

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN CHIC ELECTRICS CO., LTD.,

Petitioner,

v.

PILOT INC.,

Patent Owner.

PTAB Case No. IPR2023-00810

Patent No. 11,376,971 B2

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,376,971 B2**

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(B)	2
A. REAL PARTY IN INTEREST	2
B. RELATED MATTERS	2
C. NOTICE OF COUNSEL AND SERVICE INFORMATION	3
III. REQUIREMENTS FOR <i>INTER PARTES</i> REVIEW	4
A. GROUND FOR STANDING.....	4
B. IDENTIFICATION OF CHALLENGE.....	4
1. Claims Challenged	4
2. The Prior Art	4
3. Supporting Evidence Relied Upon For The Challenge	5
4. Statutory Ground(s) Of Challenge And Legal Principles.....	5
5. Claim Construction	5
6. How Claims Are Unpatentable Under Statutory Grounds.....	5
IV. OVERVIEW OF THE '971 PATENT	5
A. SUMMARY OF THE '971 PATENT.....	6
B. PROSECUTION FILE HISTORY AND 35 U.S.C. 325(d)	8
C. LEVEL OF ORDINARY SKILL IN THE ART	12
D. PROPOSED CLAIM CONSTRUCTION.....	12
1. “start control module” (Claims 11, 26).....	12
V. THERE IS A REASONABLE LIKELIHOOD THAT AT LEAST ONE CLAIM OF THE '971 PATENT IS UNPATENTABLE.....	13

TABLE OF CONTENTS
(continued)

	Page
VI. GROUND FOR UNPATENTABILITY OF '971 PATENT	
CLAIMS 1-30	14
A. GROUND 1: Claims 1-30 are unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter	14
1. Claim 1	16
2. Claim 2	39
3. Claim 3	40
4. Claim 4	41
5. Claim 5	41
6. Claim 6	41
7. Claim 7	42
8. Claim 8	42
9. Claim 9	42
10. Claim 10	44
11. Claim 11	45
12. Claim 12	45
13. Claim 13	45
14. Claim 14	46
15. Claim 15	47
16. Claim 16	47
17. Claim 17	47
18. Claim 18	49
19. Claim 19	52
20. Claim 20	53
21. Claim 21	53
22. Claim 22	53
23. Claim 23	53

TABLE OF CONTENTS **(continued)**

	Page
24. Claim 24	53
25. Claim 25	54
26. Claim 26	54
27. Claim 27	54
28. Claim 28	54
29. Claim 29	54
30. Claim 30	54
B. GROUND 2: Claim 10 is unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter and Zhang	55
C. GROUND 3: Claims 14, 15, and 29 are unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter and Tracey	56
1. Claims 14 and 29	57
2. Claim 15	58
D. GROUND 4: Claims 18-30 are unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter and Xinfang	59
E. GROUND 5: Claim 29 is unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter, Xinfang and Tracey	60
F. GROUND 6: Claims 1-4, 6-7, 9-13, 16-28, 30 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450	60
1. Claim 1	61
2. Claim 2	68
3. Claim 3	68
4. Claim 4	68
5. Claim 6	69
6. Claim 7	69
7. Claim 9	69

TABLE OF CONTENTS **(continued)**

	Page
8. Claim 10.....	70
9. Claim 11.....	71
10. Claim 12.....	71
11. Claim 13.....	72
12. Claim 16.....	72
13. Claim 17.....	73
14. Claim 18.....	75
15. Claim 19.....	78
16. Claim 20.....	78
17. Claim 21.....	78
18. Claim 22.....	79
19. Claim 23.....	79
20. Claim 24.....	79
21. Claim 25.....	79
22. Claim 26.....	80
23. Claim 27.....	80
24. Claim 28.....	80
25. Claim 30.....	80
G. GROUND 7: Claim 5 is unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Koebler	80
H. GROUND 8: Claims 8, 10, 16, and 30 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Richardson.....	82
1. Claim 8.....	83
2. Claim 10.....	85
3. Claim 16 and 30.....	86

TABLE OF CONTENTS
(continued)

	Page
I. GROUND 9: Claims 14, 15, and 29 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Morse	87
1. Claims 14 and 29.....	88
2. Claim 15.....	90
J. GROUND 10: Claims 18-30 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Krieger049.....	90
K. GROUND 11: Claim 29 is unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450, Krieger049 and Morse.....	92
VII. CONCLUSION.....	93

EXHIBIT LIST

- | | |
|----------|--|
| Ex. 1001 | U.S. Patent No. 11,376,971 B2 to Wang et al. (“the ’971 Patent” or “the ’971”) |
| Ex. 1002 | USPTO file history of the ’971 Patent |
| Ex. 1003 | USPTO file history for U.S. Patent 9,525,297 |
| Ex. 1004 | USPTO file history for U.S. Patent 10,046,653 Patent |
| Ex. 1005 | USPTO file history for U.S. Patent 10,323,806 Patent |
| Ex. 1006 | USPTO file history for U.S. Patent 10,875,410 Patent |
| Ex. 1007 | USPTO file history for pending application 17/131,113 |
| Ex. 1008 | U.S. Patent Application Publication No. 2010/0173182 A1 to Baxter et al. (“Baxter”) |
| Ex. 1009 | U.S. Patent No. 7,345,450 B2 to Krieger et al. (“Krieger450”) |
| Ex. 1010 | Chinese Utility New Model Patent No. CN 202696190 U, with certified translation (“Zhang”) |
| Ex. 1011 | U.S. Patent Application Publication No. 2013/0241498 to Koebler (“Koebler”) |
| Ex. 1012 | International Publication No. WO2012/080996 A1 to JTM Power Limited (“Tracey”) |
| Ex. 1013 | U.S. Patent No. 9,506,446 to Xinfang (“Xinfang”) |
| Ex. 1014 | U.S. Patent Application Publication No. 2013/0154543 to Richardson et al. (“Richardson”) |
| Ex. 1015 | L. Di Jasio et al, <i>PIC Microcontrollers</i> (2008) |
| Ex. 1016 | <i>14-Pin, Flash-Based 8-Bit CMOS Microcontrollers</i> , Microchip Technology Inc., PIC16F630/676 Data Sheet, 2010 |

- Ex. 1017 *150mA Low-Noise LDO Regulator*, Micrel Inc., MIC5206, May 2006
- Ex. 1018 *N-Channel Enhancement Mode MOSFET*, Huayi Microelectronics, HY3704P/B, V1.0
- Ex. 1019 *HEXFET® Power MOSFET*, International Rectifier, IRLS3036-7PPbF, October 2010.
- Ex. 1020 U.S. Patent Application Publication No. 2007/0285049 to Krieger et al. (“Krieger049”)
- Ex. 1021 U.S. Patent No. 5,396,162 to Brilmyer (“Brilmyer”)
- Ex. 1022 U.S. Patent No. 5,820,407 to Morse et al. (“Morse”)
- Ex. 1023 Declaration of David S. Ricketts, PhD. (“Ricketts”)
- Ex. 1024 Claim Listing for ’971 Patent

I. INTRODUCTION

Pursuant to 35 U.S.C. § 311 and 37 C.F.R. § 42.100, Shenzhen Chic Electrics Co., Ltd. (“Petitioner”) petitions for *inter partes* review (“IPR”) of claims 1-30 of U.S. Pat. No. 11,376,971 B2 (“the ’971 Patent,” Ex. 1001). The ’971 Patent has not been the subject of any prior IPR or Post Grant Review proceeding.

This Petition presents the following grounds as to why Claims 1-30 are unpatentable under AIA 35 U.S.C. §103.

Ground	Challenged Claims	Prior Art for Each Ground under 35 U.S.C. § 103(a)
1	1-30	Baxter
2	10	Baxter and Zhang
3	14, 15, and 29	Baxter and Tracey
4	18-30	Baxter and Xinfang
5	29	Baxter, Xinfang and Tracey
6	1-4, 6-7, 9-13, 16-28, 30	Krieger450
7	5	Krieger450 and Koebler
8	8, 10, 16, and 30	Krieger450 and Richardson
9	14, 15, and 29	Krieger450 and Morse
10	18-30	Krieger450 and Krieger049
11	29	Krieger450, Krieger049 and Morse

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(B)

A. REAL PARTY IN INTEREST

Pursuant to 35 U.S.C. §312(a)(2) and 37 C.F.R. §42.8(b)(1), all real parties in interest in filing of this IPR petition are as follows: Shenzhen Chic Electrics Co., Ltd.

B. RELATED MATTERS

The '971 Patent is at issue in a lawsuit involving a complaint for declaratory judgment of noninfringement, in *Shenzhen Carku Technology Co., Ltd. v. Pilot, Inc.*, 2-22-cv-08471 (C.D. Cal. Nov. 18, 2022).

In addition, there have been 7 IPR proceedings against 6 patents that are parents to or related to the '971 by sharing the same technical disclosure and same common priorities as shown in the Pilot patent family tree for the '971 in §IV.B of this Petition:

1. *NOCO v. Pilot*, IPR2022-01237 on U.S. Pat. No. 11,124,077 (Pending: Trial Instituted on Jan. 23, 2023 and Pilot did not file Patent Owner Response due April 17, 2023);

2. *NOCO v. Pilot*, IPR2022-01417 on U.S. Pat. No. 11,104,236 (Pending: Trial Instituted Feb. 14, 2023 and Pilot did not file Patent Owner Response due May 8, 2023);

3. *NOCO v. Pilot*, IPR2023-00167 on U.S. Pat. No. 11,235,673 (Pending:

Pilot did not file Patent Owner Preliminary Response and PTAB's institution decision due June 23, 2023);

4. *NOCO v. Pilot*, IPR2021-01235 on U.S. Pat. No. 10,328,806 (Final Written Decision finding Claims 1-19 unpatentable, Pilot did not appeal);

5. *NOCO v. Pilot*, IPR2021-00777 on U.S. Pat. No. 10,046,653 (Final Written Decision finding Claims 1, 4-9, 11-18, 20 unpatentable, Pilot's appeal to the Federal Circuit pending);

6. *Shenzhen Chic v. Pilot*, IPR2021-00777 on U.S. Pat. No. 10,046,653 (Final Written Decision finding Claims 1, 4-20 unpatentable, Pilot's appeal to the Federal Circuit and Shenzhen Chic's cross appeal on Claim 3 pending);

7. *Winplus v. Pilot*, IPR2018-00488 on U.S. Pat. No. 9,525,297 (PTAB instituted trial, NOCO did not file Patent Owner Response, Trial terminated due to settlement before Final Written Decision).

C. NOTICE OF COUNSEL AND SERVICE INFORMATION

Pursuant to 37 C.F.R. §§ 42.8(b)(3), 42.8(b)(4) and 42.10(a), Petitioner appoints Kevin J. Patariu (Reg. No. 63,210) as its lead counsel, and Bing Ai (Reg. No. 43,312), John D. Esterhay (Reg. No. 73,512) and John P. Schnurer (Reg. No. 52,196) as its back-up counsel. The above attorneys are all at the mailing address of Perkins Coie LLP, 11452 El Camino Real, Suite 300, San Diego, California 92130, contact numbers of 858-720-5700 (phone) and 858-720-5799 (fax), and the

following email for service and all communications:

PerkinsService-SZChic-Pilot-IPRs@perkinscoie.com

Additionally, Petitioner hereby consents to electronic service under 37 C.F.R. § 42.6(e). Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney executed by Shenzhen Chic Electrics Co., Ltd. for appointing the above designated counsel is concurrently filed.

III. REQUIREMENTS FOR *INTER PARTES* REVIEW

This Petition is complete, complies with all requirements and thus should be accorded a filing date as the date of filing of this Petition under 37 C.F.R. § 42.106.

A. GROUND FOR STANDING

Petitioner certifies that the ‘971 is available for IPR and that the Petitioner is not barred or estopped from requesting IPR challenging claims of the ‘971 on the grounds identified herein.

B. IDENTIFICATION OF CHALLENGE

1. Claims Challenged

The precise relief requested is that the Board institute an IPR trial on Claims 1-30 of the ‘971 on all presented grounds and cancel Claims 1-30.

2. The Prior Art

The prior art references relied upon are prior art discussed or referred in the papers filed with Petition, including Baxter, Krieger450, Zhang, Koebler, Tracey, Xinfang, Richardson. Krieger049, and Morse. See the Exhibit List and Declaration

of David S. Ricketts, Ph.D. (Ex. 1023).

3. Supporting Evidence Relied Upon For The Challenge

The supporting evidence includes the Declaration of Dr. David S. Ricketts (Ex. 1023) and other supporting evidence in the Exhibit List or referred in the papers filed with this Petition.

4. Statutory Ground(s) Of Challenge And Legal Principles

The review of the challenged claims is governed by AIA 35 U.S.C. §§ 102 and 103 and AIA 35 U.S.C. §§ 311 to 319 and 325(d), since the earliest effective filing date of the '971 is no earlier than April 28, 2014 as explained below.

5. Claim Construction

The '971 Patent is an unexpired patent and each claim shall be construed using the framework set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc); 37 C.F.R. § 42.100(b).

6. How Claims Are Unpatentable Under Statutory Grounds

Section VI provides an explanation of how claims 1-30 are unpatentable under AIA 35 U.S.C. § 103, including the identification of where each claim element is found in the cited prior art.

IV. OVERVIEW OF THE '971 PATENT

Claim 1-30 includes features well-known before the effective filing date of the '971. Ricketts ¶¶49-108. Prior Art Baxter and Krieger disclose microcontroller-controlled jumpstarters which receive information about the load

and battery level and control operation of a switch to connect a power supply to the jumpstarter output. Ricketts ¶¶151-167. The other references relied on in the Petition provide overlapping or supplemental technical disclosure of features well-known in the technical field of battery chargers and Jumpstarters. Ricketts ¶¶168-205.

A. SUMMARY OF THE '971 PATENT

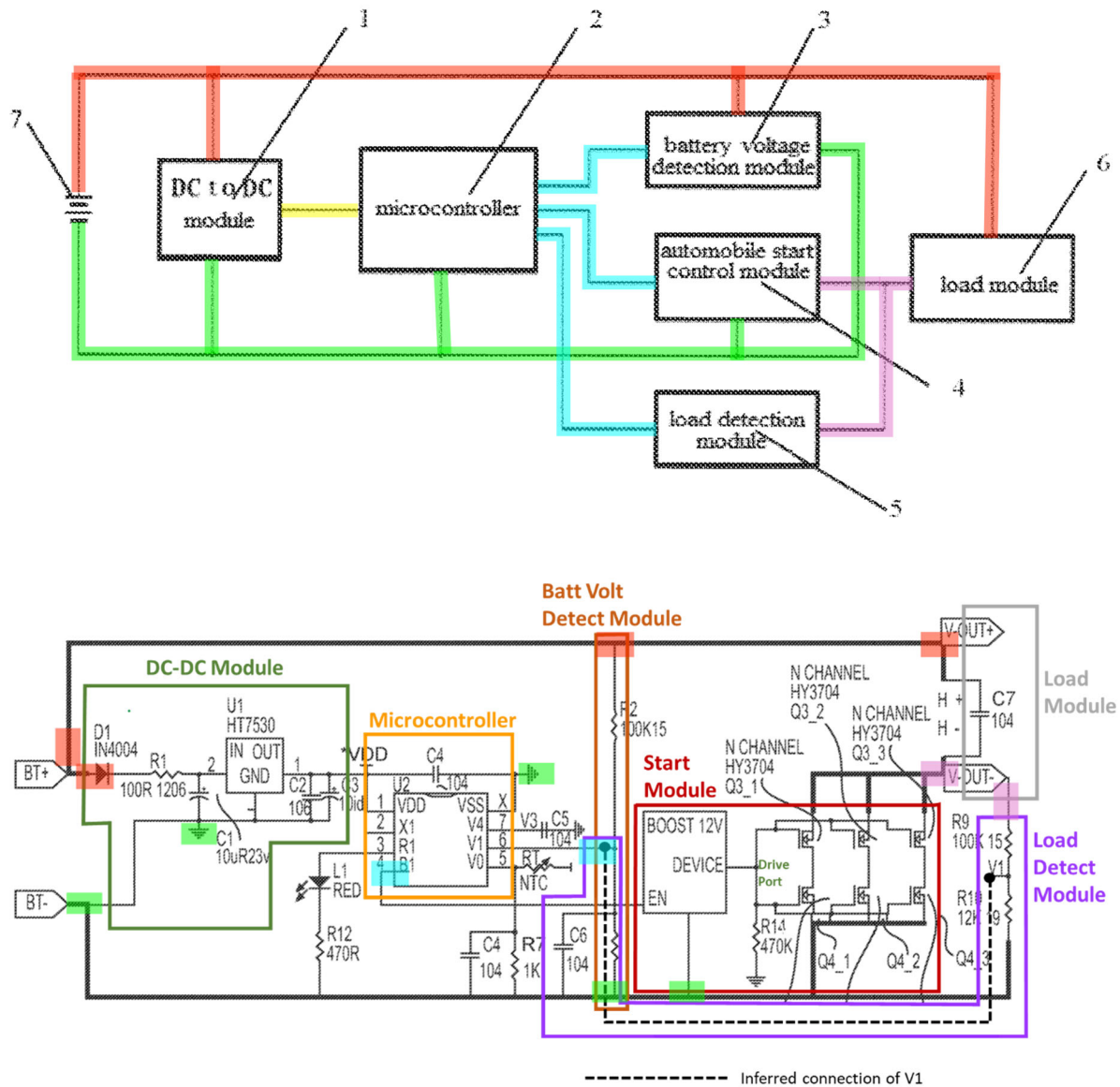
The earliest effective filing date or earliest possible priority date of the '971 is no earlier than April 28, 2014 according to face of the '971, which states a chain of priority claims to a Chinese utility model application No. CN 201420212173.5 filed on April 28, 2014.

The '971 Patent purports to disclose “an automobile charging device, in particular relates to a novel automobile charger with a safe power supply charging quickly.” 1:21-23. The '971 Patent alleges a problem in the prior art that “current automobile chargers have common problems of not able to automatically detect whether a load is connected, whether an electrode is connected with an automobile storage battery reversely, whether an automobile engine or the storage battery has a reverse current, whether the battery state is suitable for heavy current power generation.” '971 Patent 1:28-34. The '971 Patent purports to disclose a solution to these known problems. Ricketts ¶109. The purported solution is an “emergency power supply” in FIGS. 1 and 2. See, e.g., 2:62-65; 2:15-35, 1:66-2:2 (Fig. 1)

2:36-4:12 (Fig. 2); Ricketts ¶¶110-12.

Figures 1 and 2 are annotated below with the same colors used to indicate overlapping connections and/or functional blocks, with one circuit connection annotated to Fig. 2 that is described in the text but not shown in the original figure.

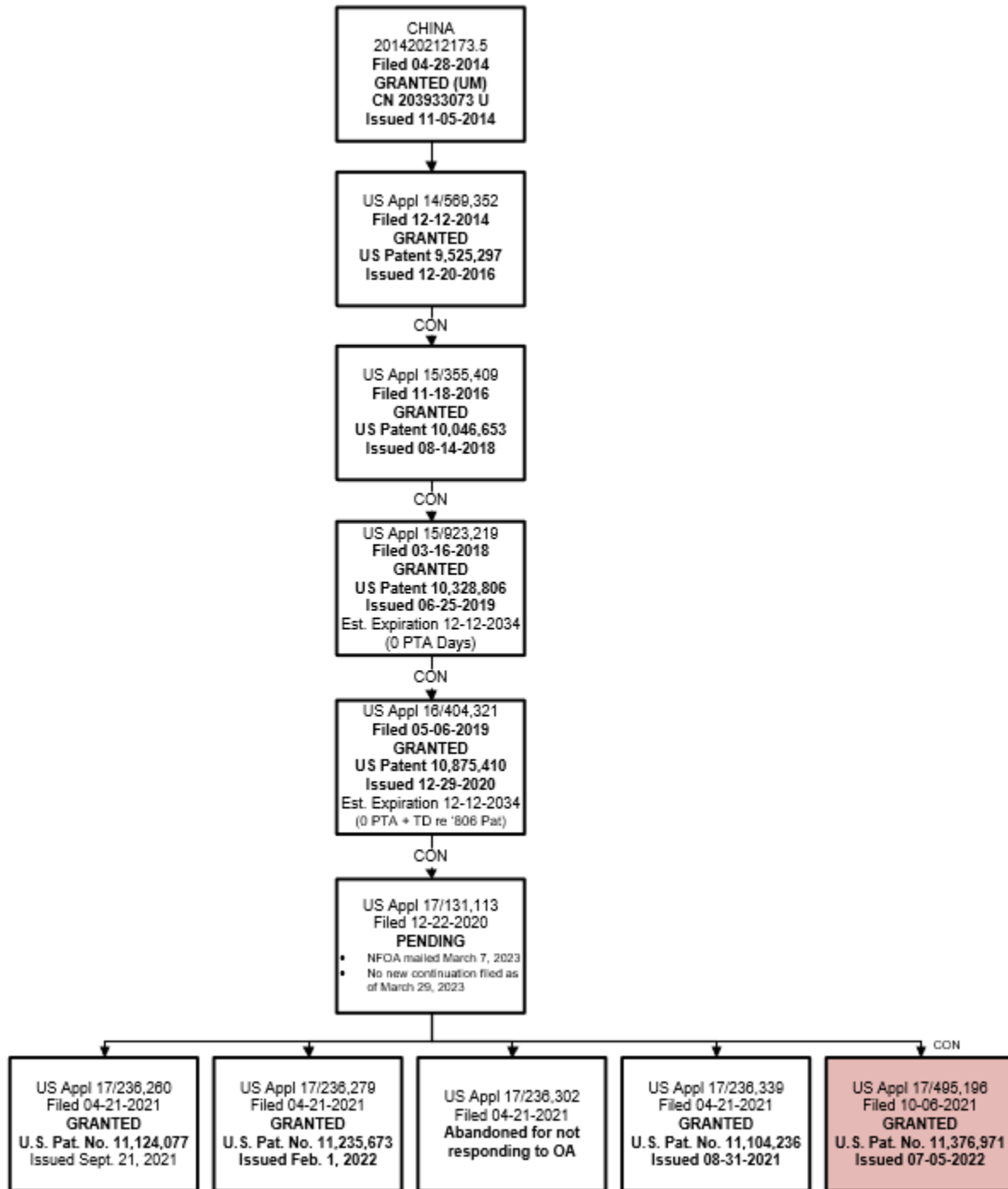
3:59-66. Ricketts ¶¶113-14.



power supply (7) as a supply of power. It is depicted in Fig. 1 with the common symbol for a battery. The automobile battery charger monitors the load module (6) and the direct current power supply (7) using a microcontroller (2). The load module is monitored by a load detection module (5), which is connected to the microcontroller (2). The microcontroller (2) “determines if the automobile storage battery is connected with the automobile engine through the load detection module,” “wherein the load detection module detects whether the load module is correctly connected.” ’971 Patent 4:20-25. The ’971 Patent also discloses using “load detection of the present disclosure can prevent improper operations by the user, such as reversed polarity.” *Id.* 2:40-43. Ricketts ¶¶115-21.

B. PROSECUTION FILE HISTORY AND 35 U.S.C. 325(d)

A family tree including the ‘971 is included below.



The application No. 17/495,196 resulting in the '971 had a single office action dated Jan.24, 2022 raising claim objections due to various informalities and obviousness-type double patent rejections over 3 other patents sharing the same

patent specification:

5. Independent Claims 7, 23 and 24 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 1 of U.S. Patent No. 11,124,077 B2, Claim 1 of U.S. Patent No. 10,875,410 B2 and Claim 1 of U.S. Patent No. 11,104,236 B2, respectively. Although the conflicting claims are not

Application/Control Number: 17/495,196
Art Unit: 2851

Page 5

all word-to-word identical, they are not patentably distinct from each other because they have similar land/or identical imitations.

Claims 8 – 22 and 25 – 36 are also rejected because of the deficiencies of their respective independent parent claims.

The Applicant subsequently amended claims to correct the informalities and filed terminal disclaimers. The Office allowed the amended claims without any discussions or evaluations of any specific prior art with respect to Claims 1-30 as granted in the ‘971. Therefore, the prior art in this Petition was not evaluated on record in an office action or otherwise compared to a claim during prosecution of the application which resulted in the ‘971. Ex. 1003-06; Ricketts ¶¶122-27. The original examination of the ‘971 did not discuss similarities and material differences between prior art in this Petition and any of the prior art on the face of the ‘971; Patent Owner made no arguments regarding Claims 1-30 with respect to any prior art reference cited in this Petition. The first-action allowance of Claims 1-30 is an error or oversight by the Patent Office by not specifically addressing any prior art made of record in the ‘971 and prior art references relied upon by the

PTAB in 4 different PTAB proceedings prior to the issuance of the ‘971:

(1) PTAB issued 3 final written decisions holding claims unpatentable in two parent patents of the ‘971: U.S. Patent Nos. 10,046,653 (*NOCO v. Pilot* in IPR2021-00777 and *Shenzhen Chic v. Pilot* in IPR2021-01232) and 10,328,806 (*NOCO v. Pilot* in IPR2021-01235); and

(2) PTAB instituted an IPR trial against Patent No. 9,525,297, another parent of the ‘971 in *Winplus v. NOCO* in IPR2018-00488.

In addition, Claims 22-26 of pending application U.S. App. No. 17/131,113, another parent application of the ‘971 are presently rejected by the Office in view of Krieger450 and Thomason references used in Grounds of this Petition. Ex. 1007; Ricketts ¶¶128-30. With respect to Claim 22, the Office has found that Krieger 450 disclosed several claim limitations similar to those in the ‘971. *Id.*; Ex. 1007 at 3-6.

Therefore, under 35 U.S.C. 325(d) and in light of the *Becton Dickinson* non-exclusive factors,¹ the Board should institute an IPR trial as requested in this Petition because the institution will remedy the unfortunate oversight and lack of examination on the merits of various highly relevant prior art references with respect

¹ *Becton Dickinson & Co. v. B. Braun Melsungen AG*, Case IPR2017-01586, slip op. at 17–18 (PTAB Dec. 15, 2017) (Paper 8) (precedential in relevant part).

to each claim of Claims 1-30 in the original examination.

C. LEVEL OF ORDINARY SKILL IN THE ART

The '971 Patent is in the field of a power management supply and particularly automobile battery charging. Ricketts ¶44.

A person having ordinary skill in the art (“POSITA”) with respect to the ‘971 by the time of the earliest possible effective filing date (Apr.28, 2014) would have of a bachelor’s degree in electrical engineering or its equivalent and two years of experience in electrical engineering with some experience in design of power supply management systems, such as battery charging systems. In lieu of a degree, a POSITA could be one whose equivalent accumulated knowledge and experience in the field of electrical engineering and specifically power supply management such as battery charging system design makes him or her a POSITA. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. Ricketts ¶¶44-48.

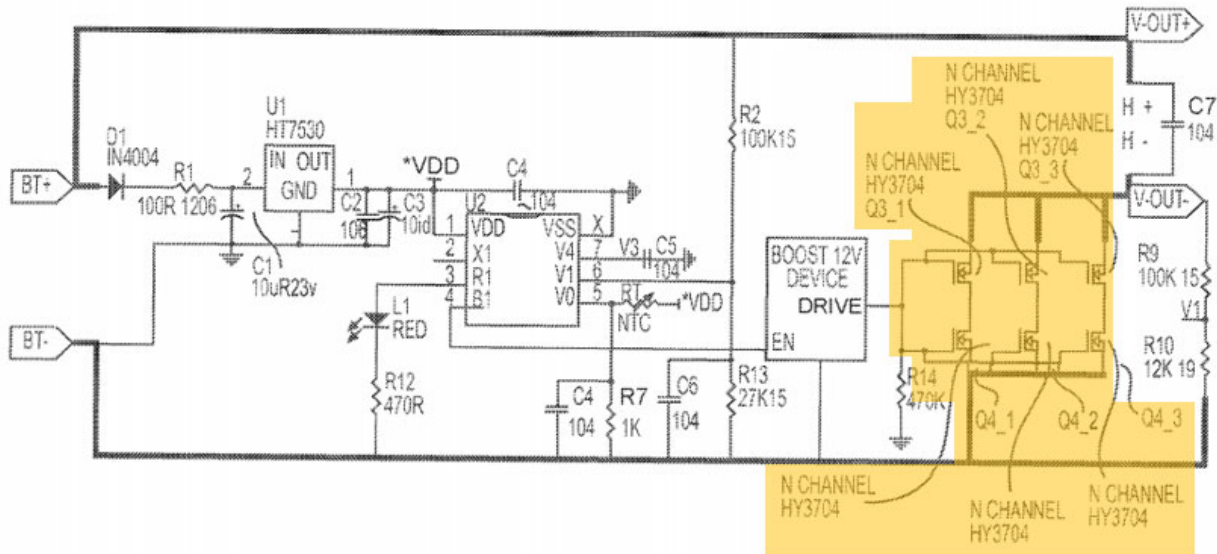
D. PROPOSED CLAIM CONSTRUCTION

Proposed constructions below are pursuant to the claim construction principles in §III.B.5 and for the sole purpose of this Petition.

1. “start control module” (Claims 11, 26)

This term, which only appears in the claims, should be construed as “electronic switch.” Ricketts ¶¶148-50. The specification text and Fig. 1 describe

an “automobile control module” that controls the supply of the power from the battery 7 to the load module 6 such as an automobile battery. Notably, the ‘971 Patent states that “the automobile start control module is the electronic switch.” 2:29-30; 4:42-45; 4:26-28, 4:29-32. The start control module includes transistors Q3_1, Q3_2, Q3_3, and Q4_1, Q4_2, Q4_3 highlighted in Figure 2 shown below, which are an electronic switch under control of the microcontroller that selectively connects negative battery terminal BT- to the output V-OUT-. *Id.* at 4:8-11.



V. THERE IS A REASONABLE LIKELIHOOD THAT AT LEAST ONE CLAIM OF THE '971 PATENT IS UNPATENTABLE

This Petition analyzes the cited prior art in the proposed invalidity grounds, compares the differences between the claimed invention and the cited prior art, and concludes that the prior art in the proposed invalidity grounds discloses all elements recited in claims 1-30 and renders the claimed subject matter as a whole

obvious and unpatentable.

VI. GROUNDS FOR UNPATENTABILITY OF '971 PATENT CLAIMS 1-30

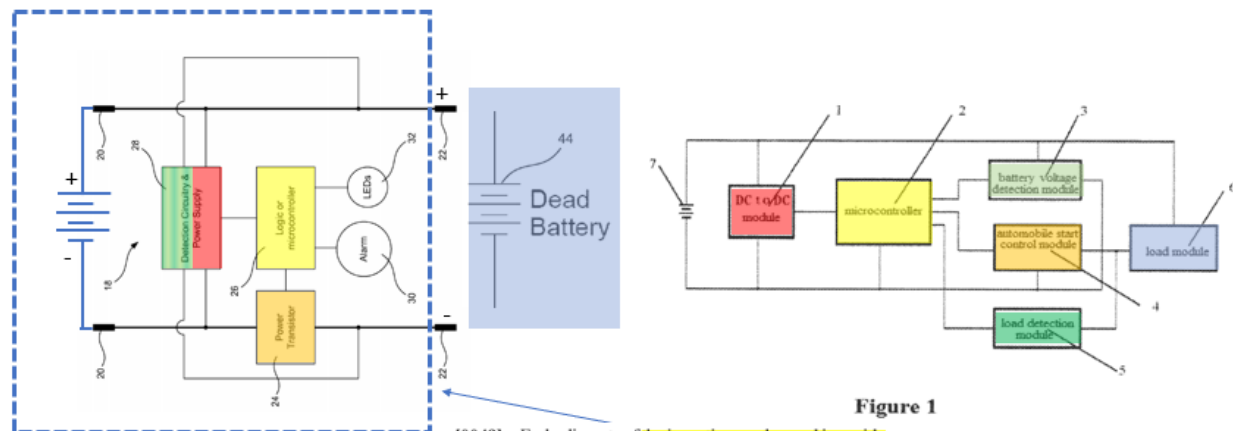
Ex. 1024 shows the listing of claims and how claims with multiple limitations are partitioned for analysis in the Grounds below.

A. GROUND 1: Claims 1-30 are unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter

Baxter published July 8, 2010, from an application filed March 24, 2010, and thus is prior art. Baxter is analogous prior art because it discloses a safety circuit with microcontroller-controlled switch that connects two low voltage systems in automotive jumpstarting applications. Abstract, [0040]. The switch connects an internal battery of a booster box with a depleted automobile battery. Abstract, [0007], [0025], [0038]; Ricketts ¶¶151-52.

Baxter's safety circuit further "includes a pair of output terminals, a detection circuit operatively connected to the output terminals and configured to detect whether the output terminals are properly connected to a low-voltage system with a correct polarity." *Id.* [0029], [0032]. Baxter's power-controlling circuit is "configured to provide electrical power to the output terminals only when a proper connection of correct polarity has been detected." *Id.* [0029]. The power controlling circuit may include "one or more high-current transistors as a switch." *Id.* [0028]; Fig. 12, and Claim 13; Ricketts ¶153.

Baxter includes power supply and detection circuitry (28) like the '971, as well as a microcontroller (26) and switching circuitry (24). Fig. 2, Ricketts ¶155. Fig. 2 does not indicate polarity ports 20/22, so the power transistor can be on either the positive or negative cable. Ricketts ¶155. The figure below shows close technical overlap between Baxter Figure 2 (annotated to show its implementation a booster box) and '971 Patent Fig. 1, with similar disclosures of DC-DC converter (red), microcontroller (yellow), battery voltage detection module (light green), load detection module (dark green), start control module (orange), load module (blue). Ricketts ¶¶154-55, ¶209.



[0044] FIG. 2 provides a diagram illustrating the concepts incorporated into one embodiment of a safety circuit 18 such

[0008] Implementation of the invention provides a battery-integrated connection between a battery and a low-voltage system that includes a safety circuit. The safety circuit leaves the low-voltage system disconnected until it determines that it is safe to make a connection. If the safety circuit detects an

[0049] Embodiments of the invention can be used in a wide variety of systems for connecting to low-voltage systems and/or for connecting between low-voltage systems. Non-limiting examples include jumper cable sets, retrofit modules for installation on existing jumper cable sets, booster boxes, battery chargers, ground power units for aircraft, temporary power units for recreational vehicles, trailers, boats, and the like, battery-powered equipment charging cords (fork lifts, floor scrubbers, tugs, etc.), DC power connections for solar cells, fuel cells, and other DC-generating equipment, and DC power connections for electronics. It will be understood that embodiments may be used in a variety of situations.

Fig. 7 shows another safety switch embodiment (annotated below to highlight sensor circuitry and to show its application in a booster box disclosure)

with further technical details, including microcontroller 60, switch of 4 FETs arranged in series/parallel configuration, and three load detection circuits. [0056], Figs. 7 and 11, Ricketts ¶156; Baxter Figs. 7, 9, Ricketts ¶157.

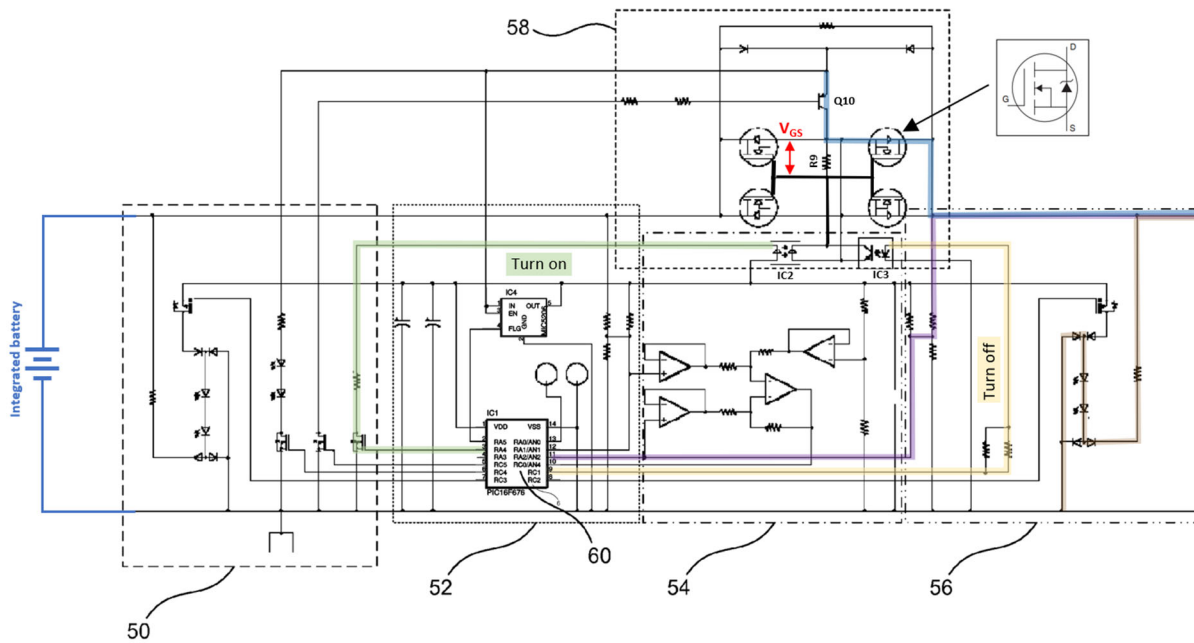


FIG. 7

This circuitry in Figs. 7-12 a load detector and internal battery voltage detector, as discussed below. Ricketts ¶¶156-57.

1. Claim 1

a. Claim 1[Pre]²

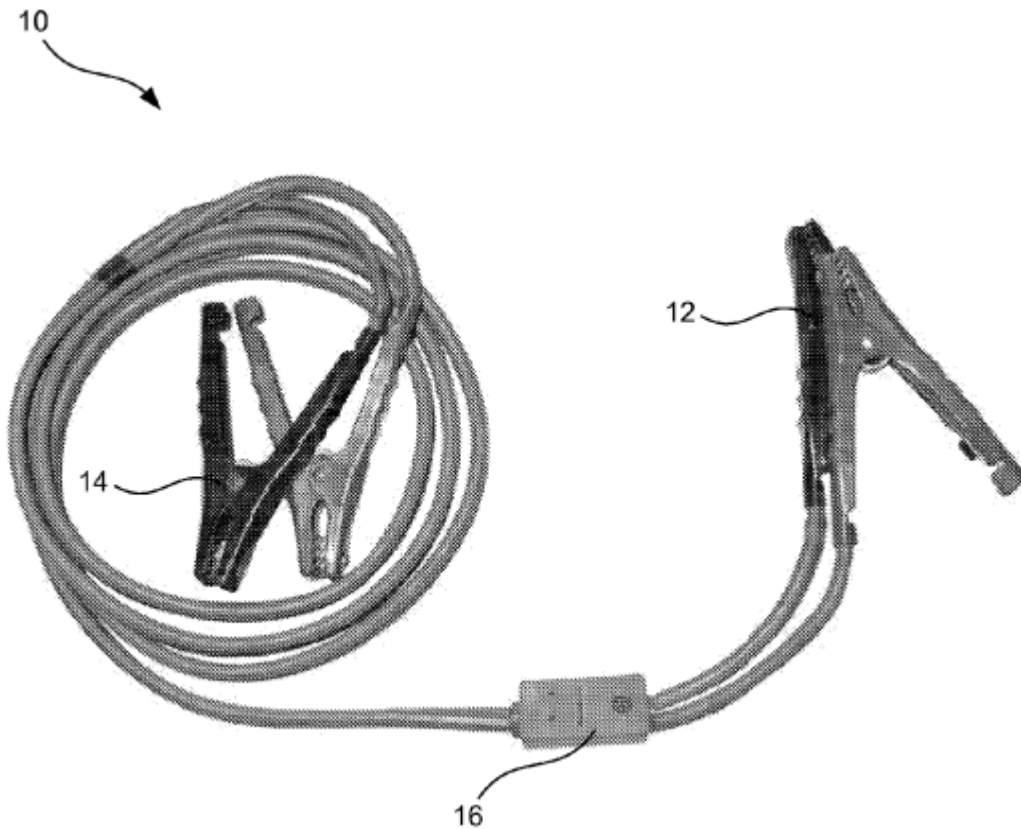
Baxter discloses jumpstarters, including booster boxes and jumper cables with safety circuits for automotive applications. [0040], [0043], [0051]-[0053].

² See Ex. 1024 for the claims listing showing partitioning of claim limitations.

Ricketts ¶211. Baxter discloses integrating the disclosed safety circuit invention embodiments into a “booster box” or “battery charger” that connects to an automobile. *Id.*; Baxter [0049], [0077], [0007], [0026], Abstract, [0038]. A “booster box” refers to a jumpstarter apparatus with integrated battery and cables to connect to a vehicle battery. Ricketts ¶211. A POSITA would understand that the detailed circuitry embodiments in Figs. 2, and 5-12 can be implemented in booster boxes and battery chargers , and would be a simple substitution of a fixed booster box DC source connected to the safety circuit shown in those embodiments. *Id.*; [0077]

Baxter’s safety circuit may be integrated into a battery connectable to a low voltage system. [0025], [0077]; Ricketts ¶212.

Baxter’s safety circuit can also be integrated in jumpstarter cables. [0025], Fig. 1 (showing cables with safety circuit 16), Ricketts ¶213.



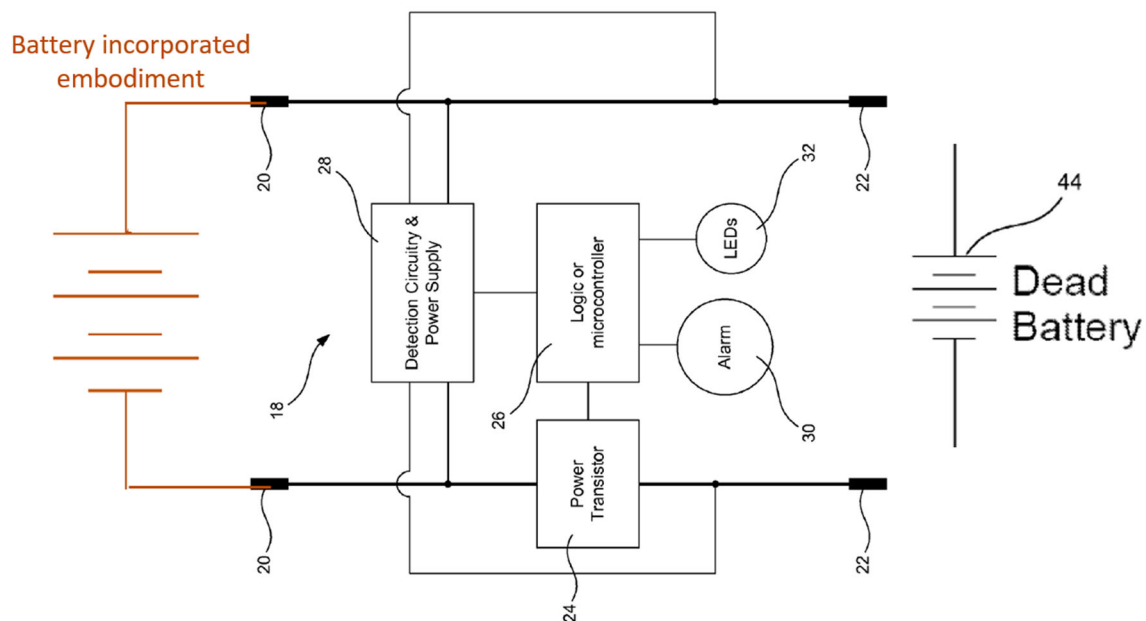
Baxter's jumper cable set 10 has a safety circuit in control box 16 to prevent personal injury and equipment damage from improper use, such as connecting the cables backward.[0005]-[0006],[0040],[0050], [0051]-[0053]. A battery, combined with the jumper cables of Fig. 1, would provide jumpstart functionality. Ricketts ¶¶214-215.

b. Claim 1[a]

Baxter's battery (e.g. a battery connected to terminals 20 in Figure 2 and Positive Cable A / Negative Cable A in Fig. 8, examples of which are shown above in the analysis of 1[pre] §VI.A.1.a in the annotated figures) is connected to a voltage regulator (in Detection Circuit & Power Supply 28 in Fig. 2 and IC4 in Fig.

9), the battery capable of supplying power, via the voltage regulator, to at least one microcontroller (e.g., logic or microcontroller in Fig. 2 and IC1 in Fig. 9). Ricketts ¶216. As explained in the analysis of 1[pre], a POSITA reading Baxter would understand that the safety circuit disclosed in Figs. 2 and 7-12 may be implemented in a booster box or integrated in a battery. *Id.*

Fig. 2 (annotated below) shows input terminals 20 of a safety circuit 18 are connected to a power source, -- the battery of a booster box. [0044]; Ricketts ¶¶217-18.



Baxter describes how input terminals 20 connect to a battery via clamps 12, which supports the conclusion that input terminals 20 connect to a battery when the safety circuit 18 is integrated in a booster box. [0040], Fig. 1 (clamps 12

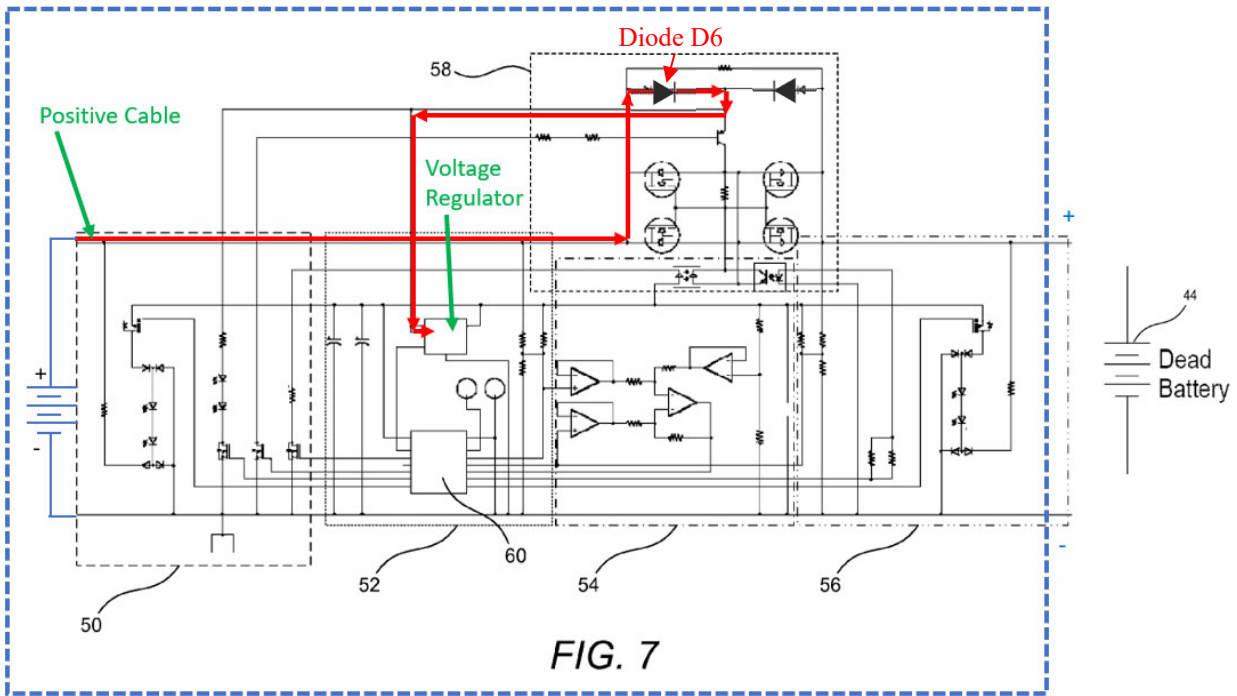
connected to control box 16), [0040] (input/output terminals 20/22 connected to clamps 12, 14.) Ricketts ¶218.

Fig. 2 illustrates how the battery connected at input terminals 20 is also connected to the power supply 28, and the logic microcontroller 26 is connected to one of the two input terminals 20 (i.e. the connection to the battery ground), and the other terminal of the logic microcontroller 26 is connected to the detection circuit and power supply 28. Baxter [0044] explains how the microcontroller connects one of the input terminals 20 for a ground connection, and the other power connection is from the power supply 28. Ricketts ¶219.

A POSITA would know that a microcontroller typically needs a 3-5V supply. Ricketts ¶219. Since an automotive battery is typically 12V or higher, the power supply 28 would need a voltage regulator to convert the input voltage to the lower voltage required by the microcontroller. *Id.*

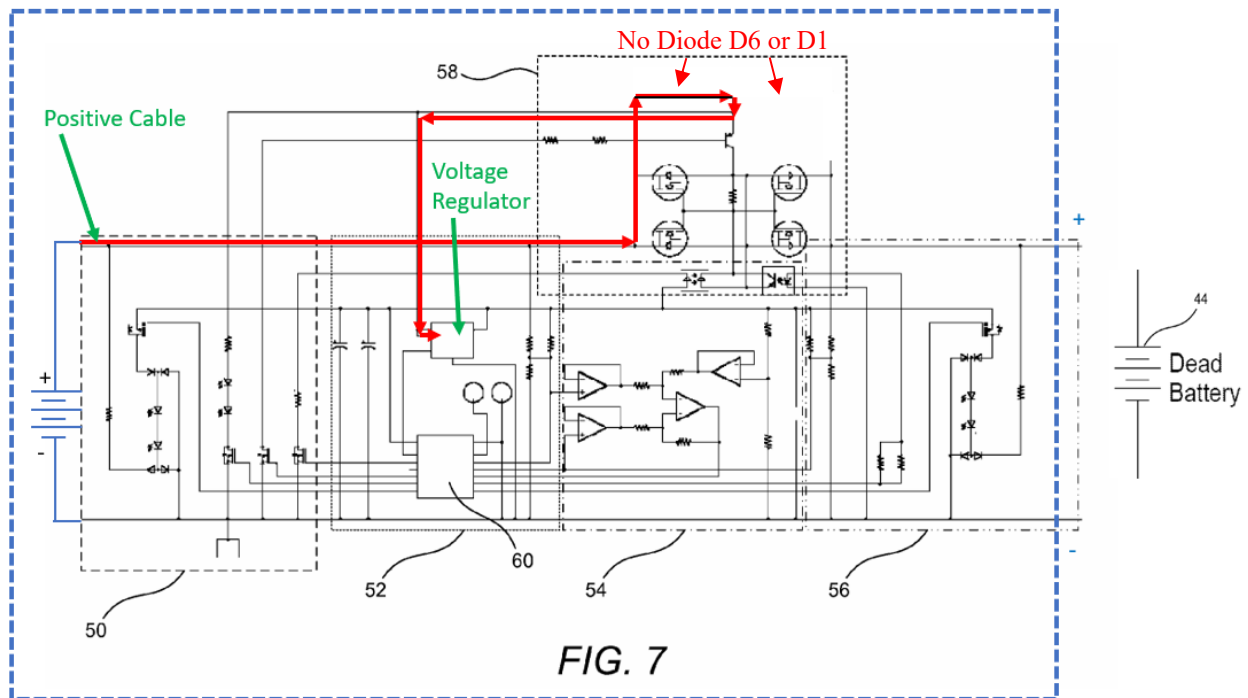
Figs. 7-12 show an exemplary safety circuit with additional technical details. This circuit connects to a battery. Ricketts ¶220. For example, Fig. 13's flowchart input battery voltage tests (which applies to the circuit in Figs. 7-12 and which is more broadly "illustrative of features of some embodiments of the invention" as explained in [0059], which a POSITA would understand to apply to the embodiment of Fig. 2) confirms that input terminals 20 connect to a battery. *Id.*; Baxter [0040]. Fig. 7 is annotated below to show the booster box's boundary and

internal battery, and electrical path for power between the positive cable and the voltage regulator (diode D6 redrawn for clarity), and to illustrate the connection points for an added dead battery 44. Ricketts ¶220.



The safety circuit illustrated in Fig. 7 may be powered from the input terminals or output terminals. Ricketts ¶220. A POSITA would understand that the safety circuit 18 can be powered by the integrated battery when used in a booster box or integrated with a battery. The diode D1 can be removed to eliminate the ability to power the circuit from the output cable, and diode D6 can be removed as

unnecessary. *Id.*



A POSITA would be aware of circuitry to power a circuit such as the safety circuit 18 shown in Figs. 2, 7-12, and would be motivated to modify the circuit above to simplify it when integrated in a booster box. *Id.* A POSITA would know that a booster box's battery can power the safety circuit, so the circuitry to power it from an external source is unnecessary. *Id.* This change would be a matter of routine experimentation with predictable results. *Id.*; Figs. 8-12; Baxter [0058]; Ricketts ¶¶222-228. Figs. 8-9 provides more implementation details of the circuitry in Fig. 7. [0058]; Ricketts ¶222. "Positive Cable A" is the positive wire connected to the internal booster box battery. Ricketts ¶223.

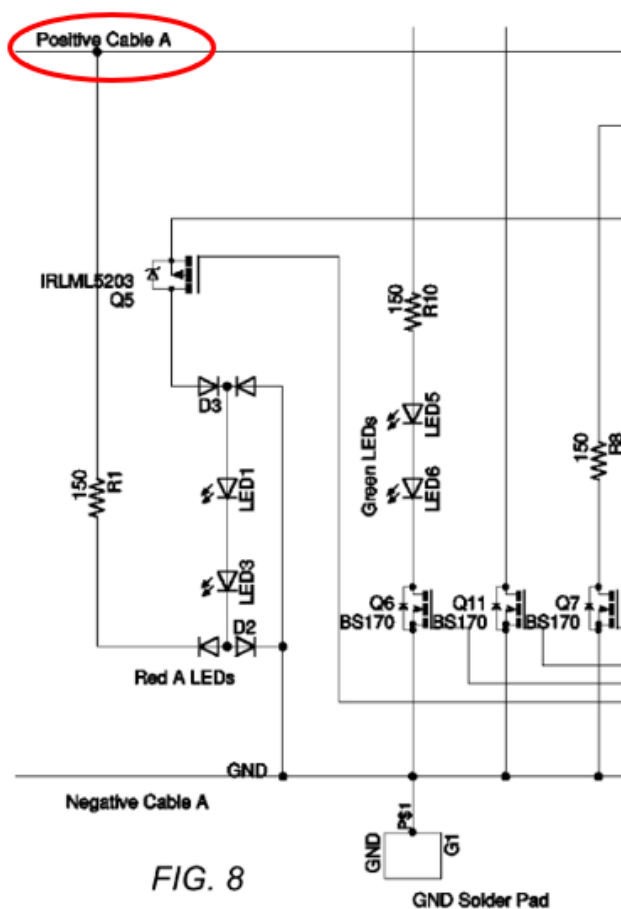


Fig. 9 (annotated) shows voltage regulator IC4. Ricketts ¶¶224-25; Ex. 1017 p.1,3.

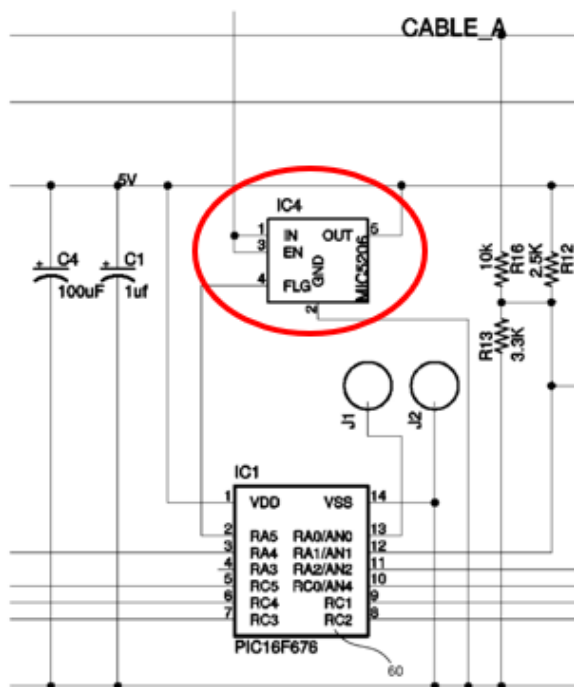


FIG. 9

The voltage regulator output (OUT) connects to the microcontroller IC1 VDD input. Ricketts ¶¶226-27; Ex. 1016 p.1,8 (identifying microcontroller and VDD pin).

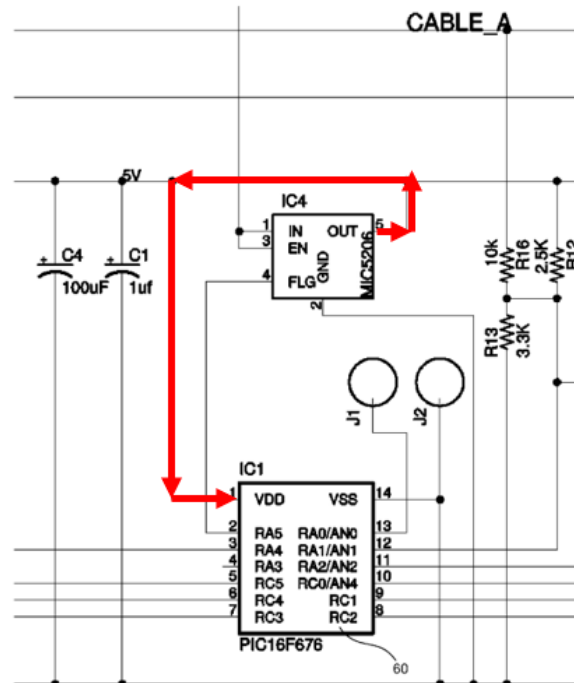


FIG. 9

The battery is also capable of supplying power to an automobile battery when the battery has at least one predetermined voltage as recited in limitation 1[a]'s analysis.

Fig. 2 shows that the safety circuit may selectively supply power from the battery connected at input terminals 20 to an automobile battery connected at output terminals 22 via power transistor switch 24. The safety circuit will not connect a battery (such as a battery in a booster box) to an automobile battery if any unsafe conditions exist. [0025]-[0026]. Baxter tests a variety of conditions, including connecting a failed battery through the switch to another battery. [0050]. A POSITA would know that Baxter's disclosure of avoiding a connection to a failed battery applies to both the booster box and automobile batteries, because the

risk of damage is the same. Ricketts ¶229. Baxter expressly discloses a “safety circuit or control circuit that detects the condition at each end of the connection cable or cables” where “the safety circuit refuses to make a connection to the low-voltage system while an unsafe condition exists.” Baxter [0008], [0010]. A POSITA would also understand that certain measured voltages across the battery’s terminals, such as zero volts, may indicate a failed battery. Ricketts ¶229. Fig. 2 discloses a detection circuit that determines whether it is safe to connect the input and output terminals 20/22 via switch 24. Baxter [0044]. Baxter discloses that measuring a voltage may be one way to determine an unsafe condition. Baxter [0053],[0063]; Ricketts ¶230.

Figs. 7, Fig. 9 (annotated below) show the supply side battery connected to the terminals of Cables A on the left side of the safety circuit powers the automobile battery connected to the terminals of Cables B on the right side. The voltage of the supply side battery connected to the terminals of Cables A is being monitored or measured by the voltage sensor formed by R16 and R13 where the sensor output is fed into microcontroller pin 12. Ricketts ¶230.

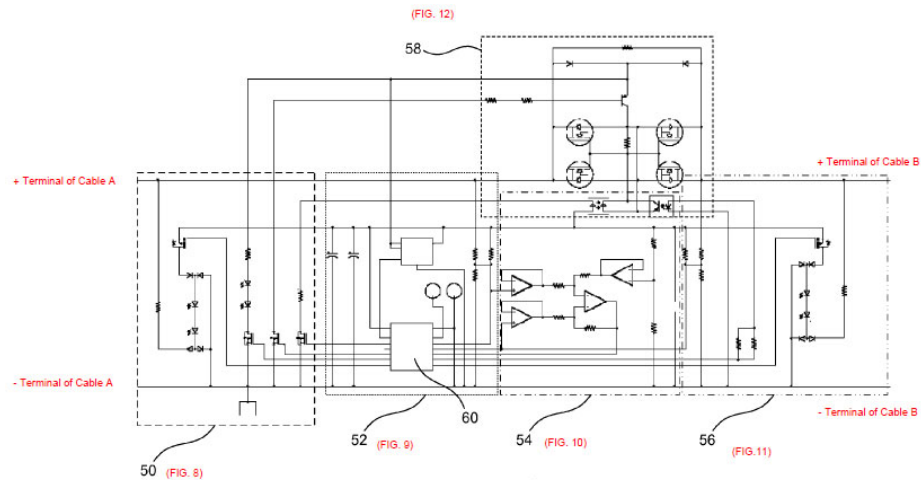


FIG. 7

Example of Safety Circuit 18 in FIG. 2

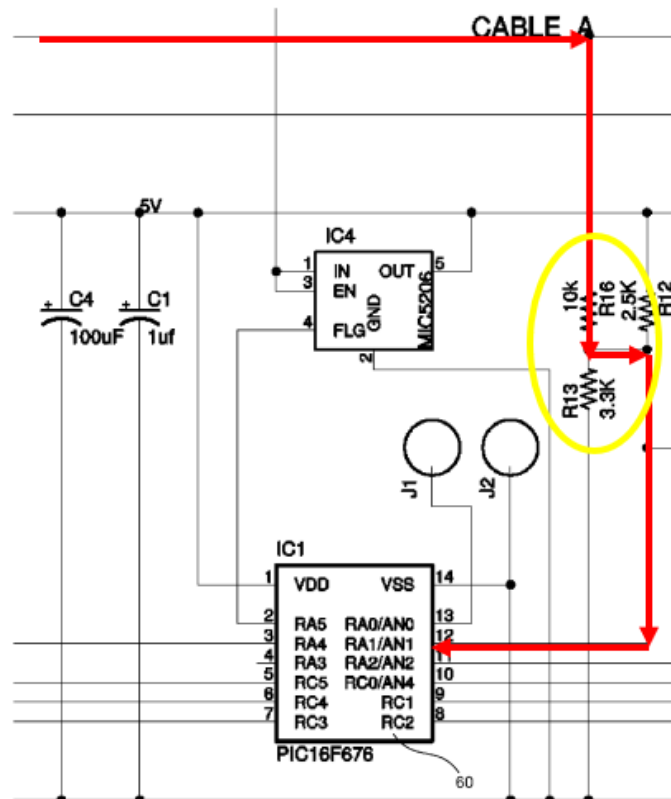


FIG. 9

Baxter's flowcharts describe the operation of the above microcontroller-controlled safety circuit 18, and specifically, how the voltage measurement operation on the supply side battery is used to determine whether to close the

switch. Baxter [0059]; Ricketts ¶230. Fig. 13 shows the process implemented by microcontroller IC1 shown in Figs. 7 and 9, and is generally illustrative of embodiments of the invention. Baxter [0060]-[0063], [0059], Ricketts ¶¶231-33.

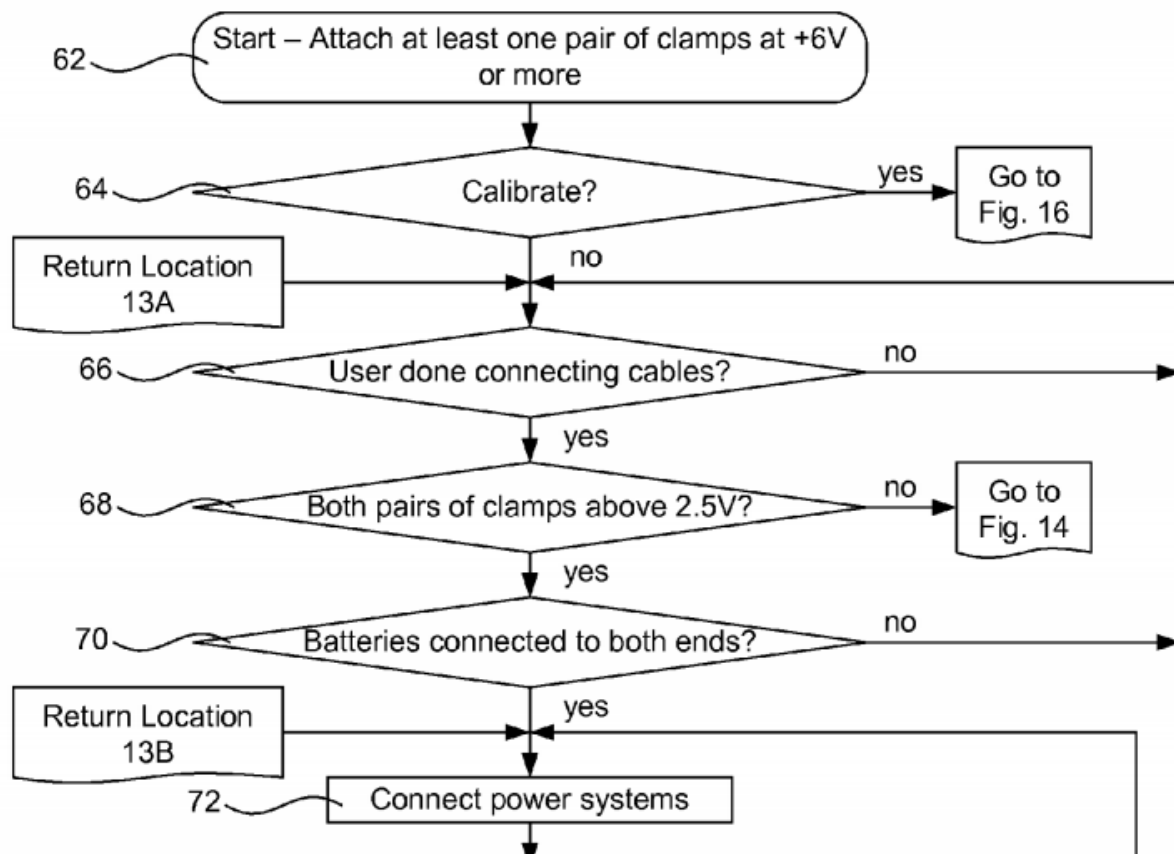


Figure 37: excerpt of Baxter Fig. 13

Fig. 13 is drafted with the assumption that the safety circuit is implemented in a jumper cable such as shown in Fig. 1, Baxter expressly discloses that the safety circuit can be implemented in a booster box or integrated with a battery. Baxter [0049], [0077]; Ricketts ¶234.

The flowchart process begins at step 62 and ends at step 72 where both power systems are connected. Baxter [0062]. When the safety circuit 18 is in a booster box or battery, execution of step 72 would connect power to the output of the booster box or battery. Ricketts ¶235.

Step 72 is not reached unless tests at steps 62, 64, 66, 68, and 70 are satisfied. Step 62 requires that one battery is greater than 6V, which is necessary for the microcontroller to be powered via voltage regulator IC4. Ricketts ¶236. The battery connected to terminal 20 will supply current to the voltage regulator and microprocessor, and in the booster box embodiment, this would be the internal battery. *Id.* Step 68 requires that the voltage of the batteries connected to the clamps 10, 12 are each greater than 2.5 volts. The booster box internal has already been checked at step 62 (Ricketts ¶236 n.10), thus step 68 checks that the dead battery connected to the booster box is also greater than 2.5V. Baxter [0062]. A POSITA would understand that when the safety circuit is implemented in booster box (as expressly contemplated by Baxter), that control cannot pass from Step 68 to Step 70 (and thus would never reach switch closure in step 72) unless the internal battery is greater than at least a predetermined voltage (2.5 volts), or more appropriately a predetermined value of 6V, as discussed above. Ricketts ¶236.

c. Claim 1[b]

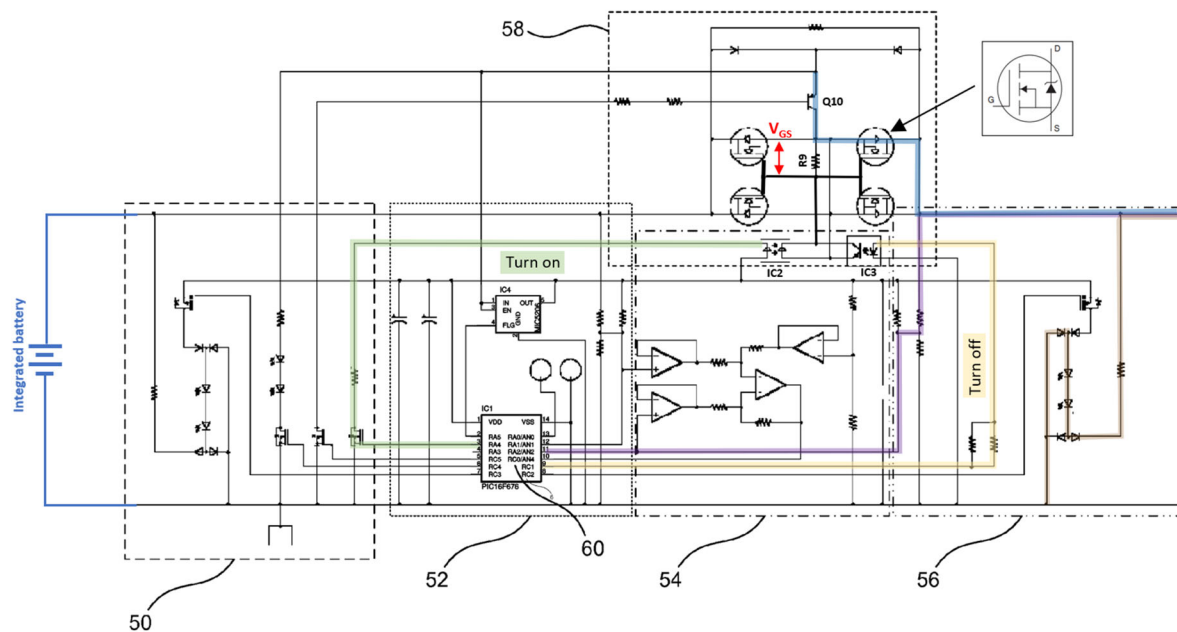
- (i) Baxter discloses a load detector in various implementations so switch closure occurs only when no unsafe conditions are detected. Baxter [0008], [0029], [0032], [0033], [0038]; Ricketts ¶¶238-239. Baxter Fig. 2, [0044], [0045]; Ricketts ¶240 Current sensing for load detection**

Figs. 5, 6 and corresponding specification [0056]-[0057] describe load detection circuitry for the safety switch 18. Fig. 5 discloses a single current sensor detects connection and polarity by detecting change in voltage (an increase in voltage), where the change in voltage is greater than a threshold, to detect a battery connected with correct polarity. Baxter [0056]; Ricketts ¶242; Baxter [0055] (describing same operation with respect to Fig. 4”) The measured voltage would not increase past the required threshold when a battery is not connected or connected with reverse polarity. Ricketts ¶242.

Fig. 6 discloses a sensor embodiment using a bidirectional current source. Baxter [0057]. The bi-directional current can detect and discern between disconnected battery, properly connected battery and a reverse connected battery conditions. Ricketts ¶243.

- (ii) Further detailed disclosure of load detection**

Fig. 7 discloses three load detectors: 1) a voltage divider 2) an LED indicator, and 3) the a current stimulus discussed above. These three load detectors are highlighted in purple and brown in Fig. 7 below. Ricketts ¶244.



(a) Voltage divider load detector

The voltage divider is annotated in purple in Fig. 7 above and consists of resistors R15, R14 and is connected to the microcontroller at pin 11. Figs. 9, 11 illustrate Fig. 7 in more detail. The voltage divider provides a voltage proportional to the battery voltage to the microprocessor, and due to limitations of the microcontroller, can only measure positive voltages. Ricketts ¶245.

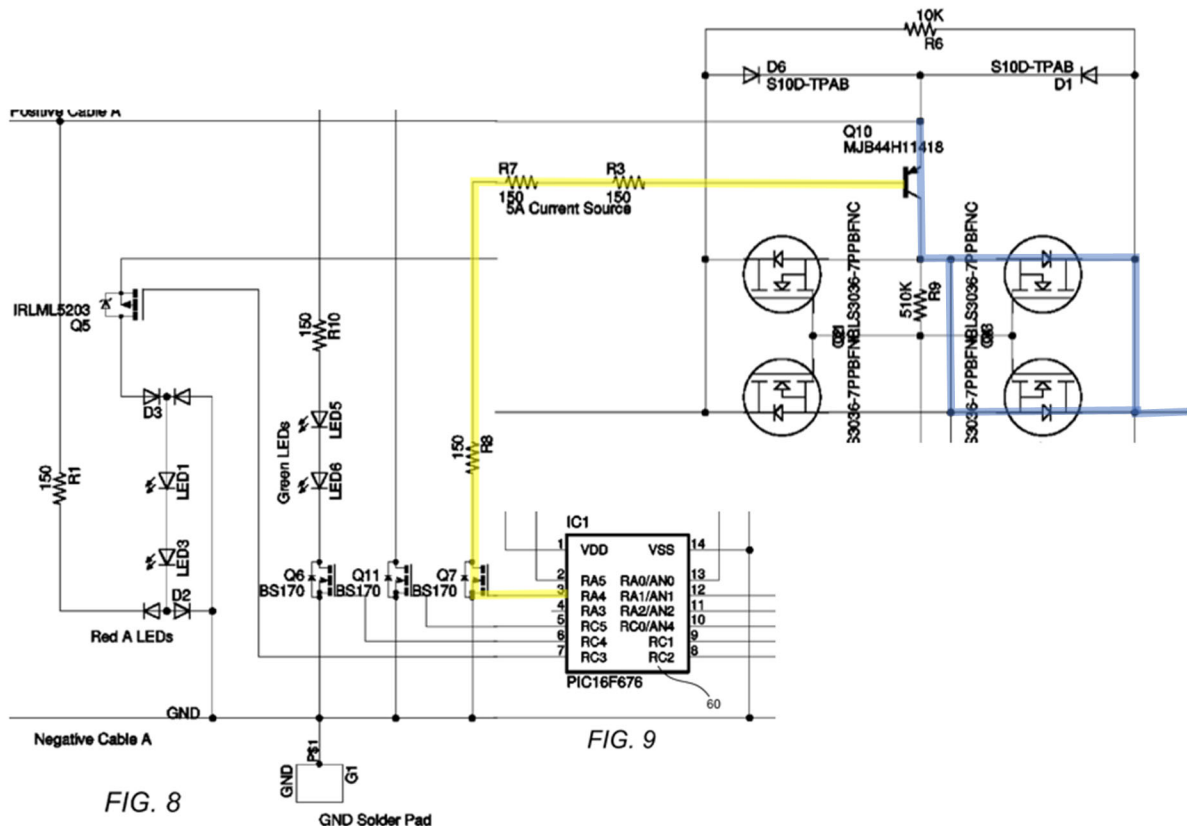
(b) LED load detector

The LED load detector is annotated in brown in annotated Fig. 7 above and consists of diodes D6, LED 1 & 2, an unmarked diode and resistor R2. LEDs 1 & 2 light up when the Positive cable B is more negative than Negative Cable B, which occurs when connection B is connected with reverse polarity. Baxter [0045],

[0051]; Ricketts ¶246.

(c) Current stimulus load detector

Fig. 8 (which is a detailed view of Fig. 7) discloses a current stimulus load detector circuit, which includes bipolar junction (BJT) transistor Q 10 controlled by the microcontroller (Yellow annotation). When pin 3 of the microcontroller is made high, a current will flow through R7 and R3, causing current proportional to the current in R7 and R3 to flow through Q10 and through the body diodes of the two parallel FETs as annotated in blue. Ricketts ¶247.

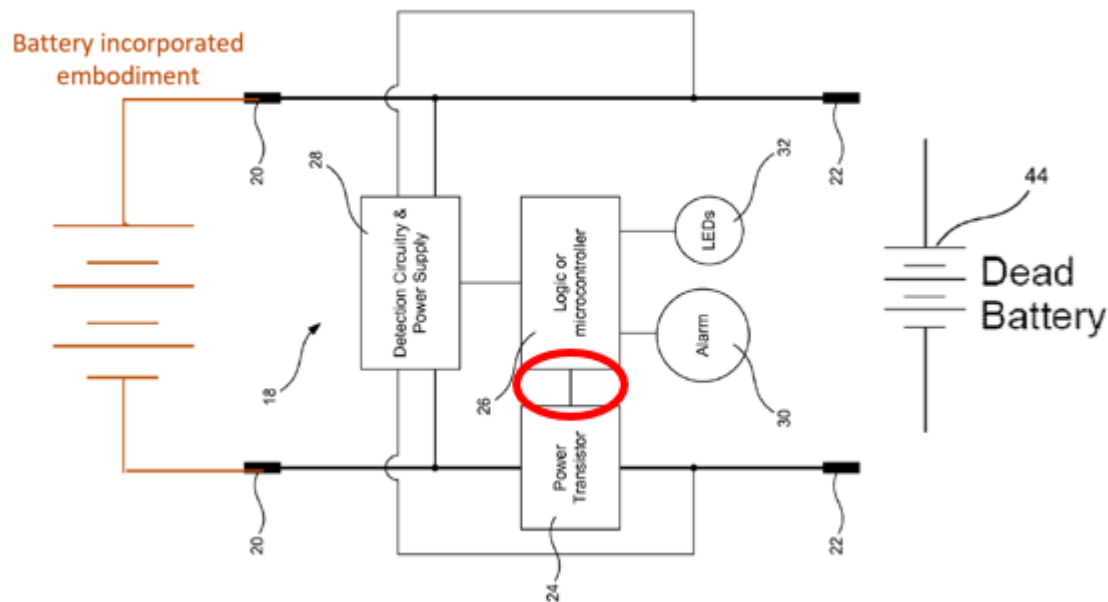


The microcontroller measures response of the output B (using the voltage divider load detection circuit) and determines the load state. *Id*. This circuit

operates similarly to the circuit described in Fig. 5 and the accompanying specification text referenced above. Ricketts ¶247. The circuit may detect proper polarity. Baxter [0031], [0055]; Ricketts ¶248. The circuit may detect whether a connection is made. Baxter [0056]; Ricketts ¶249.

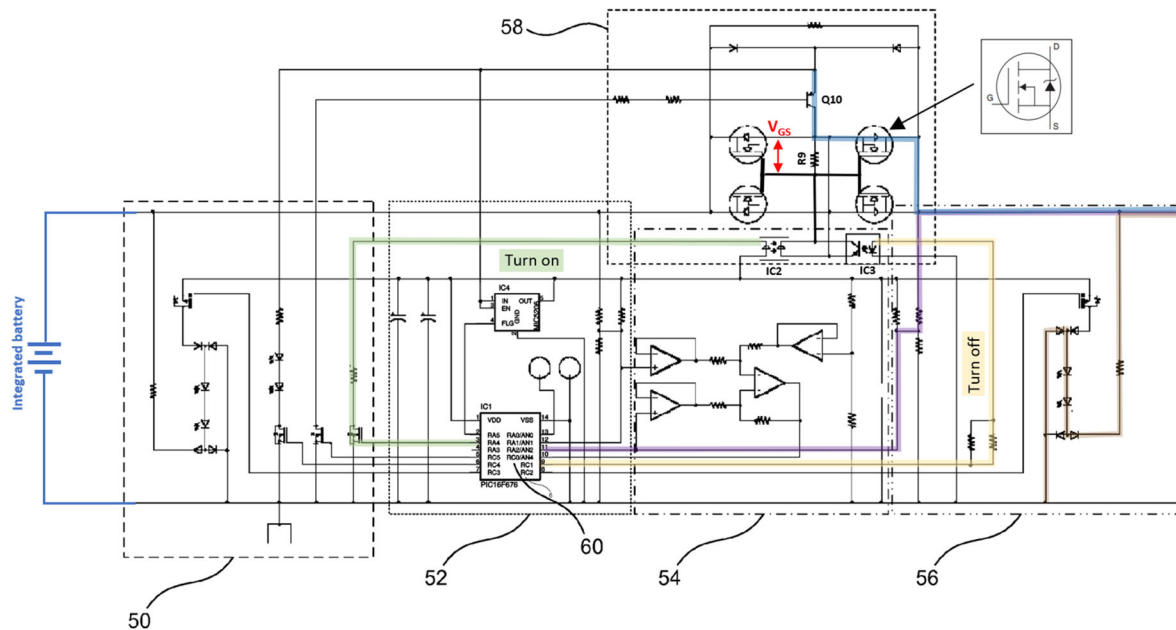
d. Claim 1[c]

Fig. 2 (annotated) shows the output signal from microcontroller 26 to power transistor 24. Ricketts ¶251.



Baxter explains the operation of the power transistor 24 under control of microcontroller 26. Baxter [0044], [0046],[0048]; Ricketts ¶252.

Figs. 7, 12 (annotated below) disclose a series-parallel transistor MOSFET switch for high current switching, controlled by a microcontroller IC1. ; Ricketts ¶253.



The FET switch, comprising 4 n-channel FET transistors in a series-parallel arrangement, is turned on by microcontroller IC1 by making microcontroller output pin 3³ HIGH (5V), (green annotation for path from output pin 3 to optocoupler IC2), turns on transistor Q7, which conducts the current through the photocoupler, IC2, generating a voltage across its output and causes V_{GS} to be

placed in a HIGH state sufficient to turn on the FET switches. Baxter [0062]; Ricketts ¶¶256-57.

To turn off the FET switch, microcontroller output pin 9 is made HIGH (yellow annotation for path from output pin 9 to optocoupler IC3) and the optocoupler IC3 turns on, shorting the voltage across the gate-to-source to zero ($V_{GS}=0$) which turns off the FET switches. Ricketts ¶258; Baxter [0071] (disclosing operation of output pin 9 to cause a “power connect system reset”).

Baxter discloses the at least one microcontroller generating, when the battery has said at least one predetermined voltage, an output signal.

Limitation 1[a]’s analysis explains that switch 24 in Fig. 2 is turned on when there are no unsafe conditions at either the input or output of the safety switch, which includes checking for a failed battery connected to either the input or output. Ricketts ¶260.

Limitation 1[a]’s analysis in § VI.A.1.b also explains that in the embodiment in Figs. 7-12, the power switch (the series-parallel transistors in Fig. 7, also power transistor 24 in Fig. 2) is turned on (at step 72 of Fig. 13) when the voltage at the input (wires labeled Positive Cable A, Negative Cable A in Fig. 8, also input terminals 20 in Fig. 2) of the safety circuit 18 is at least 2.5 volts (a test performed in Fig. 13, reference 68). Ricketts ¶261.

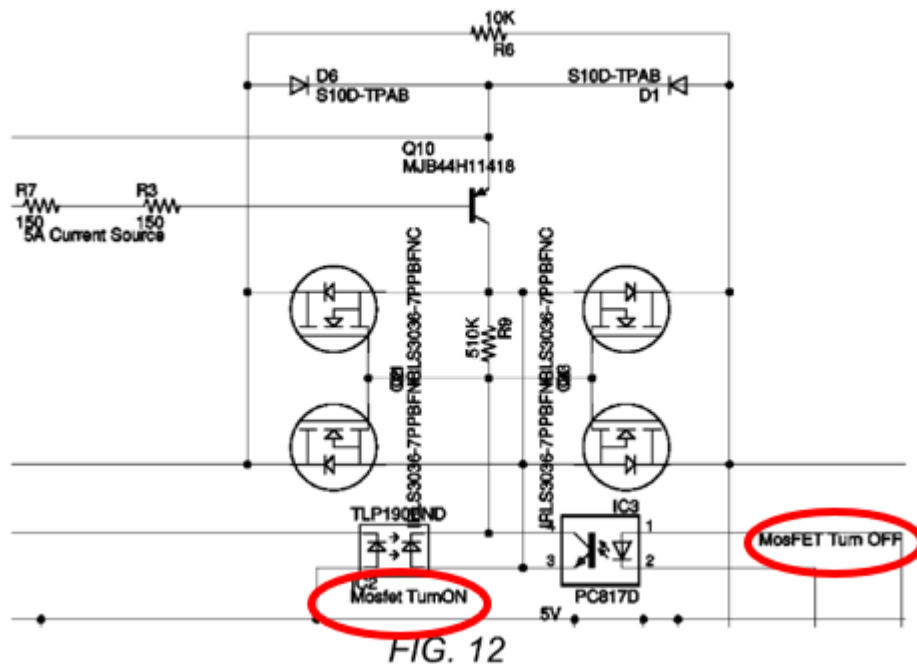
If it is argued that “when” in the limitation of “said at least one microcontroller generating, when the battery has said at least one predetermined voltage, an output signal” requires that “battery has said at least one predetermined voltage, an output signal” is a requirement of one or more requirements to be satisfied for switch closure, this limitation is disclosed. Ricketts ¶262.

Alternatively, if it is argued that “when” in the limitation “at least one microcontroller generating, when the battery has said at least one predetermined voltage, an output signal” requires that the output signal generates the output signal when the battery has said at least one predetermined voltage (and requires no other tests to be satisfied), that is a difference between the Baxter and the claim. A POSITA would know how to modify a microcontroller flowchart to test conditions before closing a switch. It would be obvious to modify Baxter by eliminating all tests before step 72 except for checking the battery voltage in step 62. Ricketts ¶263. Such a modification would require no more than routine experimentation, with predictable results. This modification would protect the booster box battery by ensuring it has a minimum voltage before connecting to a depleted battery (which protects the internal battery). Ricketts ¶263 This would allow the device to be used in more circumstances, such as when a load detection circuit is malfunctioning. *Id.* Moreover, Baxter itself contemplates modifying/simplifying

the flowcharts, including Fig. 13, for example, when the input battery is integrated or included in a booster box. Baxter [0084]; Ricketts ¶263.

e. Claim 1[d]

In the analysis for limitations 1[b] and 1[c], Baxter's output signal, switching circuitry (power transistor 24 in Fig 2 and series-parallel transistor switch shown in Figs. 7 and 12), and connections from the microcontroller output signal to the switching circuitry were described. Ricketts ¶265. The switch connects the battery to the automobile battery, as explained in the analysis for limitation 1[a]. Fig. 12 is highlighted below to show the microprocessor output signals to turn the switch on and off. *Id.*

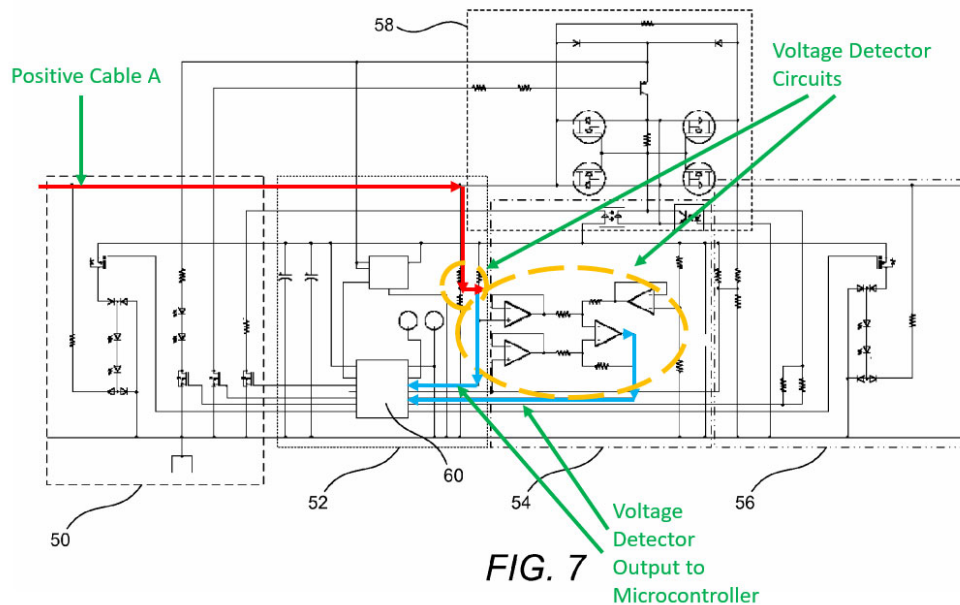


Baxter also contains numerous additional disclosures of the transistor switching circuitry and connections between a first voltage system -- the battery at

the input (the battery in the booster box) and a second voltage system -- the battery at the output (automobile battery). Baxter [0010], [0028], [0036],[0046], [0048], [0056]; Ricketts ¶266. Therefore, Claim 1[d] is disclosed or rendered obvious.

2. Claim 2

Limitation 1[a]'s analysis explains, Figures 7-9 of Baxter (annotated below) disclose a battery detector comprising R13 and R16 which outputs to microprocessor pin 12. Ricketts ¶¶268-69.



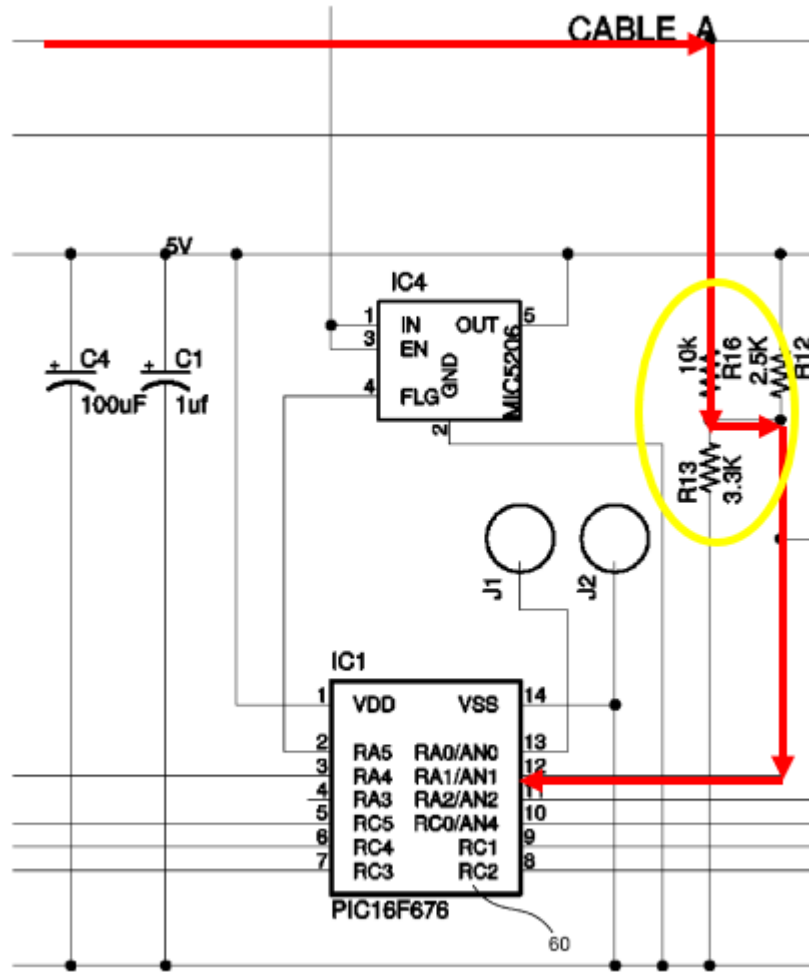
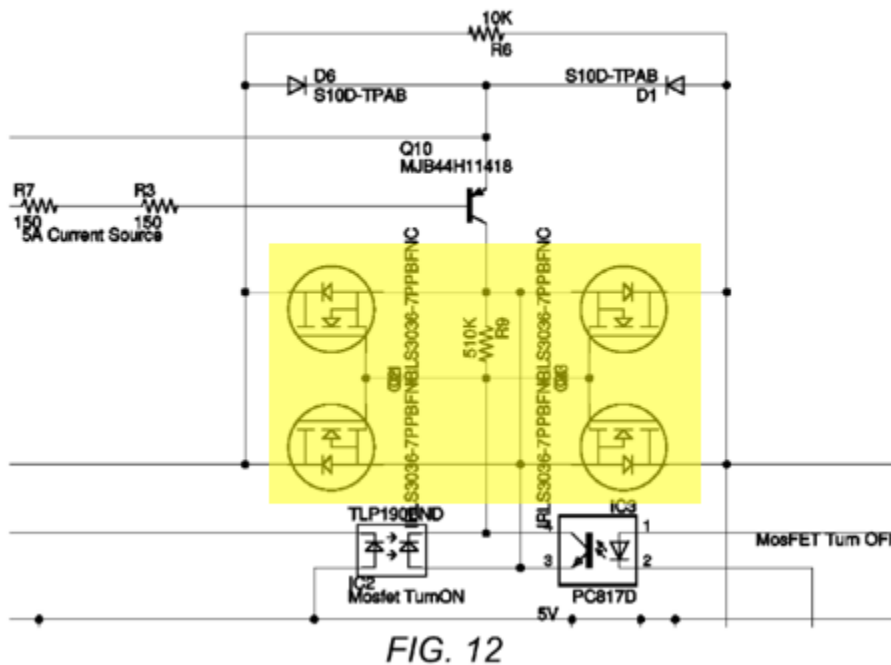


FIG. 9

Limitation 1[a]'s analysis explains that microcontroller processing shown in Fig. 13 only reaches switch closure in step 72 when the internal battery is at least 2.5 volts. Baxter [0060], [0062]. Ricketts ¶¶270-74.

3. Claim 3

The limitation 1[c] and 1[d] analysis shows in Fig. 12 that the switch (highlighted) is a series-parallel arrangement of MOSFET transistors. Ricketts ¶275.



7. Claim 7

The Limitation 1[c] and 1[d] analysis shows the switch of Fig. 12 contains a plurality of MOSFET transistors connected in parallel, as part of the series-parallel arrangement. Ricketts ¶280.

8. Claim 8

Claim 8 refers to “a” load detector without referring back to the claimed “load detector” in Claim 1[b]. Thus, Claim 8 may be a) claiming a second load detector -- separate and in addition to the load detector recited in limitation 1[b] or b) adding a further limitation that limitation 1[b]’s load detector is also capable of detecting reverse polarity connections. Ricketts ¶281.

If it is the former, the R15/R14 resistor divider identified in limitation 1[b]’s analysis can detect a correct connection, and the current stimulus circuit identified in limitation 1[b]’s analysis can detect reverse polarity connections. Ricketts ¶282.

If it is the latter, the Baxter discloses a current sensing circuit described in Fig. 6 and [0057], discussed further in limitation 1[b]’s analysis, that detects a properly connected battery, and a reverse polarity condition, with a single sensor. Ricketts ¶¶283-84.

9. Claim 9

The “standby mode” of the microcontroller in Claim 9 is disclosed or rendered obvious.

A POSITA would understand the term “outputs” in Claim 9 to mean a positive electrical output conduit and a negative electrical output conduit that are connected to the automobile battery to output to the automobile battery the electrical power that is supplied by the recited “battery capable of supplying power” in Claim 9 (limitation 1[a]). Ricketts ¶285.

A POSITA would understand “close” in “all outputs are closed” in Claim 9 to mean “shut off” or “cut off” the “outputs” so there can be no electrical power to flow through the outputs to the automobile battery. Ricketts ¶¶286-88.

As described in the limitation 1[b] analysis, Baxter discloses that switch 24 of safety circuitry 18 will remain off to shut off or cut off the electrical connection between the battery powered low-voltage systems when unsafe conditions are present, or until it is safe to connect the two battery powered low-voltage systems using the switch of the safety circuit 18. Baxter [0008], [0010], [0026], [0028]-[0029], [0032]-[0034], [0038]; Ricketts ¶289.

Limitation 1[a]’s explains that Fig. 13’s flowchart does not reach step 72 (where the switch is turned on), until other conditions in Steps 62-70 are satisfied. A POSITA would understand any of Steps 62-70, alone or in combination, as a standby mode where the safety circuit 18 is waiting for conditions to be satisfied before turning on the switch. Ricketts ¶290. Prior to step 72, the switch is off and the outputs from one system to another are closed. *Id.*

10. Claim 10

Limitation 1[a]’s analysis shows a 6v voltage test in Fig. 13 step 62 and 2.5v voltage test in step 68. Therefore, an internal battery voltage of 10v would not inhibit switch closure by causing these tests to fail. Ricketts ¶291.

If “when” in the limitation “the jumpstarter is not in a standby mode when the battery has more than 10 volts” in Claim 10 requires that the switch is on and connecting power to the output of the booster box when the battery has more than 10 volts (and requires no other tests to be satisfied), that is a difference between the Baxter and the claim. A POSITA would understand how to modify microcontroller flowcharts to test conditions as a precursor to switch closure. It would be obvious to modify Baxter to only test for this single condition, for example, by eliminating other tests before step 72 other than checking the battery voltage of the battery inside the booster box. Ricketts ¶292. Such a modification would require no more than routine experimentation, with predictable results. *Id.* This modification would allow the device to provide power to the output in more situations, such as when a load detection sensor is malfunctioning. *Id.* Moreover, Baxter itself contemplates modifying or simplifying the its flowcharts when the battery is integrated or included in a booster box. Baxter [0084], Ricketts ¶292.

11. Claim 11

As explained above, “start control module” should be construed as “electronic switch.” Switch 12 will stop supplying power to the load (depleted battery 11) when it is turned off (i.e. placed in a non-conducting state).

Limitation’s 1[b] analysis explains that Baxter step 66 Fig. 13 prevents switch closure when a load of 2.5v or more is not connected (Baxter [0062]; Ricketts ¶293), and step 78 Fig. 13 causes the switch to turn off when less than 10A to a load, which would happen when cables are disconnected (Baxter [0052][0063], Ricketts ¶295).

12. Claim 12

Fig. 2 discloses a power transistor switch 24 on the negative line between the input terminals 20 and output terminals 22, as shown in the analysis of power connections of Fig. 2 in connection with limitation 1[a]. Ricketts ¶296.

Baxter expressly contemplates using power transistor switches 24 in either positive or negative cables, or both. Baxter [0047]; Ricketts ¶155, ¶297.

13. Claim 13

The claim refers to the jumpstarter’s ability to apply current to the depleted automobile battery. Ricketts ¶298; ’971 Patent 1:21-23 (describing an “automobile charger” that has a function of “charging quickly” the automobile.); 6:14-15

(providing a “charging current to the automobile battery”). A POSITA would understand that charging quickly is providing a high current. Ricketts ¶298.

Claim 1[pre] explains that Baxter discloses a safety switch in a booster box for jumpstarting automobiles. Baxter’s power switch 24 comprises “high current transistors” to connect the two low-power systems (e.g. a booster box and automobile) to provide power. Baxter [0010], [0028]; Ricketts ¶299. The three switching transistors in ’971 Patent Fig. 2 have 75A maximum current. Ex. 1018 p.4, Ricketts ¶300. Similarly, Baxter Fig. 12 discloses The two transistors in Baxter’s Fig. 12 switch each have 240A maximum current. Ex. 1019 p.1, Ricketts ¶300. The power deliverable through Baxter’s booster box safety circuit is comparable to the ‘971 jumpstarter, so this claim is disclosed. Ricketts ¶¶300-01.

14. Claim 14

Claim 11’s analysis explains that the Fig. 13 step 78 test causes the switch to turn off in step 80 when less than 10A is flowing to output (e.g., to the load). A POSITA would understand that this functionality prevents current backflow, because the negative measured current would fail the test. Ricketts ¶302. Baxter also discloses turning off the switch after vehicle start, a situation when voltage back-flow could occur. Baxter [0052], Ricketts ¶303.

15. Claim 15

The '971 Patent uses “abnormal” twice, referring to the recharging voltage generated by an automobile after a vehicle start: a) 2:45-47 and b) 4:46-53.

Ricketts ¶304. A POSITA would understand from this disclosure that an abnormal load is a load that generates an abnormal voltage. Ricketts ¶305. Claim 13’s analysis explains two disclosures to prevent voltage backflow in this abnormal load situation. *Id.*

16. Claim 16

The '971 patent refers to voltage of the battery as the state of whether it is suitable to supply power to the automobile. 2:23-27; Ricketts ¶306.

Limitation 1[a]’s analysis explains that Fig. 13’s flowchart takes into account several conditions to determine whether the switch should be turned on, including voltage of the battery and safety circuit connection. Ricketts ¶307.

After the switch is on, Fig. 13, at step 76 continues to determine whether the booster box supply battery is capable of supplying sufficient power. Baxter [0063]; Ricketts ¶308. If a brown-out condition (a supply side under voltage) occurs, the switch is turned off. Baxter [0071], Fig. 15 (step 108); Ricketts ¶309.

17. Claim 17

a. Claim 17[Pre]

This limitation is identical to limitation 1[pre], so limitation 1[pre]’s analysis applies. §VI.A.1.a.

b. Claim 17[a]

Limitation 1[a]’s analysis explains in Baxter, Fig. 2 and Fig. 7-12 show the first battery is connected to a voltage regulator, which in turn supplies power to the microcontroller, and also discloses how the first battery can supply power to an automobile battery when the first battery has a predetermined voltage. Ricketts ¶311.

c. Claim 17[b]

Limitation 1[a] and Claim 2’s analysis explain Baxter’s disclosed voltage detection circuit and its use to detect a voltage level of the first battery (the battery inside the booster box of Baxter). Ricketts ¶312.

d. Claim 17[c]

Limitation 1[b]’s analysis describes the load detectors in Baxter and the ability of each load detector to detect a type of connection to a load, for example, proper or reverse connections. Ricketts ¶313.

e. Claim 17[d]

Limitations 1[a] and 1[c]’s analysis identifies the microcontroller and explains switch closure can only occur when the first battery has a minimum voltage (e.g. 2.5 volts). Ricketts ¶314.

f. Claim 17[e]

Limitation 1[c] and 1[d]’s analysis explains Baxter’s microcontroller-controlled switch 60 and its output signals that control whether the transistor

switch 24 in Figs. 2 and 12 of Baxter is on or off. When the transistor switches are turned on, the booster box supplies a charging current to the connected automobile battery. Ricketts ¶315.

18. Claim 18

a. Claim 18[Pre]

This limitation is identical to limitation 1[pre], so limitation 1[pre]’s analysis applies. §VI.A.1.a.

b. Claim 18[a]

As described in limitation 1[a], Baxter Fig. 2 discloses output terminals 22 on safety circuit 18. Baxter [0044], Fig. 18, [0078] (positive and negative terminals when safety circuit integrated with a battery, such a booster box); Ricketts ¶318.

c. Claim 18[b]

As explained in Limitation 1[a]’s analysis, the connections in Baxter Figs. 2, 7-12 show the internal power supply connected to a voltage regulator, which supplies power to the microcontroller. The internal power supply can also supply power to an automobile battery through an output port when the battery in the booster box has at least one predetermined voltage. Ricketts ¶319.

d. Claim 18[c]

Limitation 1[b]’s analysis describes the load detectors in Baxter and how the detectors can detect the presence of a vehicle battery connected to the outputs.

§VI.A.1.c.

Fig. 11 of Baxter (annotated below) shows a resistor divider comprising resistors R14 and R15 connected to outputs coupled to positive cable B and negative cable B, which detect the presence of a vehicle battery as shown in Fig.

13.Ricketts ¶321.

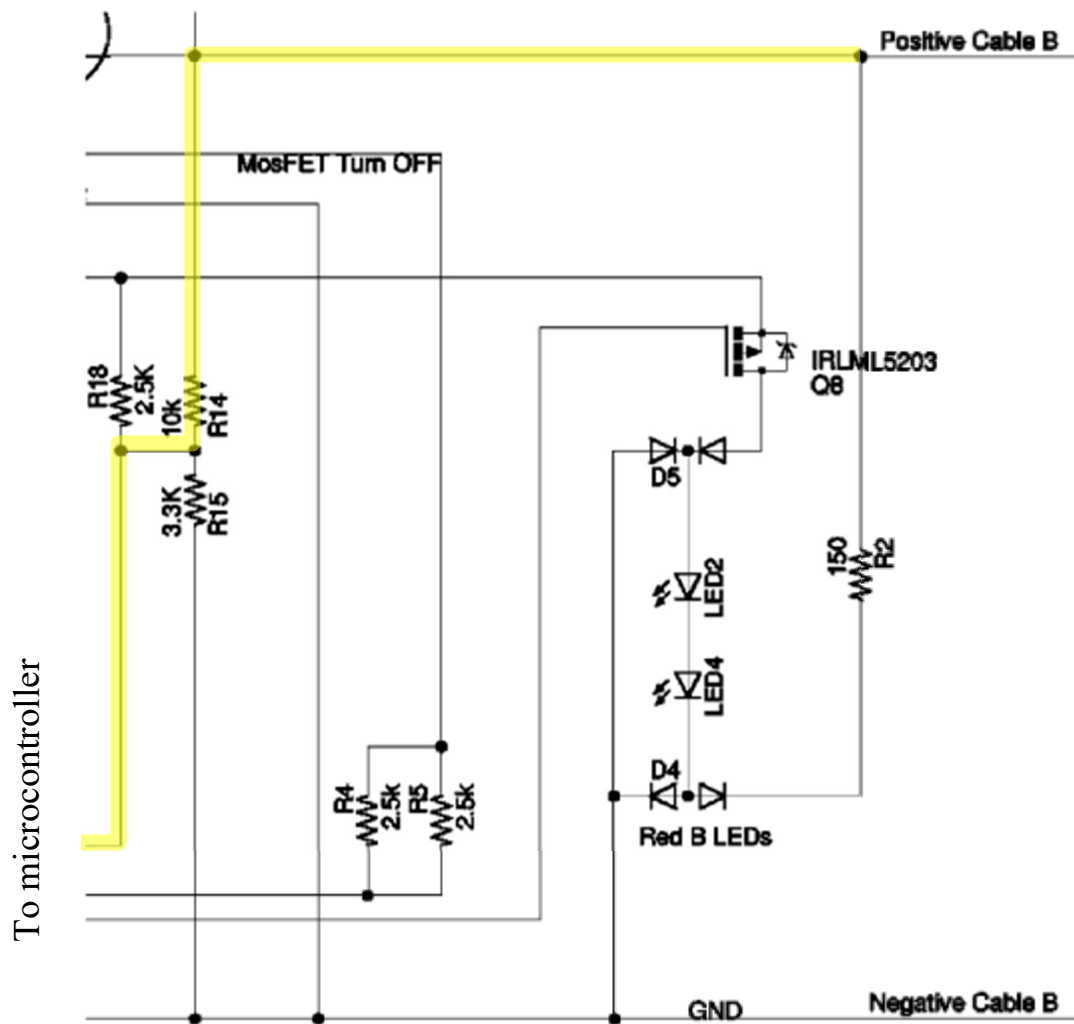


Fig. 13 shows the microcontroller using this voltage measurement, such that the voltage at the output of the connected automobile battery must be least 2.5 volts (test in step 68) in order to close the switch at step 72. Ricketts ¶322. This test would fail if a battery was not connected. *Id.*

e. Claim 18[d]

Limitation 1[b]'s analysis describes additional load detectors in Baxter and how these detectors reverse polarity connection of a vehicle battery to the outputs.

Figs. 7-12 discloses a current stimulus load detector, which can detect a reverse polarity connection as described in Baxter [0055]. Baxter [0056], [0057] describe load detection circuits which also detect reverse polarity battery connection. Ricketts ¶¶323-24.

f. Claim 18[e]

Limitation 1[c] and 1[d]’s analysis explains the power switch and its connections. Ricketts ¶325.

g. Claim 18[f]

Limitation 1[a] and 1[b]’s analysis describes how the switch will not close unless the batteries are connected with proper polarity at the safety switch’s input and output terminals. Limitation 1[c]’s analysis explains how the microcontroller generates of an output signal to cause the switch to turn on when an automobile battery is connected with proper polarity. Ricketts ¶¶326-27.

19. Claim 19

This claim is nearly identical to Claim 2, except that Claim 2 refers to a “battery” of the jumpstarter instead of an “internal power supply” of the jumpstarter in Claim 19. The claimed “battery” in claim 2 is an example of a jumpstarter’s internal power supply. Claim 2 also refers to “battery voltage detector circuit” instead of “voltage detector circuit” and “battery voltage of the battery” instead of “voltage of the internal power supply.” Both of these

differences are related to using “internal power supply” in Claim 18 instead of “battery” in Claim 2. Thus, Claim 2’s analysis applies. Ricketts ¶329. §VI.A.2.

20. Claim 20

This claim is nearly identical to Claim 6, with the exception of the language used to refer to the “plurality of power switches” (in Claim 6, it is referred to as “plurality of switches”). Thus, Claim 6’s analysis applies. §VI.A.6.

21. Claim 21

Limitation 1[b]’s analysis, included a discussion of a sensor in Fig. 5 and 6 and paragraph [0056] -[0057] of Baxter that detects a load and reverse polarity condition using the same sensor. Ricketts ¶331.

22. Claim 22

The sensor identified in Claim 21’s analysis detects a change in voltage after applying a small test current. Ricketts ¶332.

23. Claim 23

This claim is nearly identical to Claim 12, but Claim 12 refers to the power switch as “the at least one switch”. Thus, Claim 12’s analysis applies. §VI.A.12.

24. Claim 24

This claim is nearly identical to Claim 9, but claim 9 refers to the microcontroller as “said at least ono [sic] microcontroller.” Thus, Claim 9’s analysis applies. §VI.A.9.

25. Claim 25

This claim is nearly identical to Claim 10, but claim 10 refers to a “battery” of the jumpstarter instead of an “internal power supply”. The claimed “battery” in claim 10 is an example of a jumpstarter’s internal power supply. Ricketts ¶335. Thus, Claim 10’s analysis applies. §VI.A.10.

26. Claim 26

This claim is nearly identical to Claim 11, but Claim 26 uses “prevent” instead of “stop”. Thus, Claim 11’s analysis applies. §VI.A.11.

27. Claim 27

This claim is identical to Claim 23. Thus, Claim 23’s analysis applies. §VI.A.23.

28. Claim 28

This claim is identical to Claim 13. Thus, Claim 13’s analysis applies. §VI.A.13.

29. Claim 29

This claim is identical to Claim 14. Thus, Claim 14’s analysis applies. §VI.A.14.

30. Claim 30

This claim is nearly identical to Claim 16, Claim 16 refers to the microcontroller as “said at least one microcontroller.” Thus, Claim 16’s analysis applies. §VI.A.16.

B. GROUND 2: Claim 10 is unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter and Zhang

Zhang was filed on May 23, 2012 and published on January 23, 2013. Zhang is thus prior art. Ricketts ¶168. Zhang is analogous prior art, because it discloses a jumpstarter with microprocessor-controlled contactor (switch) that connects the internal battery to the output. Abstract, ¶¶0001-0003, ¶¶0050-0052, Figs. 1-5, Ricketts ¶¶168-71, ¶344. When Zhang’s internal battery voltage is less than 10 volts, it “has been discharged and should not be used again” until it is recharged, and the output is turned off by turning off the contactor. ¶0046, Ricketts ¶172. Zhang literally discloses Claim 10’s requirements. *Id.*, Ricketts ¶¶343-44.

As described in § VI.A.10, when Baxter’s internal battery has more than 10 volts, battery voltage tests at steps 62 and 68 of Fig. 13 will not inhibit switch closure. Ricketts ¶342. If it is argued that this limitation is not met because the threshold is not set at exactly 10 volts, that is a difference between Baxter and the claim. A POSITA would be aware of numerous jumpstarter products with different threshold voltages, and thus, would know that this value is a merely a design choice that can be easily implemented as a simple parameter change in a microcontroller with predictable results. Modifying Baxter to use a 10 volt minimum battery voltage at Fig. 13 steps 62 and 68, obvious to try as a value selected from a finite set of low voltages in a 12-volt system, or using a known technique to apply to a similar device with similar results. Ricketts ¶345.

C. GROUND 3: Claims 14, 15, and 29 are unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter and Tracey

Tracey was filed on December 14, 2011 and published on June 21, 2012, and is this prior art. Ricketts ¶173. Tracey is analogous art, disclosing a jumpstarter that addresses the same problems of protecting the internal battery from improper connections to an automobile battery, and other conditions which may damage the internal battery. *Id.*; Tracey1:7; 6:28-29. The jumpstarter includes a circuit 125 to prevent current backflow from the vehicle battery to the internal battery. Tracey Fig. 10, 6:18-19, 7:22-28; Ricketts ¶¶174-75, ¶¶347-48.

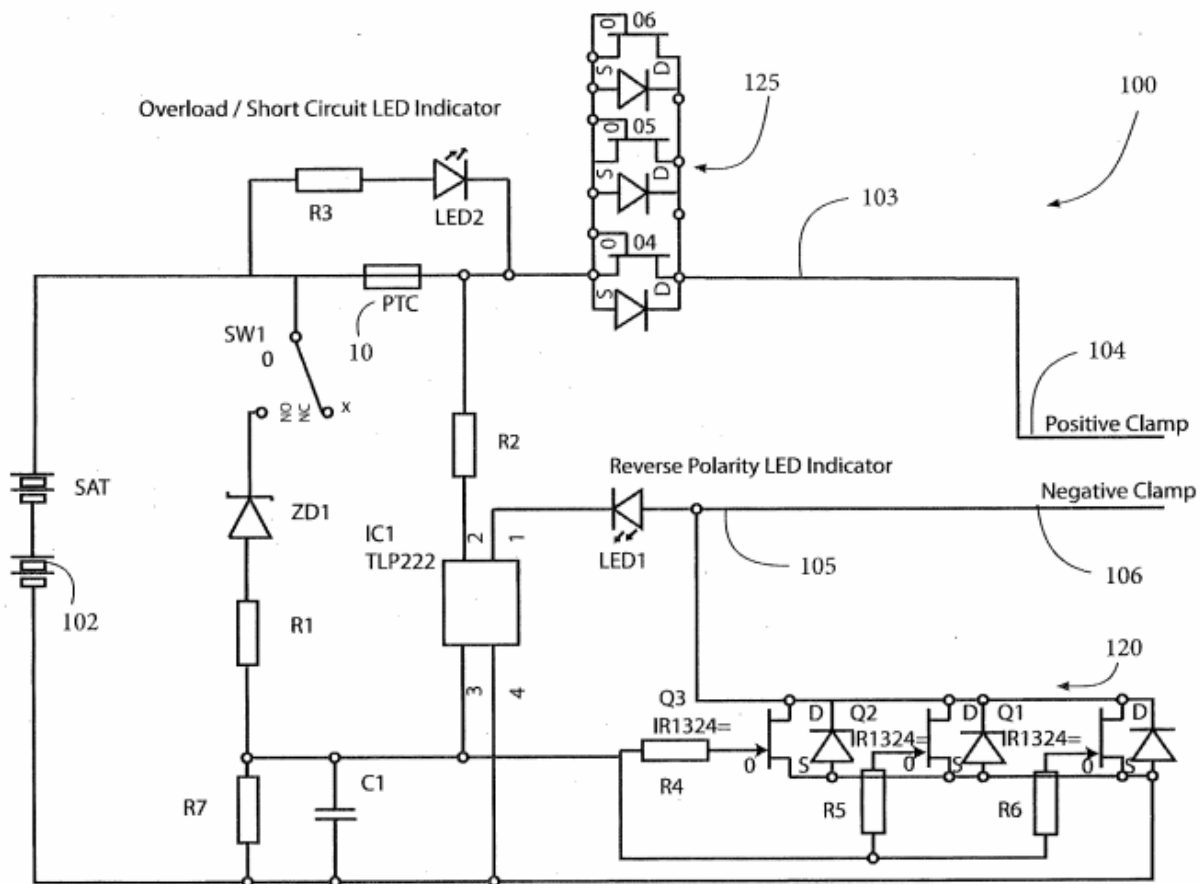


Fig.10

1. Claims 14 and 29

Tracey discloses circuitry for voltage backflow protection, discussed *supra*. In Sections VI.A.14, VI.A.29 Baxter's microcontroller-based backflow protection was described. To the extent it is argued that Baxter does not disclose voltage back-flow protection, that is a difference between the prior art and claimed subject matter. A POSITA would be aware of jumpstarter safety circuits and architectures. Modifying the positive lead on Baxter's output 22 to include the backflow protection circuit 125 as disclosed in Tracey (see amended Fig. 7 below) would require no more than routine experimentation with predictable results, without changing the operation of Baxter. Ricketts ¶348. Such a modification would simply involve applying a known circuit from Tracey to Baxter, a similar type of device ready for improvement, to yield predictable results. *Id.*

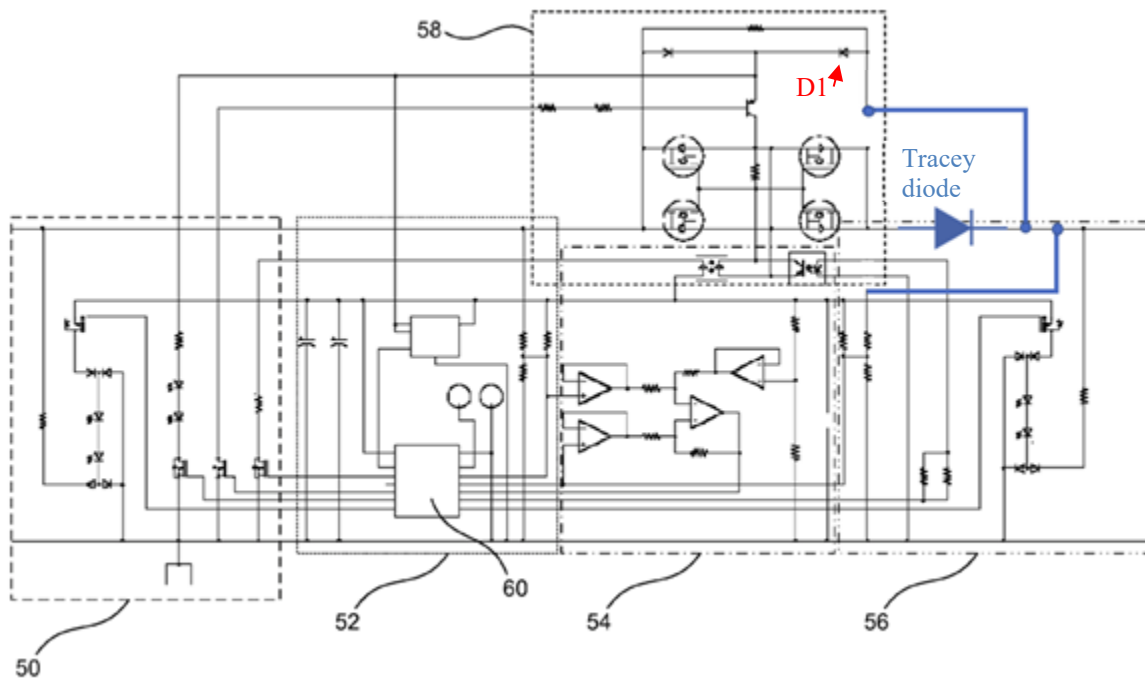


FIG. 7

A POSITA would be motivated to add passive backcharging protection from Tracey because it provides another layer of protection and avoids problems associated with microprocessor-based backcharge protection, such as software bugs. Ricketts ¶¶350-51.

2. Claim 15

§VI.A.15 explains that an abnormal load condition is when the automobile load provides a higher voltage than the jumpstarter battery after vehicle start. Ricketts ¶¶352-54. Tracey explains that its circuit 125 prevents current backflow in this situation. p. 7:26-28; Ricketts ¶352-54. It would be obvious to implement this circuit in Baxter as described in §VI.C.1 for Claims 14/29 for the same reasons.

D. GROUND 4: Claims 18-30 are unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter and Xinfang

Xinfang was filed on October 31, 2013 and published on November 19, 2016, and is thus prior art under post-AIA 35 U.S.C. § 102(a)(2). Ricketts ¶178.

Xinfang is analogous art because it is a jumpstarter with similar technical features and application. Fig. 3; 1:45-3:25, 6:4-7:3; Ricketts ¶179. Xinfang provides further technical disclosure of an ignition output port 46 of a mobile power bank 10 for jumpstarting, shown in Figs. 1-2 below:

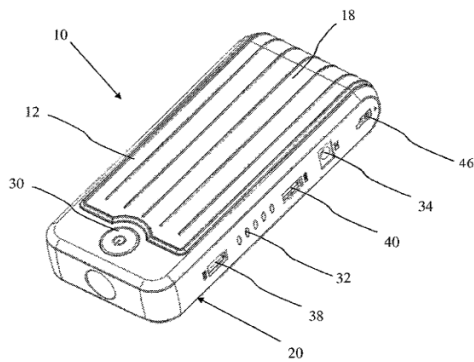


FIG. 1

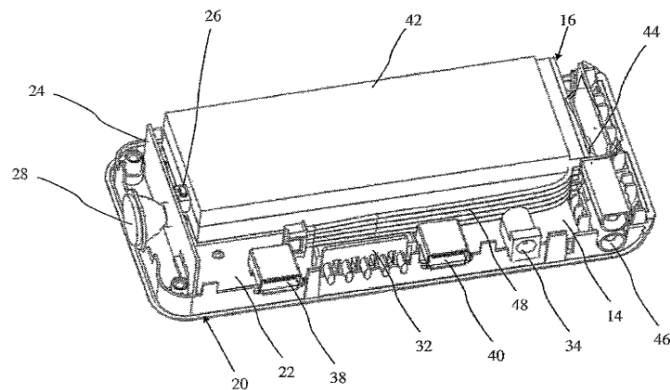


FIG. 2

Xinfang's output port provides jumpstart power, and the jumper cable assembly is connected to output port 46 and automobile battery, and thus provides express disclosure of the claimed output port. 5:28-40, 5:49-59; Ricketts ¶180, ¶359.

Claim 18 recites an output port. If it is argued that analyzed in §VI.A.18.b Baxter does not have an output port, that is a difference between the Baxter and the claim. A POSITA would be familiar with jumpstarter art and how to make

electrical connections at the periphery of an enclosure of an electronics device.

Ricketts ¶¶357-58. Modifying Baxter’s booster box to use Xinfang’s ignition output port 46 is routine experimentation with predictable results. Ricketts ¶361. A POSITA would be motivated to use Xinfang’s approach because it is more convenient for storage and allows for cable replacement. *Id.* The teaching of Baxter in Ground 1 would apply to the remaining claims and limitations. Ricketts ¶362.

E. GROUND 5: Claim 29 is unpatentable as 35 U.S.C. § 103(a) as obvious in view of Baxter, Xinfang and Tracey

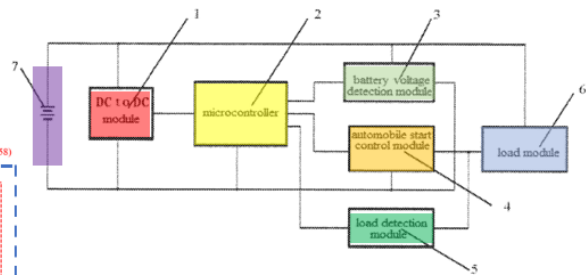
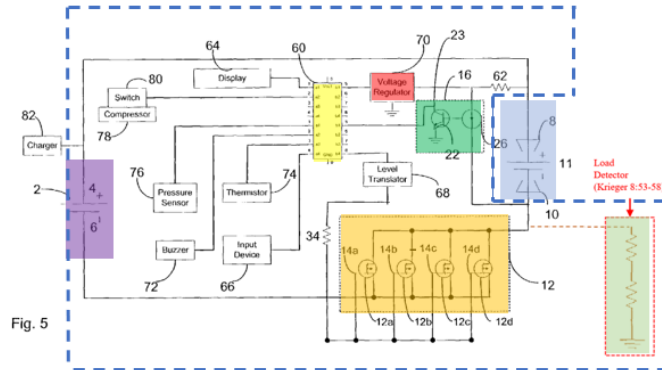
Baxter may be modified with Xinfang’s output port as explained in Ground 4. Ricketts ¶363. The combination of Baxter and Xinfang, may be further modified with Tracey’s voltage back-flow protection circuitry as explained in Ground 3. *Id.*

F. GROUND 6: Claims 1-4, 6-7, 9-13, 16-28, 30 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450

Krieger450 issued March 18, 2008 from an application filed December 10, 2002. Thus Krieger450 thus qualifies as prior art. Ricketts ¶368.

Krieger450 is analogous art. As side-by-side comparison below of Fig. 5 (supplemented with resistor divider load detector described in the specification text for Fig. 5 and annotated to show jumpstarter boundaries in blue dashed line) and

'971 Patent Fig. 1 illustrates the close overlap of technical features. Ricketts ¶¶158-67, ¶369.



The overlapping disclosure includes jumpstarter battery (purple) DC-DC converter (red), microcontroller (yellow), battery voltage detection module (light green), load detection module (dark green), start control module (orange), load module (blue).

1. Claim 1

Krieger⁴⁵⁰ discloses a jumpstarter referred to as a jump starter or a jump starter system. 3:22, 3:41-43, 2:8-17, 3:55-57, 4:5-8, 4:22-24, 4:35-38 (same).

b. Claim 1[a]

Krieger450's jump starter has a boosting battery 2 connected and supplying power to a voltage regulator 70, which supplies power to a microcontroller 60. Fig. 5 (annotated below), 9:15-18, 10:27-28; Ricketts ¶¶372-73.

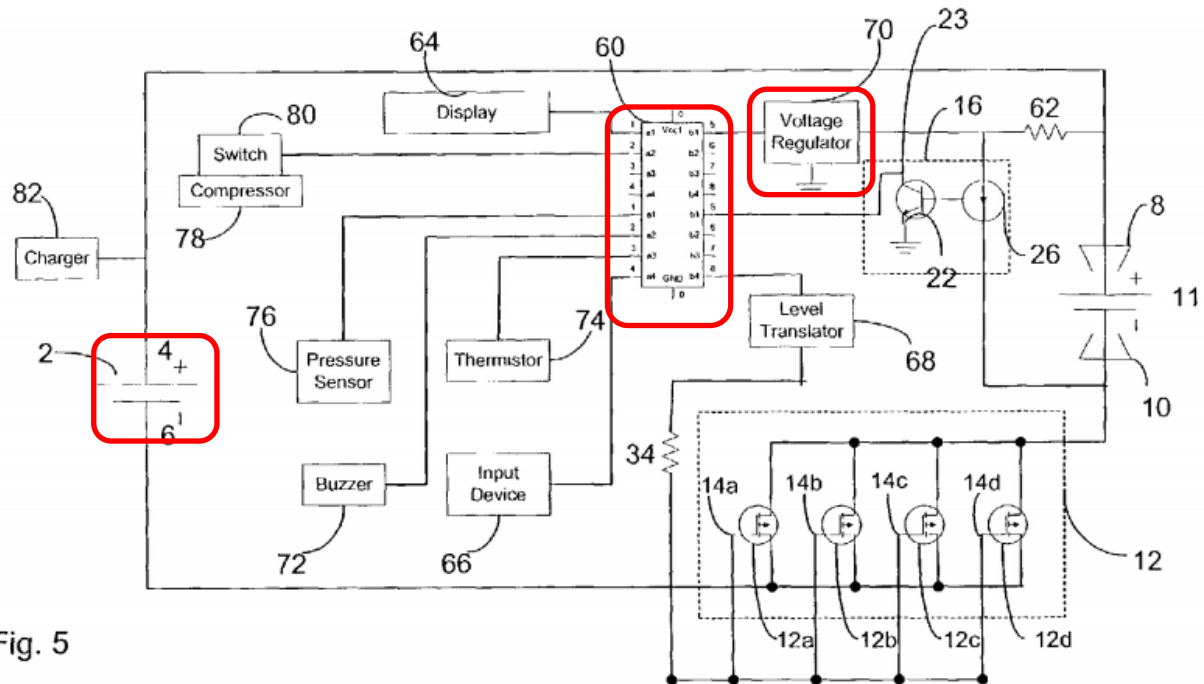


Fig. 5

Although Fig. 5 does not show a connection to the microprocessor VCC input, a POSITA would understand this connection exists based on the specification text. Ricketts ¶374.

Battery 2 can supply power to automobile battery 11. 5:22-26; Ricketts ¶375.

The microprocessor 60 can be used as part of a polarity protection circuit and other fault detection circuits. *Id.*; Krieger450 2:45-47; 3:35-40; 8:40-12:67. Ricketts ¶372.

The boosting battery 2 can supply power to an automobile battery 11 when the battery 2 has a predetermined voltage. First, Krieger450 discloses circuitry to measure the battery 2 voltage, explaining that “[b]y 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” and “[a] resistive divider may be used to provide the voltage and current measurements to the microprocessor's A/D input.” 8:48-55. A POSITA would understand that the microprocessor can detect when the boosting battery 2's voltage falls below a certain level., *infra*. Thus, Krieger therefore discloses a battery voltage detector to detect a battery voltage 2, -- a feedback circuit such as a resistive divider coupled to the microprocessor's A/D input. Ricketts ¶376.

Second, microprocessor 60 is programmed to detect when the boosting battery's 2 voltage falls below a predetermined level, such as 80% of its rated value. Ricketts ¶377. The microprocessor 60 activates a buzzer to indicate that boosting battery 2's charge is low and recharging is needed. Fig. 5 and 10:23-43. The microprocessor 60 detects the voltage levels of the boosting battery 2 and the battery to be charged 11 to improve the safety of the jumpstarter. 10:55-12:23;

Ricketts ¶378. A POSITA would understand this operation as detecting and responding to a fault condition. Ricketts ¶379.

If a fault is detected, such as a low battery level, an alarm sounds, switch 12 turns off, and power is not supplied from the boosting battery 2 to the depleted battery 11. The device remains in this state until the user recharges the boosting battery. 12:4-8 (battery 2 low level is a fault), 9:8-10 (deactivate switch when a fault is detected), 11:4-8 (jumpstart process is terminated when a fault is detected and battery 2 must be recharged before jumpstarting is attempted); Ricketts ¶380.

If it is argued that low battery conditions do not affect the switch being turned on because the words “terminate” jumpstarting or “deactivate” the switch are used, then there is a difference between the prior art and the limitation. A POSITA would be familiar with programming a microcontroller to handle fault conditions. Ricketts ¶381. It’s no more than routine experimentation with predictable results for Krieger450’s microcontroller to keep switch 12 off as part of the other fault processing (such as turning on the alarm or displaying a low voltage warning, 12:4-8) when a battery 2 low voltage condition is detected. *Id.* A POSITA would be motivated to make this change because keeping switch 12 off when battery 2 has low voltage could prevent damage to battery 2. *Id.*

c. Claim 1[b]

Krieger450 discloses two different load detectors. Ricketts ¶383.

The load detector circuits can detect other faults, such as whether a battery is connected at all. Krieger450 10:55-11:9, Ricketts ¶387.

d. Claim 1[c]

Krieger450 discloses that the microprocessor 60 can send an output signal to switch 12 when faults are detected. 8:48-9:45. Limitation 1[a]'s analysis explains that switch 12 remains off during fault conditions such as depleted boosting battery 2 (a battery below a predetermined voltage). Ricketts ¶389. The absence a depleted boosting battery 2 (i.e. a battery having at least one predetermined voltage) permits the device to generate an output signal to switch 12. *Id.*

The output signal from microcontroller 60 to switching circuitry 12 is shown in yellow Fig. 5 (annotated) below and 9:11-15. Ricketts ¶¶390-91.

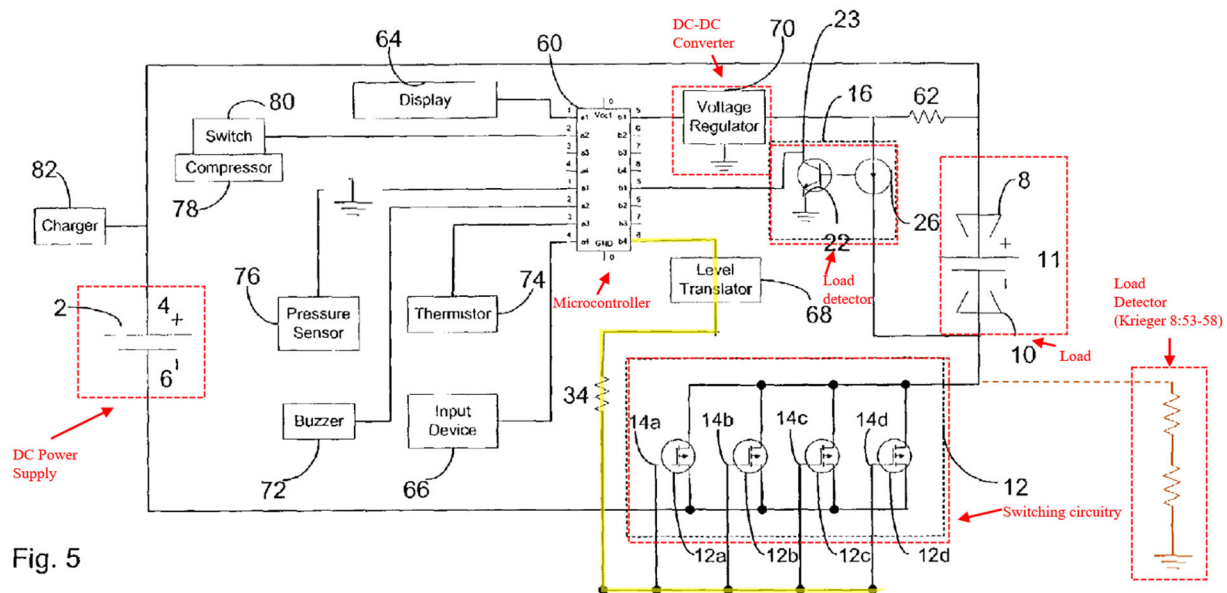


Fig. 5

The Krieger450 microprocessor 60 generates the output signal to turn on switch 12, or turn it off when a fault is detected. 8:59-9:10. Krieger discloses at least one predetermined voltage, for example 80% of its rated value. See analysis in limitation 1[a], Ricketts ¶392.

If “when” in the limitation “at least one microcontroller generating, when the battery has said at least one predetermined voltage, an output signal” requires that the output signal is generated when the battery has said at least one predetermined voltage (and requires no other tests to be satisfied) that is a difference between the Krieger450 and the claim. A POSITA would understand how to modify microcontroller testing of conditions as a precursor to switch closure. It is obvious to modify Krieger450 to eliminate tests other than checking the battery voltage of jumpstarter’s internal battery. Ricketts ¶393. Such a modification would require no more than routine experimentation, with predictable results. *Id.* This modification would allow the device to provide power to the output in more circumstances, which could allow experienced operators to use it in more circumstances, such as when a load detection sensor malfunctions. *Id.* Krieger450 contemplates modifying or simplifying the invention. *Id.*; Krieger450 13:1-12.

e. Claim 1[d]

Krieger450 discloses switching circuitry 12, including at least one switch, to operatively connect the battery to the automobile battery when said at least one microcontroller generates the output signal to supply a charging current to the automobile battery. Krieger450 Fig. 5, 9:11-15, 5:22-26. Limitation 1[c]’s analysis also further explains the switch and microcontroller control of switch operation. Ricketts ¶396.

2. Claim 2

Limitation 1[a]’s analysis explains that a resistor divider feedback circuit allows the microprocessor to monitor the voltage delivered by battery 2, and detect a fault when the battery 2 voltage falls below 80% of its rated value. 8:48-55. Ricketts ¶398.

3. Claim 3

Krieger450’s switch 12 is one or more MOSFETs connected in parallel. Krieger450 Fig. 5, reference 12, 12a-12d (showing MOSFETS in parallel), 5:34-46, 5:67, 6:2-3, 9:38-41 (describing FETS in switch 12); Ricketts ¶400. Krieger450 discloses that the number of transistors “depends upon the current flow in the circuit and the type of FET used.” Krieger450 5:34-46. Ricketts ¶400.

4. Claim 4

The Claim 3 analysis explains that switch 12 comprises MOSFETs. The MOSFETs shown in Figs. 1-5 which use a p-channel symbol, however a POSITA

would know from the circuit diagram and how they are used in Krieger that they are n-channel MOSFETs. Ricketts ¶¶164, ¶402.

5. Claim 6

The Claim 3 analysis explains that switch 12 one or more MOSFETs. See, e.g., Fig. 5. Since each MOSFET is a transistor switch, Krieger450 discloses a plurality of switches. Ricketts ¶¶404-05.

6. Claim 7

The Claim 3 analysis explains that switch 12 can be a plurality MOSFETs connected in parallel. See, e.g., Fig. 5 (shows four transistors in parallel); 5:34-46 (the number of transistors depends on current requirements and transistor characteristics); Ricketts ¶409.

7. Claim 9

The plain meaning of “all outputs are closed” in Claim 9 is provided in connection with Ground 1 in §VI.A.9, where the term “close” in “all outputs are closed” is “shut off” or “cut off” the “outputs” so there no electrical power flows through the outputs to the automobile battery. Ricketts ¶407.

Second, limitation 1[a]’s analysis explains conditions for when the jumpstarter output is not on and supplying power to the load. A POSITA would consider the jumpstarter to be in standby mode because it continues to analyze the

sensed conditions to determine whether to turn on the switch and supply jumpstart power to the automobile battery. Ricketts ¶410.

For example, Krieger450 discloses that “If the polarity connections of clamps 8, 10 to the depleted battery 11 are not correct, the switch 12 remains off.” Krieger450 9:27-28. Krieger450 also discloses that switch 12 is off when the clamps are disconnected. 9:32-41. When the switch is off, the output is turned off (“or closed”), and in this mode, no power flows to the vehicle battery. Ricketts ¶411.

8. Claim 10

The limitation 1[a] analysis describes a fault mode inhibiting jumpstarting when the boosting battery 2 is depleted. Ricketts ¶413. The analysis also explains that Krieger450 checks for fault condition of battery level less than 80%. 10:35-38. 80% of a 12 volt (rated value) battery 2 is at least 9.6 volts. Ricketts ¶413. A battery charged to over 10 volts would not inhibit jumpstart operation (and would not keep the device in standby mode), but other conditions may need to be met before the microprocessor closes switch 12. Ricketts ¶413.

If “when” in the limitation “the jumpstarter is not in a standby mode when the battery has more than 10 volts” requires that the switch is on and connecting power to the jumpstarter output when the battery has more than 10 volts (and requires no other tests to be satisfied), that is a difference between Krieger450 and

the claim. A POSITA would understand how to modify the microprocessor tests, for example, to test only internal battery 2's voltage before closing the switch. Such a modification would require no more than routine experimentation, with predictable results. Ricketts ¶414. This modification would allow the device to provide power in more circumstances, enabling experienced operators to use it in more circumstances, such as when a faulty load detector would prevent switch closure. *Id.* Krieger450 contemplates modifying its embodiment including adding or omitting elements. 13:1-14; Ricketts ¶414.

9. Claim 11

As explained above in §IV.D.1, “start control module” should be construed as “electronic switch.” As explained in limitation 1[d], switch 12 is the claimed start control module, and will stop supplying power to the load (depleted battery 11) when it is turned off (i.e. placed in a non-conducting state), such as when there is no depleted battery 11 connected to the device. Krieger450 Fig. 5 and 9:32-41, Ricketts ¶417.

10. Claim 12

Krieger450 discloses (1) the at least one switch 12 switches a negative voltage and (2) the at least one switch is connected to a negative battery terminal 10 of depleted battery 11, as shown in annotated Fig. 5 below and the text description in 5:22-33. Ricketts ¶¶419-20.

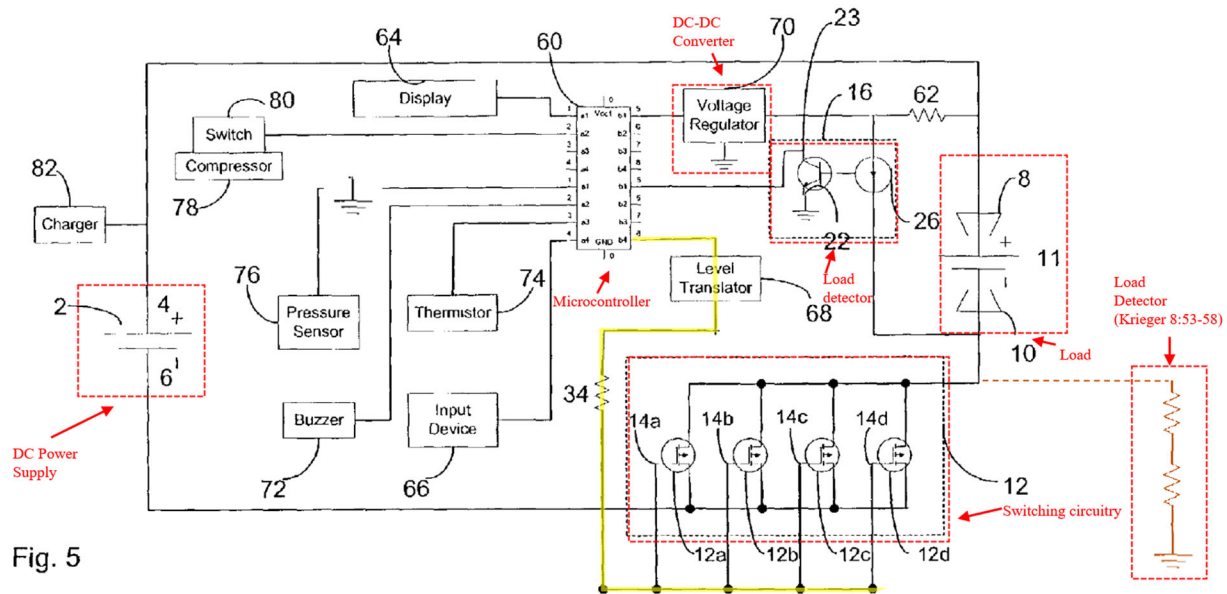


Fig. 5

11. Claim 13

Claim 13's analysis in Ground 1 explains that the claim language refers to the jumpstarter's ability to apply a current to the depleted automobile battery. Ricketts ¶422. Krieger450 Fig. 5, discloses 4 MOSFETs in parallel, and parallel MOSFETs reduce the ON resistance and allow higher currents to flow. Ricketts ¶422. Like the '971, the limitation 1[pre] analysis shows that Krieger450's jumpstarter jumpstarts automobiles or quickly charges depleted vehicle batteries. *Id.* Krieger450 discloses or suggests the features in Claim 13. Ricketts ¶423.

12. Claim 16

The Claim 16 analysis in Ground 1 explains that the '971 refers to battery voltage as the state of whether it is suitable to supply power to the automobile. 2:23-27. Ricketts ¶424.

Krieger450 discloses a display that shows conditions about a self-test or status of battery 2. Krieger450 12:40-45. Krieger450 discloses that each component is tested for faults, and a POSITA would understand that battery 2 is tested as part of a self-test. 11:64-67; Ricketts ¶425. Krieger450 discloses that if the battery 2 is below 80% of its rated value, the user is notified that battery 2 is at low capacity and should be charged, and jumpstarting is disabled until it is charged as discussed in the limitation 1[a] analysis in §VI.F.1.b.

To the extent it is argued that “a battery state” can also refer to the depleted battery 11’s state, Krieger450’s jumpstarter can determine the cold cranking amps (CCA) available from depleted battery 11. 11:9-26. CCA is a measure of the battery’s ability to provide power during a vehicle start operation. Ricketts ¶426. Krieger450 discloses that the jumpstarter may test the depleted battery for a shorted or open cell. 11:27-55. A POSITA would understand that an open/shorted cell in a vehicle battery substantially impacts its ability to provide power during vehicle starts. Ricketts ¶426.

13. Claim 17

a. Claim 17[Pre]

This limitation is identical to limitation 1[pre]. Thus, limitation 1[pre]’s analysis applies. §VI.F.1.a.

b. Claim 17[a]

Limitation 1[a]’s explains that Krieger450 discloses that the first battery is connected to and powers voltage regulator, which supplies power to the microcontroller, and can supply power to an automobile battery when it has at least one predetermined voltage. Ricketts ¶429.

c. Claim 17[b]

Limitation 1[a] and Claim 2’s analysis explain Krieger450’s disclosed voltage detection circuit and its use to detect first battery 2’s voltage level. Ricketts ¶430.

d. Claim 17[c]

Limitation 1[b]’s analysis describes opto-isolator 16’s ability to detect a type of connection to a load, i.e., a correct connection to the load. Ricketts ¶431.

e. Claim 17[d]

Limitation 1[a] and 1[c]’s analysis explains that Krieger450 can detect when the boosting battery 2 voltage falls below 80% of its rated value. In this fault condition, switch 12 turns off and remains off until the fault is corrected.

The microcontroller can only generate an output signal to turn on the switch when battery 2 is above 80%. Ricketts ¶432.

f. Claim 17[e]

Limitation 1[c] and 1[d]’s analysis explain how Krieger's switch 12 is controlled by microcontroller 60, which generates an output signal that turns the switch on or off. When the switch is on, it connects boosting battery 2 to depleted battery 11, and the jumpstarter supplies a charging current to automobile battery 11. Ricketts ¶433.

14. Claim 18

a. Claim 18[Pre]

This limitation is identical to limitation 1[pre]. Thus, limitation 1[pre]’s analysis applies. §VI.F.1.a.

b. Claim 18[a]

Krieger⁴⁵⁰ discloses cables connected to a portable box with a power source. 2:33-36. Annotated Fig. 5 shows the box periphery and the connections the positive and negative outputs of the box to cables that in turn connect to a depleted battery 11 via clamps 8, 10. Ricketts ¶436.

c. Claim 18[b]

Claim 18[a]’s analysis explains that discloses or renders obvious an output port. Limitation 1[a]’s analysis explains how Krieger450 discloses an internal power supply that can supply power an automobile battery via an output port, and to a microcontroller via a voltage regulator. Ricketts ¶438.

d. Claim 18[c]

Limitation 1[b]’s analysis describes Kriger450’s load detectors and specifically, how the resistor divider detects the presence of a vehicle battery connected to the positive/negative polarity outputs. Ricketts ¶439.

e. Claim 18[d]

Limitation 1[b]’s analysis describes Kriger450’s load detectors and specifically, how the optoisolator 16 detects a proper connection of a vehicle battery connected to the positive/negative polarity outputs. Ricketts ¶440.

f. Claim 18[e]

Limitation 1[c] and 1[d]’s analysis explains the power switch and its connections. Ricketts ¶441.

g. Claim 18[f]

Limitation 1[b]’s analysis generally describes how if the switch is turned on, it is in response to the depleted battery 11 being properly connected at both input and outputs of the safety switch. Limitation 1[c]’s analysis explains the

microcontroller generates an output signal to turn on switch 12. In the absence of a properly connected battery, the switch will not be turned on. Ricketts ¶442.

15. Claim 19

Claim 19 is nearly identical to Claim 2, but it uses the term “internal power supply” instead of “battery” of the jumpstarter. The claimed “battery” in claim 2 is an example of a jumpstarter’s internal power supply. Ricketts ¶444. Claim 2 also refers to “battery voltage detector circuit” instead of “voltage detector circuit” and “battery voltage of the battery” instead of “voltage of the internal power supply.” Both of these differences are related to using “internal power supply” in Claim 19 instead of “battery” in Claim 2. Thus, Claim 2’s analysis applies. Ricketts ¶444. §VI.F.2.

16. Claim 20

This claim is nearly identical to Claim 6, with the exception of the language “plurality of power switches” (in Claim 6, it is referred to as “plurality of switches”). Thus, Claim 6’s analysis applies. §VI.F.5.

17. Claim 21

Limitation 1[b] and 18[d]’s analysis describes the load detectors in Krieger and, specifically, how the optoisolator 16 can detect a proper connection of a vehicle battery connected to the positive polarity output and negative polarity output. Krieger450 8:60-63, 8:59-9:8; Ricketts ¶447. A POSITA reading this

disclosure would understand that the optoisolator is producing an output to microcontroller 60 when 1) a battery is detected, and 2) the battery is connected with correct polarity. Thus, the optoisolator 16 can be both the claimed load detection sensor and reverse polarity sensor. *Id.*

18. Claim 22

In the analysis of Claim 21, the optoisolator 16 was identified as the sensor that operates as the load detection sensor and the reverse polarity sensor. Optoisolator 16 responds to a voltage input corresponding to a correct connection of a depleted battery 11. Krieger⁴⁵⁰ 8:60-9:1; Ricketts ¶447.

19. Claim 23

This claim is nearly identical to Claim 12, with the exception of the language used to refer to the power switch (in Claim 12, it is referred to as “the at least one switch”). Thus, Claim 12’s analysis applies. §VI.F.10.

20. Claim 24

This claim is nearly identical to Claim 9, with the exception of a minor language difference used to refer to the microcontroller (in Claim 9, it is referred to as “said at least one [sic] microcontroller”). Thus, Claim 9’s analysis applies. §VI.F.7.

21. Claim 25

This claim is nearly identical to Claim 10 (where claim 10 refers to a “battery” of the jumpstarter instead of an “internal power supply” of the

jumpstarter in Claim 25). The claimed “battery” in claim 10 is an example of a jumpstarter’s internal power supply. Ricketts ¶450. Thus, Claim 10’s analysis applies. §VI.F.8.

22. Claim 26

This claim is nearly identical to Claim 11 (where Claim 26 uses “prevent” instead of “stop”). Thus, Claim 11’s analysis applies. §VI.F.9.

23. Claim 27

This claim is identical to Claim 23. Thus, Claim 23’s analysis applies. §VI.F.19.

24. Claim 28

This claim is identical to Claim 13. Thus, Claim 13’s analysis applies. §VI.F.11.

25. Claim 30

This claim is nearly identical to Claim 16, with the exception of a minor language difference used to refer to the microcontroller (in Claim 16, it is referred to as “said at least one microcontroller”). Thus, Claim 16’s analysis applies. §VI.F.12.

G. GROUND 7: Claim 5 is unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger⁴⁵⁰ and Koebler

Koebler was filed on November 28, 2011 and published on September 19, 2013 and thus is prior art. Ricketts ¶176.

Koebler is analogous prior art, disclosing a battery with integrated safety switch 62 controlled by a microcontroller 60 for selectively connecting power to positive/negative output terminals. Abstract, [0001]-[0002], [0024]-[0033]; [0078], [0088]-[0093] and Figs. 7-8 and 24-25, Ricketts ¶177. Like Krieger450 and the ‘971, Koebler’s switch is a low-side MOSFET switch, except in Koebler, the plurality of MOSFETs are arranged in a series-parallel configuration, which discloses Claim 5. Figs. 16 (shown below), 18, 20 and 22 (showing negative-side switch between cells and “NEG” terminal”) and [0078]-[0094]. Ricketts ¶177. Koebler’s switch may be used in “any battery system that requires charging and discharging in order to extend battery life, and for safety” thus motivating a combination. [0094]; Ricketts ¶177.

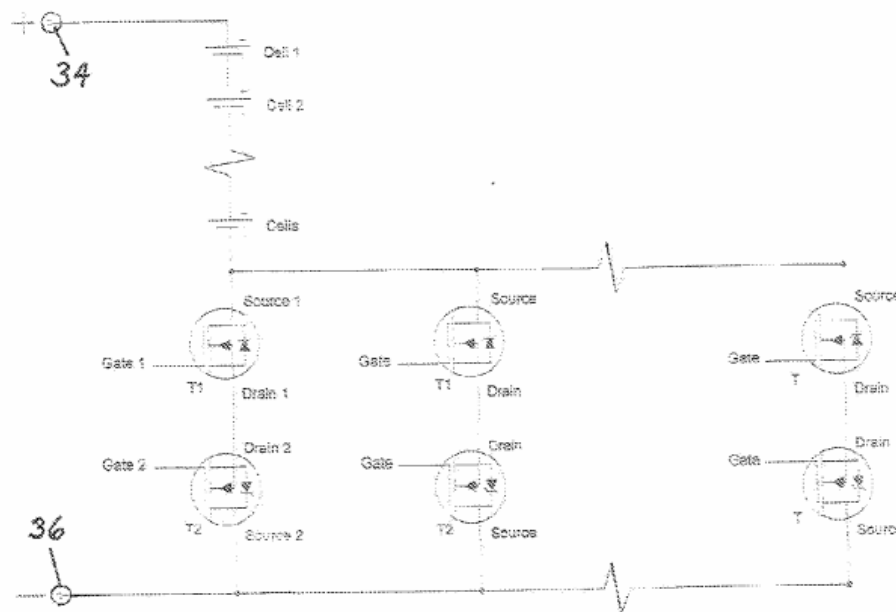


Fig. 16

Krieger450's switch 12 comprises transistors in parallel, and that is a difference between the prior art and this claim. A POSITA would be aware of various transistor switch circuits. Modifying Krieger450 to use the transistor switch in Koebler Fig. 16 or Fig. 18 would be a matter of routine experimentation with predictable results, simple substitution of one transistor switch for the other with predictable results, and obvious to try. Ricketts ¶458. Moreover, the overlapping technical disclosure of references supports their combination. *Id.* A POSITA would be motivated to use Koebler's series-parallel switch in place of switch 12 in Krieger450 because to improve immunity to transient voltages when switching power to a large inductive load, such as jumpstarter cables. *Id.*

H. GROUND 8: Claims 8, 10, 16, and 30 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Richardson

Richardson was filed on February 15, 2013 and published on June 20, 2013, and thus is prior art. Ricketts ¶181.

Richardson is analogous art that discloses jumpstarter features to address safety problems during jumpstarting, including reverse polarity connections to the automobile battery and, jumpstarting when the jumpstarter battery is depleted and overheated. Specifically, Richardson discloses a microprocessor that receives information from sensors (including vehicle voltage sensor 30 and reverse polarity sensor 24 described in [0014]) and turns on a switch 34 to connect its internal power supply (described in [0006]- [0007]) to an output 58 connected to a depleted

battery when it is safe to do so. Richardson [0005], Figs. 1, 3, 5, 6 and accompanying description. Ricketts ¶¶182-85. Richardson tests the temperature and charge state of its internal battery before allowing switch closure. *Id.* ¶186-88.

1. Claim 8

Krieger450 discloses displaying a “Warning: Reverse Polarity” message to the user “if the polarity of connections of the jump starter system is not correct.” Krieger450 12:40-47. Limitation 1[b]’s analysis in Ground 1 explains Krieger450’s optoisolator is used to detect correct polarity connections.

Richardson discloses a reverse polarity sensor 24 connected to a microcontroller input, where the sensor can always distinguish a battery that is connected in correct polarity, from one that is connected in reverse polarity, across the full voltage range. Ricketts ¶462.

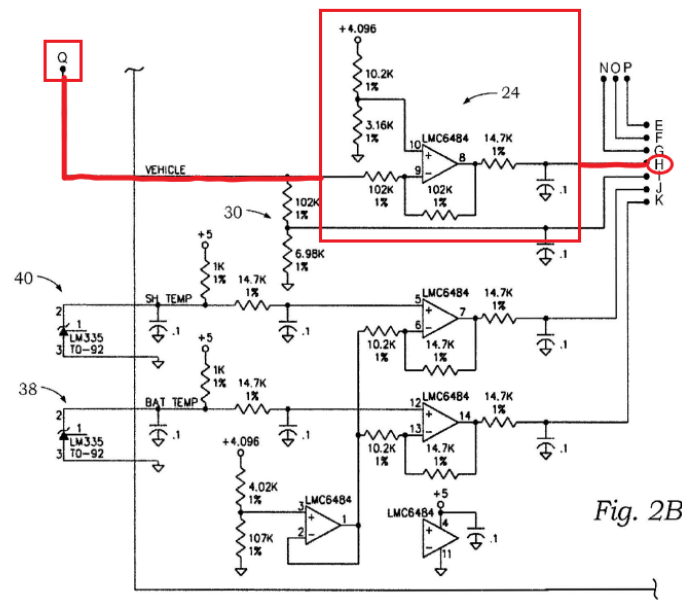


Fig. 2B

To the extent it is argued that Krieger450's load detectors are incapable of detecting a reverse polarity connection, that is a difference between the prior art and the claim. A POSITA would be aware of various sensors and circuitry to detect the polarity of a connection and whether or not a battery is connected. Modifying Krieger450 to use Richardson's sensor 24 in place of optocoupler 16 would be a matter of routine experimentation with predictable results, simple substitution of one transistor switch for the other with predictable results, and obvious to try. Ricketts ¶463. . This substitution is merely the use of a sensor circuit that can meet the disclosed functionality of Krieger450 (turning on the switch when a correct connection is made (Krieger450 8:59-9:8, 9:33-42) and warning the user of a reverse polarity condition (Krieger450 12:40-47)). *Id.* Moreover, as described above, both references have overlapping technical

disclosure which support their combination. *Id.* And a POSITA would be motivated to replace the optocoupler 16 in Krieger450 with the sensor 24 shown in Richardson because Richardson's circuit would meet Krieger's disclosure of detecting both correct and reverse polarity conditions without adding another sensor. *Id.*

2. Claim 10

The analysis of Krieger450 with respect to Claim 10 is covered in Ground 6.

Richardson contains similar and more express disclosure of the device not being in a standby mode if the battery has more than 10 volts. This condition is checked to determine whether power should be applied from the internal battery/capacitor power source to the clamps. Ricketts ¶465. In Step 222 of Fig. 5, the microcontroller tests whether the battery charge is greater than 20 percent. If not, control cannot reach the switch closure at step 268 of Fig. 6, "[t]he system stays in this condition, which prohibits any further jump starter action" and the user is instructed to charge the battery. Richardson [0028]. If so, control may continue to other steps leading to switch closure at Step 268 of Fig. 6. This test for a lead acid battery would check for a voltage around 10V. Ricketts ¶465. Thus, jumpstarting is inhibited, and the unit remains in a standby mode waiting to be charged if the battery level is less than about 10 volts. *Id.*

If it is argued that Krieger450's disclosure of testing for less than 80% battery charge is not a disclosure of a jumpstarter that is not in a standby mode when the battery has more than 10 volts because Krieger450 uses the words "terminate" the jumpstarting process or "deactivate" the switch when a fault occurs such as a low battery voltage, and does not characterize a deactivated state caused by a low voltage condition as a "mode," that is a difference between the claim and prior art. A POSITA would be aware of tests which can be performed on batteries and actions which can be taken to inhibit the operation of a jumpstarter in view of a failed test. Ricketts ¶469. A POSITA would be motivated to apply this 10v test teaching of Richardson with respect to the function of its microcontroller testing of battery voltage conditions before switch closure to Krieger450, as it would require no more than routine experimentation with predictable results, and it is merely the use of a known technique to improve similar devices in a similar way. *Id.* A POSITA would be motivated to apply Richardson's safety feature to improve the safety of the device and avoid damage to the internal battery. *Id.*

3. Claim 16 and 30

The analysis of Krieger450 with respect to Claims 16 and 30 is covered in Ground 6.

Richardson contains more express disclosure of tests of the internal battery which must be passed before switch closure, including battery temperature in Step

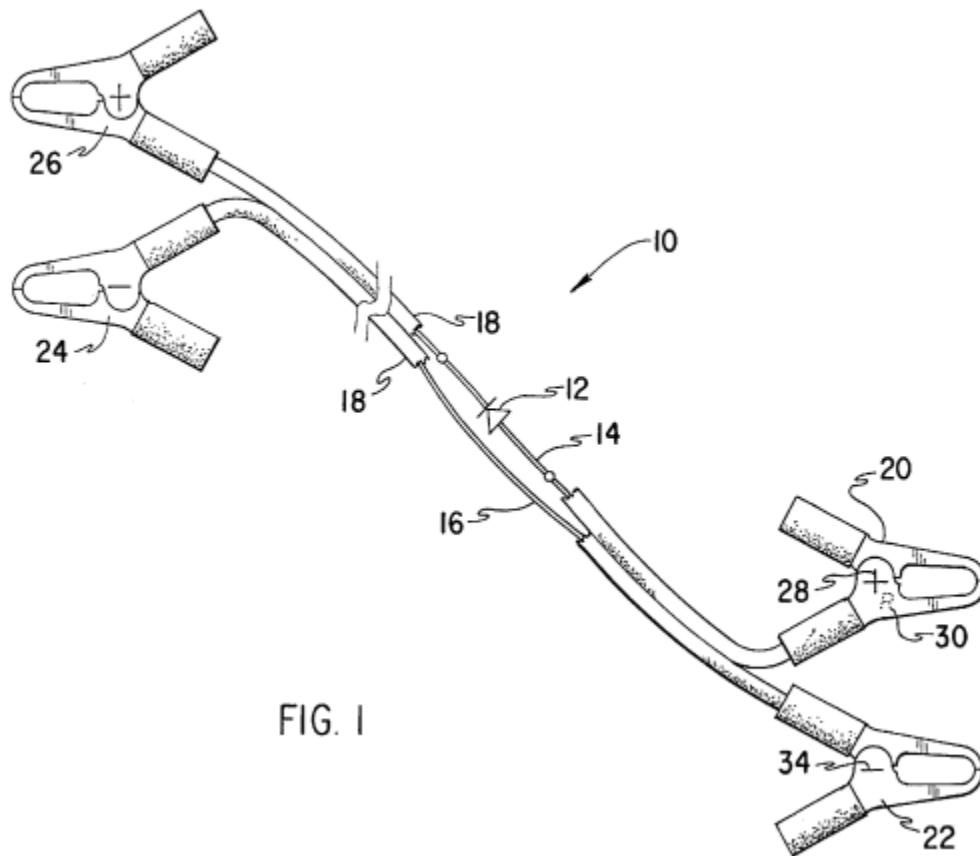
232 of Fig. 5, to determine whether the temperature is suitable to close the switch in Step 268 of Fig. 6. If the temperature is too high, an error message is displayed, and “[t]he system prevents any further operation until the battery and/or capacitor temperature falls below a safe level 238.” Richardson [0030]. Battery temperature has a direct effect on battery capacity. Ricketts ¶468.

If it is argued that Krieger450’s disclosure of testing for greater than 80% battery charge is not a disclosure of a microcontroller determining whether a battery state is suitable for a heavy current power generation, that is a difference between the claim and prior art. A POSITA would be aware of tests which can be performed on batteries relevant to jumpstarter performance, and actions which can be taken to inhibit the operation of a jumpstarter in view of a failed test. Ricketts ¶469. A POSITA would be motivated Richardson’s battery temperature test before switch closure to Krieger450, as it would require no more than routine experimentation with predictable results, and it is merely the use of a known technique to improve similar devices in a similar way. *Id.* A POSITA would be motivated to apply Richardson’s battery temperature testing to improve safety and avoid damage. *Id.*

I. GROUND 9: Claims 14, 15, and 29 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Morse

Morse was filed on February 26, 2007 and published on December 13, 2007, and thus is prior art. Ricketts ¶203.

More is analogous art because it addresses the same problem of backflow during jumpstarting referenced in the '971, the risks of damage caused by backflow, and a solution to the problem. Abstract, 1:46-51, 3:31-37; Ricketts ¶204, ¶¶471-72. Morse discloses using a half-wave rectifier in the clamp electrical path to prevent back flow. *Id.*; Morse at Abstract, 3:50-53, 4:57-59, Figs. 1-3; Ricketts ¶204.



1. Claims 14 and 29

Morse discloses a jumper cable with “an electrical current restrictor in the form of a half wave rectifier for preventing reverse current flow while a user

attempts to restart a stranded vehicle.” Morse at 4:57-59, Fig. 1, 3. A POSITA would understand that a half-wave rectifier 12 in Figs. 1, 3 is a diode. Ricketts ¶473.

Like Morse, Krieger450 discloses that a safety goal of the device is to avoid damage to the jumpstarter battery, and avoiding explosions or fire when using a jumpstarter. 1:47-54. As explained above, Morse discloses preventing damage to the electronics of the vehicle supplying power. Ricketts ¶474.

To the extent it is argued that Krieger450 does not disclose the claimed voltage back-flow protection, a POSITA would be aware of jumpstarter safety circuits and architectures. Ricketts ¶475. Include the Morse’s backflow protection circuit 14 in Krieger450’s positive lead connected to positive clamp 8 would require no more than routine experimentation with predictable results. *Id.* Such a modification would involve no more than applying a known circuit from Morse’s jumper cables (a diode or half-wave rectifier), to Krieger450’s jumper cables, a similar type of device ready for improvement to improve a similar device in the same way. *Id.* A POSITA would be motivated to make this modification because it would improve the safety of the device by adding protection against backcharging and battery/electronics damage. *Id.*

If it is argued that Morse’s voltage back-flow protection is incompatible with Krieger450’s alternator testing functionality, (e.g. Krieger450 11:9-27) a POSITA

would understand that the alternator testing functionality is optional and need not be included in the Fig. 5 jumpstarter embodiment cited in this Ground. Ricketts ¶476.

2. Claim 15

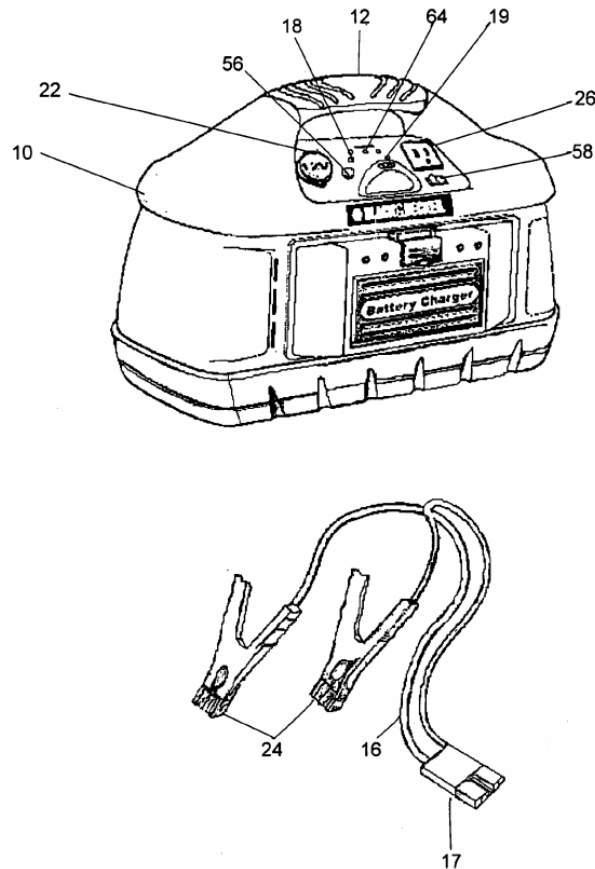
Section VI.A.15 explains that an abnormal load condition is when the automobile load provides a higher voltage than the jumpstarter battery after vehicle start. Ricketts ¶¶304-05, ¶¶477-78. Morse's disclosure of protecting current backflow during jumpstarting from the vehicle's voltage regulator would apply to this situation. Morse at 1:46-51, 3:31-37, Ricketts ¶479. It would be obvious to implement this circuit in Krieger450 as described in §VI.C.1 for Claims 14/29 for the same reasons.

J. GROUND 10: Claims 18-30 are unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450 and Krieger049

Krieger049 was filed on February 26, 2007 and published on December 13, 2007, and thus is prior art. Ricketts ¶197. Krieger049 and Krieger450 share the same lead inventor, and are both associated with Vector Products Inc., a manufacturer of jumpstarters in the 2000s. Ricketts ¶198.

Krieger049 is analogous art, disclosing a portable jumpstarter in a housing 10 with internal battery 20 and controller 14 microprocessor that may control its operation and jumper cables 16 with a plug 17 that can be connected to an electrical connector on the housing. Krieger049 at Abstract, [0013]-[0014],

[0017]; Figs. 1 (shown below), Figs. 2-3; Ricketts ¶199, ¶485. Krieger049
discloses the “output port” of limitation 18[a]. Ricketts ¶486.



Krieger450 discloses or renders obvious Claim 18’s output port, but does not include a jumpstarter’s housing mechanical drawing and connection of the jumper cables. §VI.A.18.b

If it is argued that Krieger450’s disclosure is not an output port, that is a difference between the Krieger450 and the claim. A POSITA would be aware of a

variety of electrical connections suitable for connecting jumpstart clamps to a jumpstarter, such as Krieger450's jumpstarter. Krieger049's disclosure of a jumpstarter cable 16 with plug 17 receivable at a connector in jumpstarter housing 10 is simply a more detailed exemplary embodiment of how to implement an aspect of the jumpstarter disclosed in Krieger450. Ricketts ¶487.

Modifying Krieger450's jumpstarter to use Krieger049's jumpstarter cable 16 with plug 17 receivable at a connector in jumpstarter housing 10, requires no more than routine experimentation with predictable results, using a known technique (for connecting output power) to apply to a similar device with similar results. A POSITA would be motivated to add a removable cable to Krieger049 for ease of storage, shipping, and replacement. Ricketts ¶488.

The remaining limitations in Claims 18-30 are disclosed by Krieger450 for the same reasons articulated in Ground 6 in §VI.F.

K. GROUND 11: Claim 29 is unpatentable as 35 U.S.C. § 103(a) as obvious over Krieger450, Krieger049 and Morse

Krieger450 may be modified with the teachings of Krieger049's output port for the reasons explained in Ground 10. Ricketts ¶491. The combination of Krieger450 and Krieger049, may be further modified with the teachings Morse's voltage back-flow protection circuitry for the reasons explained in Ground 3. Ricketts ¶492. The references have overlapping technical disclosure that supports their combination. Ricketts ¶493.

VII. CONCLUSION

Petitioner respectfully requests an IPR trial on the ‘971 and cancellation of claims 1-30.

Dated: May 22, 2023

Respectfully submitted,

/Kevin J. Patariu/

Lead Counsel

Kevin J. Patariu, Reg. No. 63,210

PERKINS COIE LLP
11452 El Camino Real, Suite 300
San Diego, California 92130-2080
858.720.5700 (phone)
858.720.5799 (fax)

Back-up Counsel
Bing Ai, Reg. No. 43,312
John D. Esterhay, Reg. No. 73,512
John P. Schnurer, Reg. No. 52,196

Attorneys for Petitioner

CERTIFICATE OF WORD COUNT UNDER 37 CFR §42.24(d)

Under 37 C.F.R. §42.24(d), the undersigned certifies that the word count for this *Petition for Inter Partes Review* totals 13,995, excluding the parts exempted by 37 C.F.R. §42.24(a).

The word count was made using the built-in word count function in the Microsoft® 365 Word software used to prepare this document.

Dated: May 22, 2023

Respectfully submitted,

/ Kevin J. Patariu/

Lead Counsel

Kevin J. Patariu, Reg. No. 63,210

PERKINS COIE LLP
11452 El Camino Real, Ste 300
San Diego, California 92130-2080
858.720.5700 (phone)
858.720.5799 (fax)

Back-up Counsel
Bing Ai, Reg. No. 43,312
John D. Esterhay, Reg. No. 73,512
John P. Schnurer, Reg. No. 52,196

Attorneys for Petitioner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that true copies of this Petition for *Inter Partes* Review and supporting materials (Exhibits 1001-1024 and Power of Attorney) have been served via Federal Express mail delivery in their entirety on counsel for patent owner as follows:

Sheridan Ross PC
1560 Broadway, Suite 1200
Denver, CO 80202

In addition, an electronic courtesy copy has been sent to the attorneys of record for Plaintiff in the pending litigation matter involving U.S. Pat. No. 11,376,971:

Alex W. Ruge
Sheridan Ross PC
1560 Broadway Suite 1200
Denver, CO 80202
720-543-9154
Fax: 303-863-0223
Email: aruge@sheridanross.com

Sean A. O'Brien
Payne and Fears LLP
4 Park Plaza Suite 1100
Irvine, CA 92614
949-851-1100
Fax: 949-851-1212
Email: sao@paynefears.com

Dated: May 22, 2023

Respectfully submitted,

/Kevin J. Patariu/

Lead Counsel

Kevin J. Patariu, Reg. No. 63,210

PERKINS COIE LLP

11452 El Camino Real, Ste 300

San Diego, California 92130-2080

858.720.5700 (phone)

858.720.5799 (fax)

Back-up Counsel

Bing Ai, Reg. No. 43,312

John D. Esterhay, Reg. No. 73,512

John P. Schnurer, Reg. No. 52,196

Attorneys for Petitioner