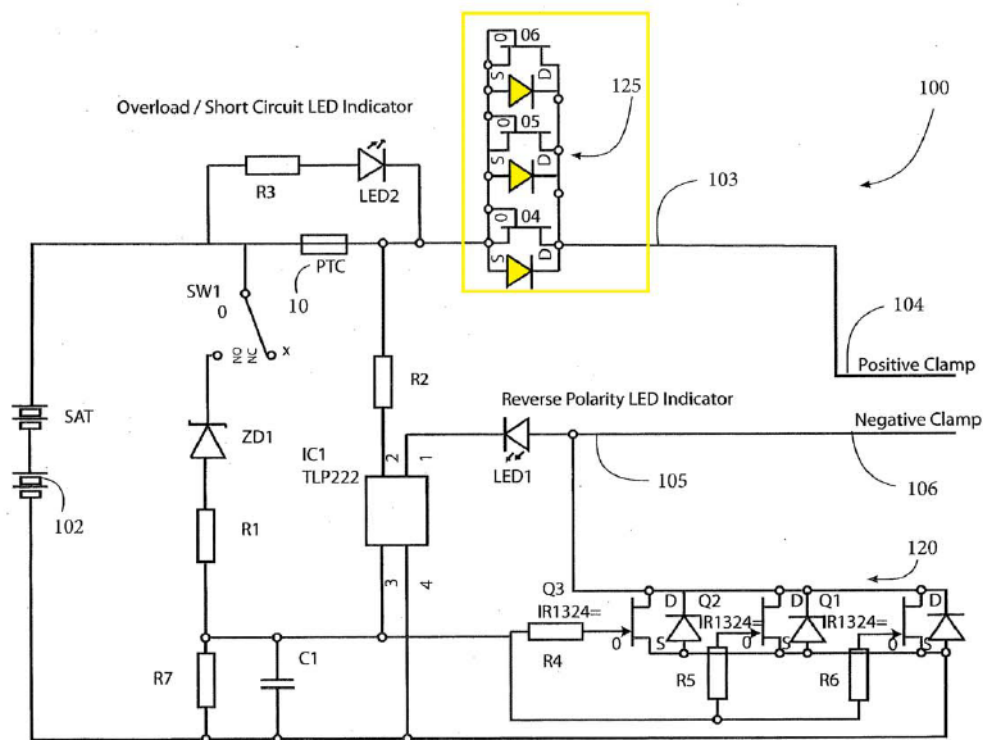


Fig.10

Ex. 1007, Fig. 10 with highlighting added. As shown at reference 125 in Fig. 10, the positive lead 103 of the jump starter circuit 100 is connected to a trio of “MOSFETS (or alternatives) Q4, Q5 and Q6.” *Id.* at 7:22-23; Fig. 10. “These devices are connected in such a way as to utilise their intrinsic diodes for the purposes of reverse blocking of current.” *Id.* at 7:23-24. “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.” *Id.* at 7:26-27. “This feature protects the jump-starter’s internal battery 102 from potentially dangerous overcharge conditions.” *Id.* at 7:27-28. *Tracey* thus discloses “voltage back-flow protection for an abnormal load.”

The POSITA would have been motivated to combine *Krieger* and *Tracey* to

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provide further back-flow protection between the vehicle battery and jump starter battery in *Krieger's* system. See Ex. 1003 ¶118. *Krieger* and *Tracey* are in the same field of endeavor, namely jump starter circuits that include protections against unsafe conditions such as reverse polarity connections and improper battery conditions. *Id.* Further, as evidenced by *Tracey*, it was well known in the field that reverse current flow from a vehicle battery to a jump starter battery can cause unsafe conditions, especially when the vehicle battery has a higher voltage than the jump starter is intended for (*i.e.*, an abnormal load). *Id.* The combination of *Tracey's* back-flow protection circuit 125 with *Krieger's* jump starter circuit would therefore have had the predictable result of protecting against unsafe conditions caused by connecting the jump starter to a vehicle with an abnormally high voltage load. *Id.*

E. Ground 4: *Richardson* Renders Claims 1-7, 9-16, 18-21, and 24 Obvious

As demonstrated below, claims 1-7, 9-16, 18-21, and 24 would have been obvious over *Richardson*.

***i.* Claim 1**

1[P] A jumpstarter, comprising:

To the extent that the preamble is limiting, *Richardson* discloses a jumpstarter. For example, Fig. 1 of *Richardson* (set forth below) discloses a “portable supplemental power source (jump starter) of the present invention [that] is generally indicated by reference numeral 10.” Ex. 1004 ¶ [0014].

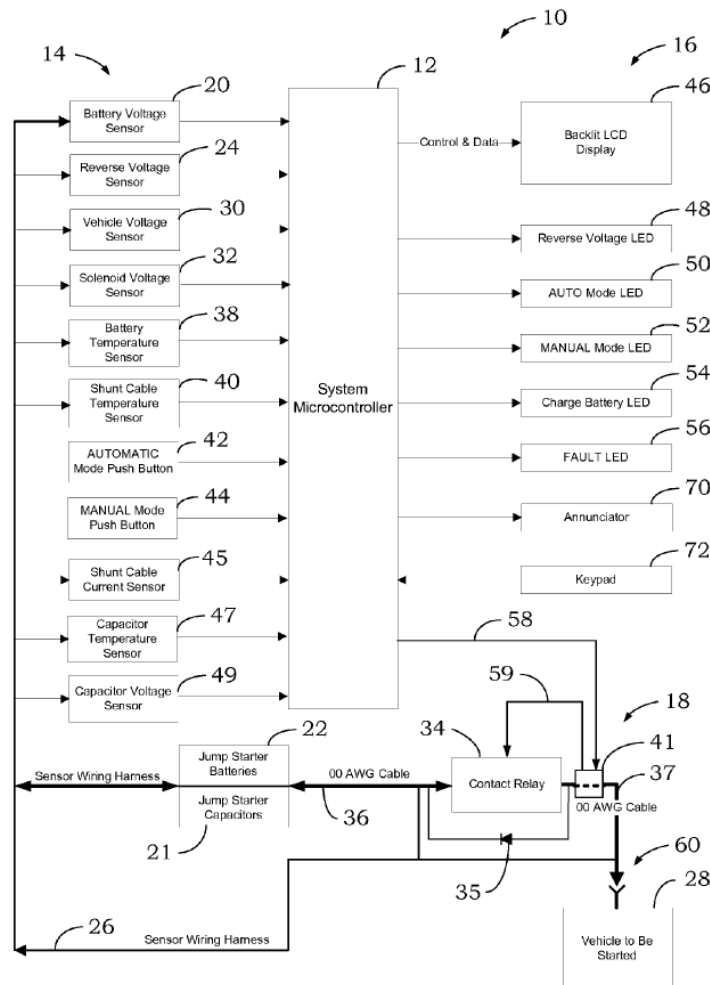
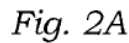


Fig. 1

Ex. 1004, Fig. 1

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

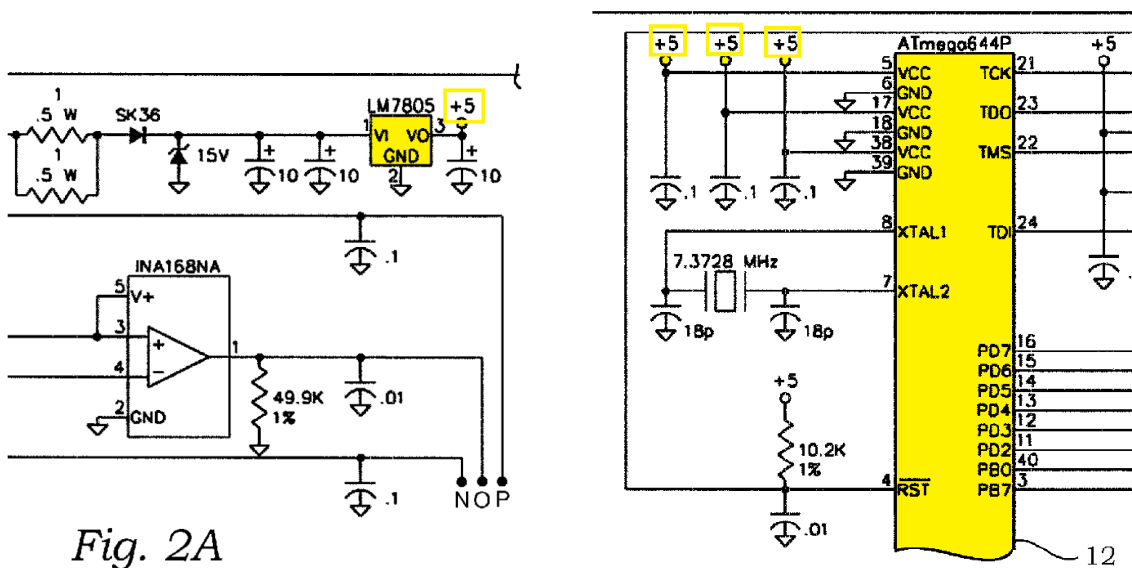
Richardson discloses a battery connected to a voltage regulator. A schematic hardware diagram of *Richardson's* jump starter 10 is illustrated in Figs. 2A-2D. Ex. 1004 ¶ 21. As shown in Figs. 1 and 2A, the jump starter 10 includes “one or more jump starter batteries 22” as well as “one or more capacitor[s] 21... to provide additional energy storage.” *Id.* at ¶¶ [0015], [0016]. In addition, Fig. 2A shows that



[1(a)(ii)] the battery capable of supplying power, via the voltage regulator, to at least

a microprocessor,

Richardson discloses that the battery is capable of supplying power, via the voltage regulator, to at least a microprocessor. As shown in Figs. 1 and 2C, *Richardson* discloses that “[j]ump starter 10 includes a programmable microprocessor 12 which receives inputs 14 and produces informational outputs 16 and control outputs 18.” Ex. 1004 ¶ [0014]. The microprocessor 12 is supplied with power (+5V) from the one or more batteries 22 via the voltage regulator (LM7805), as highlighted below.



Ex. 1004, Figs. 2A and 2C, with highlighting added.

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

Richardson also discloses that the battery is capable of supplying power to an automobile battery when the battery has at least a predetermined voltage. For example, as highlighted in Fig. 1 below, *Richardson* discloses that “[t]he system

includes one or more internal batteries [22] and capacitors [21] to provide the power to the battery of the vehicle to be jump started.” Ex. 1004 ¶ [0007]. “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.* at ¶ [0021]

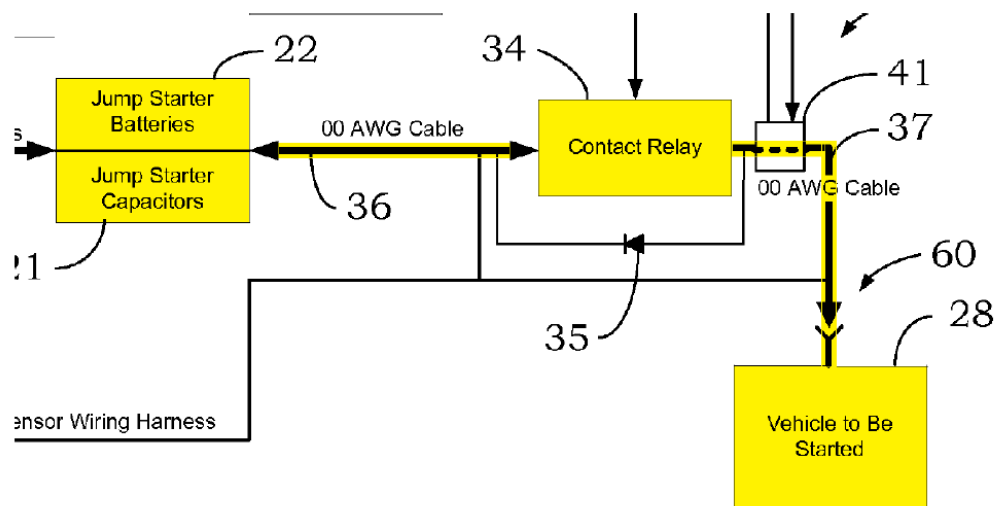


Fig. 1

Ex. 1004, Fig. 1 with emphasis added. *Richardson* further discloses monitoring the jump starter batteries 22 to detect when the batteries combined voltage fall below a predetermined voltage needed for jump starting the automobile. *See id.* at ¶ [0020] (“If 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. The charge battery LED 54 remains illuminated until the batteries 22 are charged to a minimum state of charge such as fifty percent, for example.”) *Richardson* therefore discloses that the

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boosting battery is “capable” of supplying power to an automobile battery when the 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.

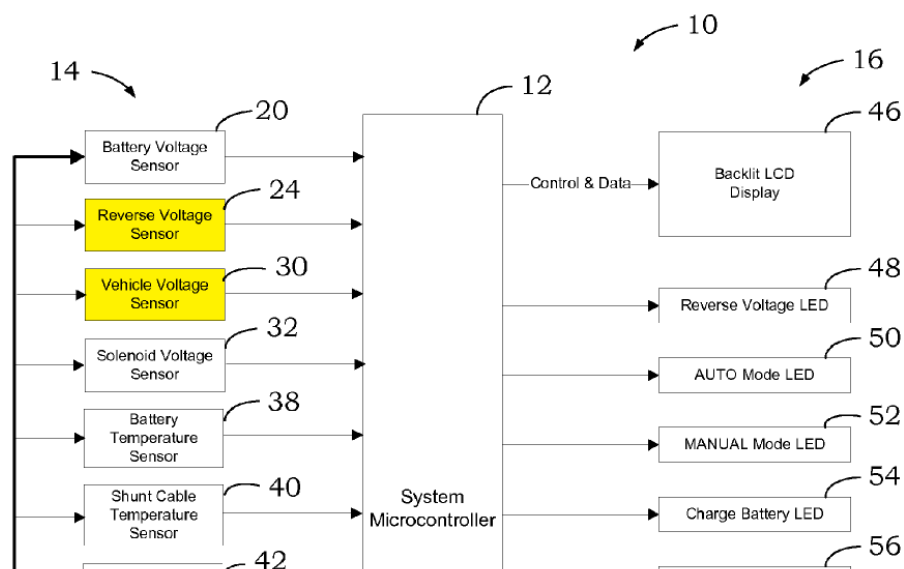
Further, if the Board were to determine that claim element 1(a)(iii) also requires that the jumpstarter prevent the battery from supplying power to the automobile battery if the battery does not have a predetermined voltage, this is also disclosed by *Richardson*. For example, *Richardson* discloses that when the voltage level of the batteries 22 falls below a predetermined voltage, an error flag is set which prevents any further jump starter action by the operator until an adequate charging voltage is detected. *Id.* at ¶ [0028] (“If the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set and the event recorded in memory 224... The system stays in this condition, which prohibits any further jump starter action by the operator until a charging voltage is detected 226, which is great enough to indicate that a battery charger (not shown) has been connected to the batteries 22.”)

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

As detailed above, based on the disclosure set forth in the ‘077 Patent, the POSITA would have understood that a detection that the jumpstarter is “correctly connected to the automobile battery” must at least include detecting that (1) the load (*i.e.*, automobile battery) is connected to the jumpstarter and (2) the positive and

negative polarities of the load (*i.e.*, automobile battery) are not reversely connected. *See supra* Section IV.B.i.1(b). This is disclosed by *Richardson*.

For example, as detailed below, *Richardson* discloses a reverse voltage sensor 24 connected to microprocessor 12 that monitors the polarity of the jumper cables connected to the vehicle battery (*see* Ex. 1004 ¶¶ [0016], [0020], [0027]) and 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 (*see id.* at ¶¶ [0016], [0036], [0041]). Fig. 1 of *Richardson* is set forth below with the reverse voltage sensor 24 and vehicle voltage sensor 30 highlighted.



Ex. 1004, Fig. 1 with highlighting added.

Richardson discloses that the “reverse voltage sensor 24 monitors the polarity of the jumper cables on line 26 which are connected to the vehicle's electrical system 28.”

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Ex. 1004 ¶ [0016]. “A 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.” *Id.* at ¶ [0020]. More specifically, *Richardson* discloses the following process for using the reverse voltage sensor 24 to prevent jump starting when a reverse polarity is detected:

If the system does not detect a battery charging voltage 212, once jumper cables 60 have been manually connected to the vehicle to be started 28, the voltage is measured by the reverse voltage sensor 24 to determine if the cables have been properly connected to the vehicle 214. If the voltage measured is significantly less than the voltage of the jump starter capacitors 21 and batteries 22, then a reverse polarity connection of the jumper cables to the vehicle is determined and an error flag is set and the event saved in non-volatile memory 216. A “Reverse Polarity” error message is displayed 218 on the LCD 46, and the reverse voltage LED 48 is illuminated 216. Any further jump starter action by the operator is ignored until the reverse polarity condition is corrected 220, at which point processing returns to the start of the main processing loop 210.

Id. at ¶ [0027]. *Richardson* further discloses that the “vehicle voltage sensor 30 monitors the voltage on line 37 (voltage of the vehicle).” *Id.* at ¶ [0016]. If the vehicle voltage sensor 30 detects that the vehicle battery has been disconnected, then the contact relay 34 is opened by the microprocessor to stop the jump starting process:

If the system detects an increase in the difference between the measured jump starter battery voltage 20 and the voltage measured 30 across the contact relay 34 indicating that one of the jump starter cables has been disconnected 302 from the vehicle's battery or starter system 28 then a jumper cable unplugged error count is incremented 304, a “Jumper Cable Unplugged” error message is displayed 306 on the LCD 46, the contact relay 34 is opened and the fault LED 56 is illuminated 290.

Id. at ¶ [0041]. Based at least on the above disclosure, the POSITA 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 the microcontroller (*i.e.*, microprocessor 12) to detect when the jump starter 10 is correctly connected to the automobile battery 28. Ex. 1003 ¶131.

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

Richardson discloses that a microcontroller (*i.e.*, microprocessor 12) that generates an output signal when the jump starter 10 is correctly connected to the automobile battery. For example, *Richardson* discloses a “contact relay control output 58” generated by the microprocessor 12 that “operates the contact relay 34 through temperature sensor 41,” as highlighted in Fig. 1 below. *See* Ex. 1004 ¶ [0021]. “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.* As detailed above for claim element 1(b), control of the contact relay 34 by the microprocessor 12 is conditioned on a determination that the automobile battery is correctly connected. *See supra* Section IV.E.1.1(b).

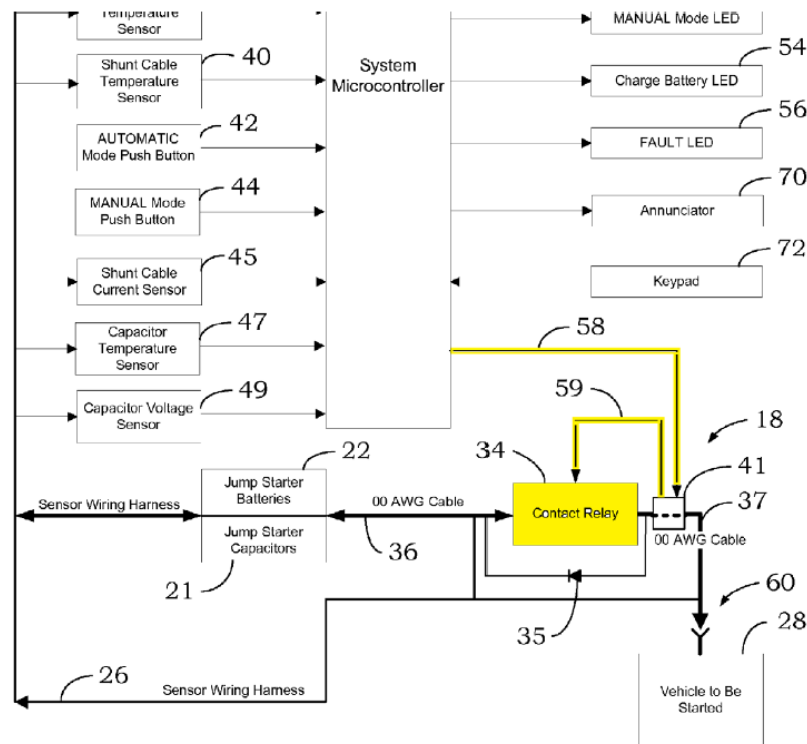


Fig. 1

Ex. 1004, Fig. 1 with highlighting added.

[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.

Richardson discloses a contact relay 34 (*i.e.*, switching circuitry that includes at least one switch) that 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:

A contact relay control output 58 operates the contact relay 34 through temperature sensor 41. 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.

Ex. 1004 ¶ [0021]. The contact relay (*i.e.*, switching circuitry) is shown in Figs. 1 and 2C of *Richardson*, as highlighted below.

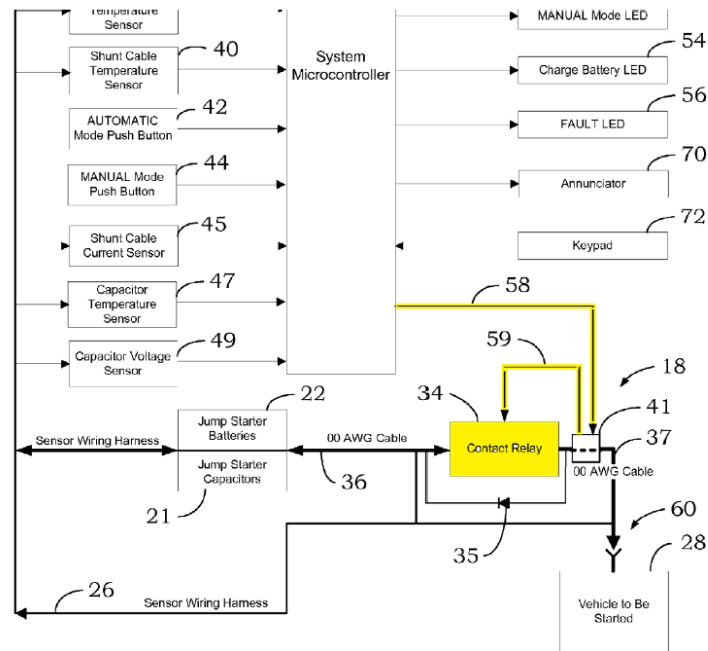


Fig. 1

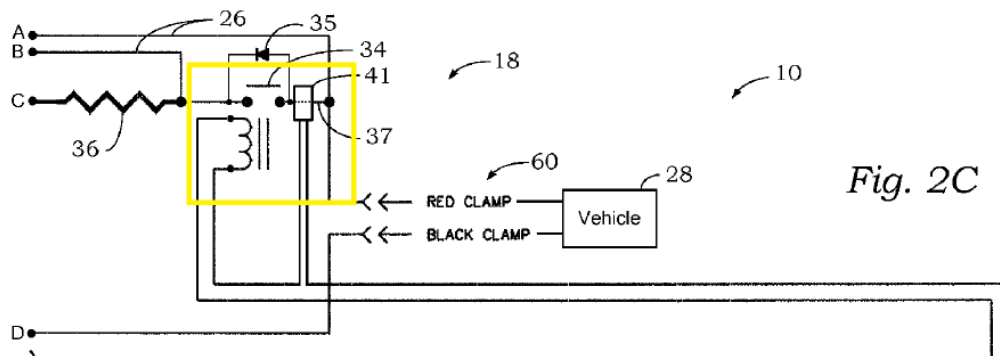


Fig. 2C

Ex. 1004, Figs. 1 and 2C with highlighting added.

For at least the above reasons, claim 1 is obvious over *Richardson*. See also, Ex. 1003 ¶¶ 120-134.

ii. **Claim 2**

Claim 2 depends from claim 1 and further recites, “a battery voltage detector circuit to detect a battery voltage of the battery.” This is disclosed by *Richardson*. For example, *Richardson* discloses “[a] battery voltage sensor 20 [that] monitors the voltage level of one or more jump starter batteries 22,” as highlighted in Fig. 1 below. *See* Ex. 1004 ¶ [0016].

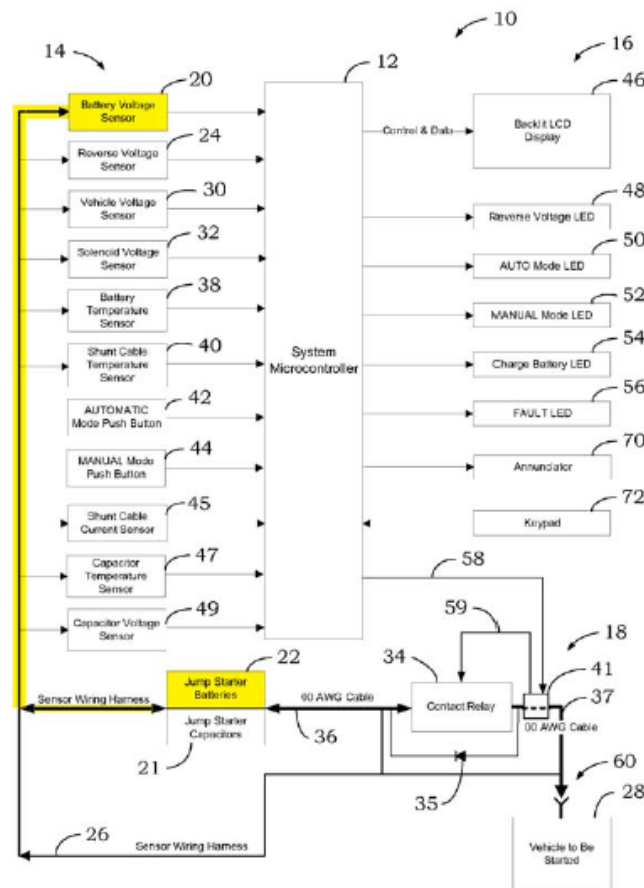


Fig. 1

Ex. 1004, Fig. 1 with highlighting added. *See also*, Ex. 1003 ¶135.

***iii.* Claim 3**

Claim 3 depends from claim 1 and further recites, “wherein the at least one switch is one or more MOSFETs.” This would have been obvious in view of *Richardson* and the common knowledge in the field.

The POSITA would have understood, based on the common knowledge in the field, that MOSFETs were, and continue to be, the most common choice for switches in power circuitry, such as the jump starter device described in *Richardson*. Ex. 1003 ¶137. The POSITA would have understood that a MOSFET-based power switch is advantageous over a relay at least because of a) smaller size, b) the ability to control the rate of increase of load current, and c) physical ruggedness and reliability. *Id.* The POSITA would therefore have been easily motivated to substitute a MOSFET-based switching circuit for the contact relay 34 in *Richardson* to provide the predictable result of improving product reliability while providing the advantages of smaller size and control of load current.

***iv.* Claim 4**

Claim 4 depends from claim 3 and further recites, “wherein the one or more MOSFETs are n-channel MOSFETs.” This would have been obvious in view of *Richardson* and the common knowledge in the field.

As detailed above for claim 3, the POSITA would have been motivated, based on the common knowledge in the field, to substitute a MOSFET-based switching circuit

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for the contact relay 34 in *Richardson*. The POSITA would have further understood that, compared to p-channel MOSFETs, n-channel MOSFETs are more commonly used in power switching applications because of the wider variety of available types resulting from the comparative ease of manufacture of n-channel MOSFETs. Ex. 1003 ¶139. The POSITA would therefore have been further motivated, based on the common knowledge in the field, to utilize an n-channel MOSFET switch in place of the contact relay 34 in *Richardson*.

v. Claim 5

Claim 5 depends from claim 1 and further recites, “wherein there are a plurality of switches.” This would have been obvious in view of *Richardson* and the common knowledge in the field.

As detailed above for claim 3, the POSITA would have been motivated, based on the common knowledge in the field, to substitute a MOSFET-based switching circuit for the contact relay 34 in *Richardson*. The POSITA would have further understood that the use of a plurality of MOSFET switches connected in parallel is commonly used in power switching circuits to allow for higher current flow. Ex. 1003 ¶141. The POSITA would therefore have been further motivated, based on the common knowledge in the field, to utilize a MOSFET switching circuit with a plurality of MOSFETs connected in parallel in place of the contact relay 34 in *Richardson*.

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vi. Claim 6

Claim 6 depends from claim 1 and further recites, “wherein the at least one switch is a plurality of MOSFETs.” This would have been obvious in view of *Richardson* and the common knowledge in the field for at least the same reasons detailed above for claim 5. *See also*, Ex. 1003 ¶142.

vii. Claim 7

Claim 7 depends from claim 6 and further recites, “wherein the plurality of MOSFETs are connected in parallel.” This would have been obvious in view of *Richardson* and the common knowledge in the field for at least the same reasons detailed above for claim 5.

viii. Claim 9

Claim 9 depends from claim 1 and further recites, “a load detector to detect a reverse polarity connection to the automobile battery.” This is disclosed by *Richardson*. As detailed above for claim element 1(b), the load detector circuit disclosed in *Richardson* includes a reverse voltage sensor 24 (*i.e.*, a load detector) that monitors the polarity of the jumper cables connected to the vehicle battery, thereby enabling prevention of jump starting when a reverse polarity connection is detected. *See supra* Section IV.E.i.1(b); *see also* Ex. 1004 ¶¶ [0016], [0020], [0027]. *See also*, Ex. 1003 ¶144.

ix. Claim 10

Claim 10 depends from claim 1 and further recites, “wherein the microprocessor

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includes a standby mode where all outputs are closed.”

As detailed above, claim 10 should be interpreted in the context of the '077 Patent's specification to require that the microprocessor includes a standby mode during which the jumpstarter is prevented from supplying a charging voltage to the automobile battery. *See supra* Section IV.B.ix. This is disclosed by *Richardson*.

For example, *Richardson* discloses a “Charge Battery” condition that is a standby mode during which the jump starter 10 is prevented from supplying a charging voltage to the automobile battery:

If the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set and the event recorded in memory 224. The charge battery LED 54 is illuminated and the LCD 46 displays a “Charge Battery” message 225. The system stays in this condition, which prohibits any further jump starter action by the operator until a charging voltage is detected 226, which is great enough to indicate that a battery charger (not shown) has been connected to the batteries 22... The jump starter batteries 22 only need to reach a 50% charge in order for the system to attempt to start the vehicle.

Ex. 1004 ¶ [0028]. *See also*, Ex. 1003 ¶¶ 145-147.

x. Claim 11

Claim 11 depends from claim 10 and further recites, “wherein the microprocessor closes all outputs when a voltage of the direct current power supply is lower than that of a state being able to supply power.” This is disclosed by *Richardson*.

As detailed above for claim 10, *Richardson* discloses that the microprocessor

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prevents jump starting (*i.e.*, closes all outputs) when a voltage of the batteries 22 “is equal to a state of charge of eighty percent or more below a fully charged voltage level” (*i.e.*, when the battery voltage is lower than a state of being able to supply power). *See supra* Section IV.E.ix.; *see also* Ex. 1004 ¶ [0028]; Ex. 1003 ¶¶ 148-149.

***xi.* Claim 12**

Claim 12 depends from claim 10 and further recites, “wherein the jumpstarter is in a standby mode when the battery has less than 9 volts.” This would have been obvious in view of *Richardson* and the common knowledge in the field.

As detailed above for claim 10, *Richardson* discloses that the microprocessor prevents jump starting (*i.e.*, enters a standby mode) when a voltage of the batteries 22 “is equal to a state of charge of eighty percent or more below a fully charged voltage level 222.” *See supra* Section IV.E.ix.; *see also* Ex. 1004 ¶ [0028]. *Richardson* further discloses that the jump starter 10 may be configured to operate at different operating voltages, including for example, 12, 18, 24, 30, 36, 42, and 48 volts. *See* Ex. 1004 ¶ [0034]. In view of this disclosure, the POSITA would have understood that the exact value for the disclosed threshold of “eighty percent or more below a fully charged voltage level 222” would be dependent on the type of battery being used and the operational voltage of the jump starter 10. Ex. 1003 ¶151. It would therefore have been obvious to the POSITA, based on the disclosure of *Richardson* and the common knowledge in the field, that *Richardson*’s jump starter 10 would enter “standby mode

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when the battery has less than 9 volts” upon selection of the appropriate type of battery and operational voltage. *Id.* at ¶152

***xii.* Claim 13**

Claim 13 depends from claim 10 and further recites, “wherein the jumpstarter is not in a standby mode when the battery has more than 10 volts.” As detailed above for claim 10, *Richardson* discloses that the microprocessor prevents jump starting (*i.e.*, enters a standby mode) when a voltage of the batteries 22 “is equal to a state of charge of eighty percent or more below a fully charged voltage level 222” and allows further jump starting (*i.e.*, is not in standby mode) when the jump starter batteries 22 reach a 50% charge. *See supra* Section IV.E.ix.; *see also* Ex. 1004 ¶ [0028]. *Richardson* further discloses that the jump starter 10 may be configured to operate at different operating voltages, including for example, 12, 18, 24, 30, 36, 42, and 48 volts. *See* Ex. 1004 ¶ [0034]. In view of this disclosure, the POSITA would have understood that the exact value for the disclosed threshold of a 50% charge for coming out of standby mode would be dependent on the type of battery being used and the operational voltage of the jump starter 10. Ex. 1003 ¶152. It would have therefore been obvious to the POSITA, based on the disclosure of *Richardson* and the common knowledge the field, that *Richardson*’s jump starter 10 would exit standby mode when the battery has more than 10 volts upon selection of the appropriate type of battery and operational voltage. *Id.*

***xiii.* Claim 14**

Claim 14 depends from claim 10 and further recites, “wherein the jumpstarter is in a normal mode when the battery has more than 10 volts.” This would have been obvious over *Richardson* and the common knowledge in the field for at least the same reasons as detailed above for claim 12.

***xiv.* Claim 15**

Claim 15 depends from claim 1 and further recites, “wherein the supply power to the automobile battery is 12 volts.” This is disclosed by *Richardson*. For example, *Richardson* discloses that “[t]he jump starter 10 may be configured for 12, 18, 24, 30, 36, 42 or 48 volts, for example, using a selector jumper 55.” Ex. 1004 ¶ [0034]. *See also*, Ex. 1003 ¶154.

***xv.* Claim 16**

Claim 16 depends from claim 1 and further recites, “wherein the predetermined voltage is 10 volts.” This would have been obvious over *Richardson* and the common knowledge in the field for at least the same reasons as detailed above for claim 13.

***xvi.* Claim 18**

Claim 18 depends from claim 1 and further recites, “a start control module to stop supplying battery power when there is no load.” This is disclosed by *Richardson*. As detailed above for claim element 1(b), the load detector circuit disclosed in *Richardson* includes a vehicle voltage sensor 30 connected to the microprocessor 12 (*i.e.*, a start control module) that monitors the voltage of the vehicle battery to detect

possible fault conditions such as a disconnected vehicle battery. *See supra* Section IV.E.i.1(b); *see also* Ex. 1004 ¶¶ [0016], [0036], [0041]. If the vehicle voltage sensor 30 detects that the vehicle battery has been disconnected (*i.e.*, there is no load), then the contact relay 34 is opened by the microprocessor to stop supplying battery power to the vehicle battery. *Id.* *See also*, Ex. 1003 ¶156.

***xvii.* Claim 19**

Claim 19 depends from claim 1 and further recites, “wherein the at least one switch switches a negative voltage.” This would have been obvious in view of *Richardson* and the common knowledge in the field.

As shown in Figs. 2A and 2C, the contact relay 34 in *Richardson* is connected to the positive terminal (C) of the jump starter batteries 22. See Ex. 1004, Figs. 2A and 2C. However, it would have been obvious to the POSITA based on the common knowledge in the field, that connection of the contact relay 34 to either the positive (C) or negative (D) battery terminals is an arbitrary design choice that would have no effect on the overall operation of *Richardson*’s jump starter circuit 10. Ex. 1003 ¶158 (explaining that a relay would be equally effective if placed on either the power or negative battery terminals). The POSITA would therefore have been equally motivated to connect *Richardson*’s contact relay 34 to switch the negative battery voltage, instead of the positive battery voltage.

xviii. Claim 20

Claim 20 depends from claim 1 and further recites, “wherein the at least one switch is connected to a negative battery terminal.” This would have been obvious in view of *Richardson* and the common knowledge in the field for at least the same reasons detailed above for claim 19.

xix. Claim 21

Claim 21 depends from claim 1 and further recites, “wherein the jumpstarter has a fast charging function.” This is disclosed by *Richardson*.

For example, *Richardson* discloses a fast charging function for quickly recharging the jump starter batteries 22 using the vehicle battery:

Referring to FIGS. 1 and 2, a diode 35 may be connected across the contact 34 to charge the capacitors 21 and jump starter batteries 22 from the vehicle charging system 28. The charging system of the vehicle may be used to charge the capacitors 21 and jump starter batteries 22. Whenever the vehicle has a working charging system this will occur as long as the cables are connected to the vehicle. This allows the capacitors 21 and jump starter batteries 22 to be fully recharged in about 1 to 5 minutes and can therefore start many vehicles in a row without becoming discharged. Even in situations in which the jump starter batteries 22 may be discharged to an extent that they alone may not be able to provide the necessary power to start a vehicle, the capacitors 21 may be rapidly recharged to start many vehicles in a row. This is very useful when starting fleets of vehicles with dead batteries.

Ex. 1004 ¶ [0055]. *See also*, Ex. 1003 ¶161.

xx. Claim 24

Claim 24 depends from claim 1 and further recites, “wherein the microcontroller determines whether a battery state is suitable for heavy current power generation.” This

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is disclosed by, or at least obvious in view of, *Richardson*.

For example, *Richardson* discloses that the microprocessor 12 detects whether the battery state is suitable for heavy current power generation. *See, e.g., id.* at ¶ [0028] (“If the voltage level of the system batteries 22 measured by the voltage sensor 30 is equal to a state of charge of eighty percent or more below a fully charged voltage level 222, an error flag is set and the event recorded in memory 224.”) Therefore, the POSITA would have understood that *Richardson*’s process of detecting that the voltage level of the batteries 22 is “equal to a state of charge of eighty percent or more below a fully charged voltage level 222” would operate to determine whether the battery state is suitable for heavy current power generation. *Id. See also*, Ex. 1003 ¶163.

F. Ground 5: *Richardson* in view of *Lai* renders claim 17 obvious under 35 U.S.C. § 103

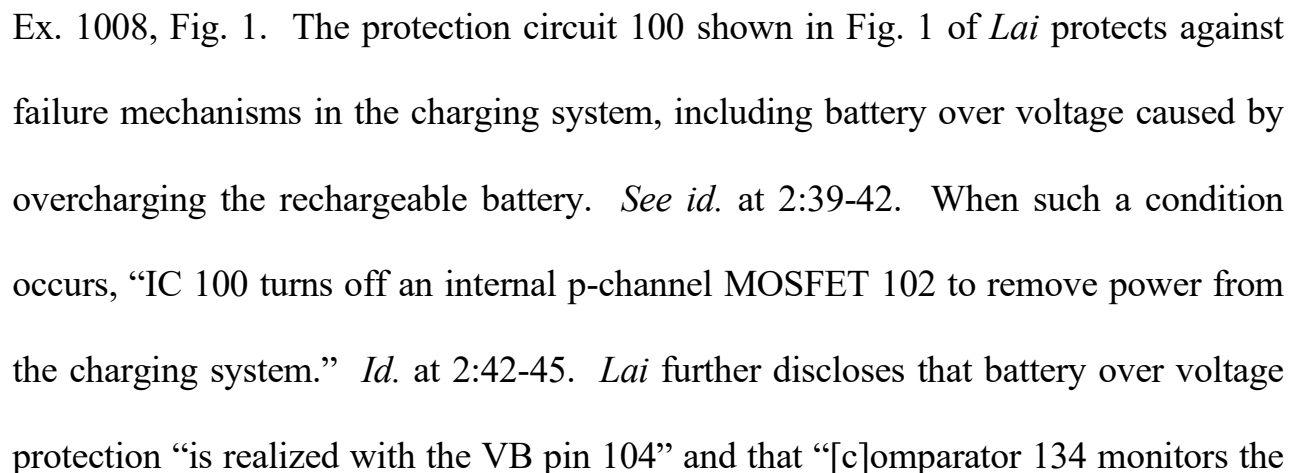
Claim 17 depends from claim 1 and further requires “a start control module to prevent recharging of a normal voltage of the battery.” As explained in the specification of the ’077 patent, “the automobile engine will generate the normal voltage to recharge the battery after the automobile starts, whereas 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.” Ex. 1001 at 4:36-41. In other words, 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

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“a normal voltage of the battery.” *See* Ex. 1003 ¶164. This type of protection against overcharging a battery has been well known to the POSITA long before the ’077 patent, and would therefore have been obvious based on the common knowledge in the field, as evidenced for example by *Lai*.

As detailed above, *Richardson* discloses a fast charging function for quickly recharging the jump starter batteries 22 using the vehicle battery. *See supra* Section IV.E.xix. As shown in Fig. 1 of *Richardson*, “a diode 35 may be connected across the contact 34 to charge the capacitors 21 and jump starter batteries 22 from the vehicle charging system 28.” Ex. 1004 ¶ [0055]. As explained by *Lai*, however, rechargeable batteries are sensitive to overcharge, which may lead to explosion, flame or other hazardous conditions. *See* Ex. 1008 at 1:34-36. “From [a] safety point of view, it is very critical that the Li-ion battery is properly protected against over charge.” *Id.* at 1:39-41. The POSITA would therefore have been easily motivated to add an overcharge protection circuit, such as disclosed in *Lai*, to *Richardson*’s fast charging system in order to protect against dangerous conditions that may be caused if the jump starter batteries 22 are overcharged by the vehicle charging system 28. *See* Ex. 1003 ¶165.

Lai describes an over voltage, over current and overcharge protection circuit for use with a battery charging system (e.g., such as the fast charging system in *Richardson*). *See, e.g.*, Ex. 1008, 1:18-22; 2:32-48. An example of *Lai*’s over voltage,



VB pin 104 and issues an over voltage signal when the battery voltage exceeds a [] battery over voltage protection (OVP) threshold”. *See id.* at 4:65-5:2. *Lai* therefore discloses a start control module (*i.e.*, IC 100, p-channel MOSFET 102, and comparator 134) to prevent recharging of a normal voltage of a battery.

As detailed above, the POSITA would have been motivated to utilize an overcharge protection circuit, such as disclosed in *Lai*, to protect against dangerous overcharging conditions in the jump starter of *Richardson*. As explained by Dr. Wood, this could have been easily achieved by replacing the diode 35 shown in Fig. 1 of *Richardson* with a switched overcharge protection circuit, for example as disclosed in *Lai*. Ex. 1003 ¶168. This combination would have provided the predictable result of cutting off 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.*

G. Ground 6: *Richardson* in view of *Tracey* renders claims 17, 22, and 23 obvious under 35 U.S.C. § 103.

Claim 22 depends from claim 1 and further recites “a voltage back-flow protection.” Claim 23 depends from claim 22 and recites, “wherein the voltage back-flow protection [is] for an abnormal load.” To the extent that *Richardson* may not expressly disclose the use of a voltage back-flow protection circuit to prevent back-flow from the vehicle battery to the jump starter battery in case of an abnormal load this would have been obvious in view of *Tracey* for the same reasons as detailed above at

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Section IV.D.

Further, the POSITA would have been motivated to combine *Richardson* and *Tracey* to provide further back-flow protection between the vehicle battery and jump starter battery in *Richardson*'s system. See Ex. 1003 ¶170. *Richardson* and *Tracey* are in the same field of endeavor, namely jump starter circuits that include protections against unsafe conditions such as reverse polarity connections and improper battery conditions. *Id.* Further, as evidenced by *Tracey*, it was well known in the field that reverse current flow from a vehicle battery to a jump starter battery can cause unsafe conditions, especially when the vehicle battery has a higher voltage than the jump starter is intended for (*i.e.*, an abnormal load). *Id.* The combination of *Tracey*'s back-flow protection circuit 125 with *Richardson*'s jump starter circuit would therefore have had the predictable result of protecting against unsafe conditions caused by a connecting the jump starter to a vehicle with an abnormally high voltage load. *Id.*

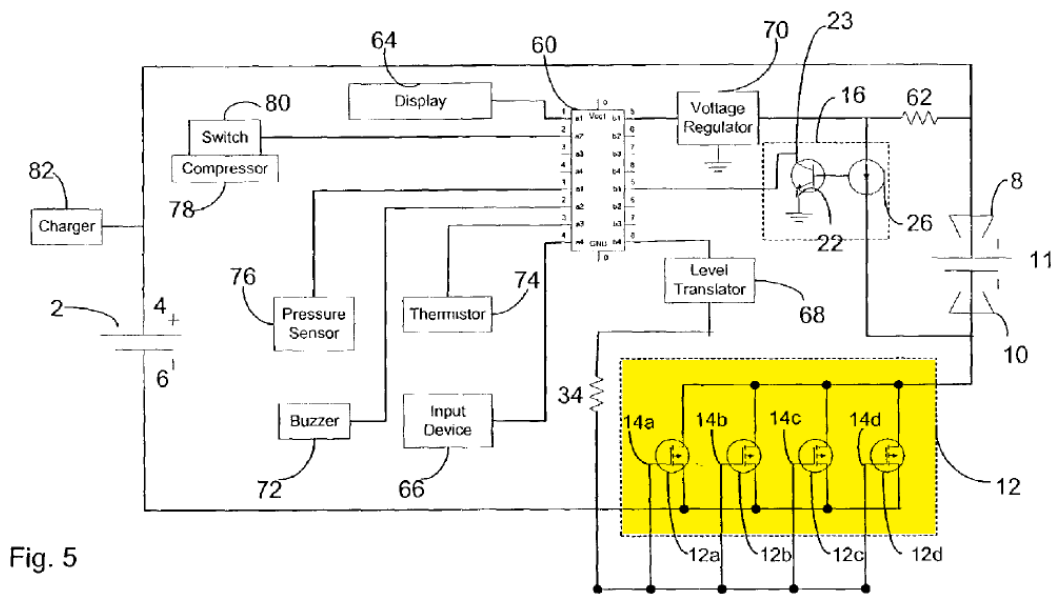
H. Ground 7: *Richardson* in view of *Krieger* renders claims 3-7, 19, and 20 obvious under 35 U.S.C. § 103

***i.* Claims 3-7**

Dependent claims 3-7 each recite limitations relating to the configuration of the switching circuitry recited in independent claim 1 as including MOSFETs. As detailed above, Petitioner submits that the use of MOSFETs for a switching circuit in the configurations recited in these dependent claims is a basic power engineering design choice that would have been obvious to the POSITA based on the common knowledge

in the field. *See supra* Sections IV.E.iii-vii. If the Board were to determine, however, that these limitations are somehow more than trivial design choices, they would have been further obvious in view of the teachings of *Krieger*.

As detailed above in Sections IV.B.iii-vii, each of the limitations of dependent claims 3-7 relating to configurations of a MOSFET-based switching circuit are disclosed by *Krieger*, for example as shown in Fig. 5 (set forth below).



Ex. 1005, Fig. 5 (with highlighting added). Further, the POSITA would have been easily motivated to utilize a MOSFET-based switching circuit, as disclosed in *Krieger*, in place of the contact relay disclosed in *Richardson*. Ex. 1003 ¶173. Both *Krieger* and *Richardson* are directed to vehicle jump starter circuits, and both address the same problem of using a processor-controlled switching circuit to prevent jump starting when a fault is detected, such as a disconnected battery or reverse polarity connection. *See*,

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e.g., Ex. 1004 ¶ [0007] and Ex. 1005 ¶ [0016]; *see also* Ex. 1003 ¶173. For this same purpose, *Richardson* utilizes a relay-based switching circuit (*see* Ex. 1004, Fig. 2C) and *Krieger* utilizes a MOSFET-based switching circuit (*see* Ex. 1005, Fig. 5). But the POSITA would have understood, based on the common knowledge in the field, that MOSFETs were, and continue to be, the most common choice for switches in power circuitry. Ex. 1003 ¶173. The POSITA would have further understood that a MOSFET-based power switch is advantageous over a relay-based switching circuit at least because of a) smaller size, b) the ability to control the rate of increase of load current, and c) physical ruggedness and reliability. *Id.* The POSITA would therefore have been motivated to substitute a MOSFET-based switching circuit, as disclosed in *Krieger*, for the contact relay 34 in *Richardson* to provide the predictable result of improving product reliability while providing the advantages of smaller size and control of load current. *Id.*

***ii.* Claims 19 and 20**

Dependent claims 19 depends from claim 1 and further recites “wherein the at least one switch switches a negative voltage.” Similarly, claim 20 depends from claim 1 and further recites “wherein the at least one switch is connected to a negative battery terminal.” As detailed above, Petitioner submits that it would be a trivial design choice to connect the contact relay 34 of *Richardson* to the negative battery terminal, instead of the positive battery terminal. *See supra* Sections IV.E.xvii and xviii. If the Board

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were to determine, however, that these limitations are somehow more than trivial design choices, they would have been further obvious in view of the teachings of *Krieger*.

As detailed above in Sections IV.B.xii and xiii, the limitations of dependent claims 19 and 20 are disclosed by *Krieger*, which discloses a MOSFET-based switch that is “electrically connected to the negative terminal 6 of the boosting battery 2.” *See* Ex. 1005 ¶ [0032]. For the same reasons as detailed above for dependent claims 3-7, the POSITA would have been motivated to utilize the MOSFET-based switch of *Krieger* in place of the contact relay 34 of *Richardson*. In doing so, the POSITA would have been further motivated to connect the switch to the negative battery terminal, as taught by *Krieger*, because, as stated in the Declaration of Dr. Wood: (i) n-channel MOSFETs are preferred over p-channel MOSFETs, (ii) n-channel MOSFETs need positive gate voltages (relative to their source terminals), and (iii) positive gate voltages are readily available when the source terminals are connected to the negative battery terminal. *See* Ex. 1003 ¶175. Such an arrangement provides a simplified electrical connection. *Id.*

I. Ground 8: *Richardson* in view of *Krieger* and *Baxter* renders claim 8 obvious under 35 U.S.C. § 103

Claim 8 depends from claim 6 and further recites, “wherein the plurality of MOSFETs are connected in a series-parallel topology.” As detailed above, claim 6 would have been obvious over *Richardson* in view of *Krieger*. *See supra* Section IV.G.i. Further, as detailed above at Section IV.C, to the extent that the *Krieger* may

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not expressly disclose that the switch may be implemented using MOSFETs connected in a series-parallel topology, this would have been obvious to the POSITA in view of *Baxter*. *See supra* Section IV.C. The POSITA would have been motivated to combine *Richardson* and *Krieger* for at least the same reasons detailed above at Section IV.G.i, and would have been further motivated to combine *Richardson* and *Krieger* with *Baxter* for at least the same reasons detailed above at Section IV.C. *See also*, Ex. 1003 ¶176.

V. DISCRETIONARY DENIAL UNDER 35 USC 325(d) IS NOT WARRANTED

As demonstrated by the strong showing of unpatentability in this Petition, the Office clearly erred in a manner material to the patentability of the challenged claims in allowing the '077 Patent over the cited art. Although the cited art was listed in a 200+ reference IDS, the Examiner failed to reject the claims over the cited art, or any other art submitted by the Patent Owner. Discretionary denial under 35 U.S.C.325(d) and the Board's *Advanced Bionics* framework is therefore not warranted.

VI. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests *inter partes* review of claims 1-24 of the '077 Patent.

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VII. MANDATORY NOTICES PURSUANT TO 37 C.F.R. § 42.8(a)(1)

Pursuant to 37 C.F.R. § 42.8(a)(1), the mandatory notices identified in 37 C.F.R. § 42.8(b) are provided below as part of this petition.

A. 37 C.F.R. § 42.8(b)(1): Real Parties-In-Interest

The real parties-in-interest is The NOCO Company, Inc.

B. 37 C.F.R. § 42.8(b)(2): Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner is aware of the following patent infringement lawsuit that involves the '077 Patent:

- *Pilot Inc. v. The NOCO Company*, Case No. 2:22-cv-00389-SPL (U.S. District Court, District of Arizona).

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**C. 37 C.F.R. § 42.8(b)(3), (4): Lead And Back-Up Counsel
And Service Information**

Petitioner provides the following designation of counsel:

Lead Counsel	Back-up Counsel
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Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney for Petitioner accompanies this petition. Please address all correspondence to lead and back-up counsel at the addresses above. Petitioner also consents to electronic service by email at the email addresses listed above.

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Dated: July 1, 2022

Respectfully submitted,

/Joseph M. Sauer/

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing petition for *Inter Partes* Review of U.S. Patent No. 11,124,077, including all Exhibits, was served on July 1, 2022 via Express Mail delivery directed to the attorney of record for the patent at the following address:

Jason H. Vick
Sheridan Ross PC
1560 Broadway, Suite 1200
Denver, Colorado 80202

In addition, courtesy copies have been served via electronic mail on litigation counsel at:

Pilot-NocoIPR-ServiceSR@sheridanross.com

Date: July 1, 2022

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CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. § 42.24(a)

I, the undersigned, do hereby certify that the attached petition contains 13,960 words, as measured by the Word Count function of Microsoft Word. This is less than the limit of 14,000 words as specified by 37 C.F.R. § 42.24(a)(1)(i).

Date: July 1, 2022

By: /Joseph M. Sauer/

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APPENDIX OF EXHIBITS

EXHIBIT NO.	TITLE
1001	U.S. Patent No. 11,124,077 (“the ’077 Patent”)
1002	Excerpts from the ’077 Patent File History
1003	Declaration of Dr. Jonathan Wood (“Wood Decl.”)
1004	U.S. Patent Application Pub. No. 2013/0154543 to Richardson, <i>et al.</i> (“ <i>Richardson</i> ”)
1005	U.S. Patent Application Pub. No. 2004/0130298 to Krieger, <i>et al.</i> (“ <i>Krieger</i> ”)
1006	U.S. Patent Application Pub. No. 2010/0173182 to Baxter, <i>et al.</i> (“ <i>Baxter</i> ”)
1007	International (PCT) Application Publication No. WO 2012/080996A1 to Tracey, <i>et al.</i> (“ <i>Tracey</i> ”)
1008	U.S. Patent No. 8,232,772 to Lai, <i>et al.</i> (“ <i>Lai</i> ”)
1009	<i>Curriculum Vitae</i> of Dr. Jonathan Wood
1010	U.S. Patent No. 7,969,119 to Odaohhara
1011	U.S. Patent No. 8,264,205 to Kopera

1012	U.S. Patent No. 7,363,129 to Barnicle <i>et al.</i>
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