IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of	Atty. Docket No.: 663
Koebler, Martin	Confirmation No.: 6889
App. No.: 14/657,101	Art Unit: 1722
Pat. No. : 9,954,207	Filed: 3/13/2015
Examiner: Jonathan Jelsma	Issued: 4/24/2018

For: LITHIUM BATTERY WITH SOLID STATE SWITCH

* * * * * * * * * * *

March 24, 2021

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PATENT OWNER'S LETTER TO MAKE OF RECORD IN GRANTED PATENT

Sir:

Patent Owner respectfully requests that the following list of references be entered into the file wrapper of the above-identified issued patent:

U.S. Patent No.	Issue Date	Inventor
5142215	1992-08-25	MATHISON; Leslie C.
5635821	1997-06-03	SMITH; Gregory J.
6081101	2000-06-27	YANG; Tai-Her
6133709	2000-10-17	PUCHIANU; Silviu
7301303	2007-11-27	HULDEN; Richard M.
7466082	2006-12-16	SNYDER; Mark W. et al.
7791317	2010-09-07	SUZUKI; Isac

U.S. Pub. No.	Pub. Date	Inventor
20050069777	2005-03-31	TAKAMI; Nerio et al.
20070080662	2007-04-12	WU; Deping
20080203967	2008-08-28	KRIEGER; Michael et al.
20080241653	2008-10-02	CHANG; Tsun-Yu
20090123813	2009-05-14	CHIANG; Yet-Ming et al.
20100092844	2010-04-15	TAKEDA; Takashi
20100177507	2010-07-15	WEST; Stacey H. et al.
20100244769	2010-09-30	SAKAKIBARA; Kazuyuki
20100301800	2010-12-02	INSKEEP; Mathew
20100320961	2010-12-23	CASTILLO; Armando et al.
20110068744	2011-03-24	ZHU; Dao-Yi
20120068537	2012-03-22	HINTZ; Andrew Stephen et al.
20120139456	2012-06-07	TAKANO; Nobuhiro et al.
20130101874	2013-04-25	PEVEAR; Brian J.

For. Pub. No.	CC	Pub. Date	Name
1444320	CN A	2003-09-24	SEIKO EPSON CORP[JP]
1793639	CN A	2006-06-28	KOMATSU ZENOA KK [JP]
1949559	CN A	2007-04-18	DEL. POWER SYSTEMS CORP. [CA]
201069788	CN Y	2008-06-04	GUANGZHOU GREAT POWER BATTERY [CN]
102008000947	DE A1	2009-10-08	DILO TRADING AG [CH]
1646103	EP A1	2006-04-12	KOMATSU ZENOA KK [JP]
1940003	EP A2	2008-07-02	NISSAN MOTOR [JP]

2211399	EP A1 2010-07-28	PANASONIC CORP [JP]
0021179	WO A1 2000-04-13	QUALCOMM INC [US]
2010042517	WO A1 2010-04-15	BOSTON POWER INC [US], et al.

Respectfully submitted,

THOMAS M. JOSEPH, ESQ.

By: /Thomas M. Joseph/
Thomas M. Joseph
Reg. No. 48,689

TMJ:tbm

P.O. Box 14789
Pittsburgh, PA 15234-9998
Telephone: (412) 780-4061
Email: *tmdjoseph@yahoo.com*

Electronic Acknowledgement Receipt

EFS ID:	42264516
Application Number:	14657101
International Application Number:	
Confirmation Number:	6889
Title of Invention:	LITHIUM BATTERY WITH SOLID STATE SWITCH
First Named Inventor/Applicant Name:	Martin Koebler
Correspondence Address:	RALPH H. DOUGHERTY - 1235 AVALON PLACE - MATTHEWS NC 28104 US 704-968-8396 RALPH@RALPHDOUGHERTY.COM
Filer:	Thomas Michael Joseph
Filer Authorized By:	
Attorney Docket Number:	5094
Receipt Date:	24-MAR-2021
Filing Date:	13-MAR-2015
Time Stamp:	08:48:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	LET663.pdf	158940 ff0e252ed1bf0abd8be2ac6751b6c59289fb6f4b	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	158940		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER

MAY 03 2018

PTO/AIA/122 (08-12)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

CHANGE OF CORRESPONDENCE ADDRESS Application

Address to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	14/657,101
Filing Date	March 13, 2015
First Named Inventor	Martin Koebler
Art Unit	1721
Examiner Name	Jonathan G. JELSMA
Attorney Docket Number	5094

Please change the Correspondence Address for the above-identified patent application to:

☐ The address associated with Customer Number: _____

OR

☒ Firm or Individual Name Ralph H. Dougherty

Address: 1235 Avalon Place

City Matthews | State NC | Zip 28104

Country US

Telephone 704-968-8396 | Email ralph@ralphdougherty.com

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

I am the:

☐ Applicant.

☒ Attorney or agent of record. Registration Number 25,851

☐ Registered practitioner named in the application transmittal papers who acts in a representative capacity under 37 CFR 1.34. See 37 CFR 1.33(a)(1). Registration Number _____

Signature

Typed or Printed Name Ralph H. Dougherty

Date 05-02-2018 | Telephone 704-968-8396

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER
MAY 03 2018

FAX COVER SHEET

TO	
COMPANY	
FAX NUMBER	1-571-273-8300
FROM	Ralph H Dougherty PA
DATE	2018-05-03 13:32:02 GMT
RE	Docket 5094 - Address Change

COVER MESSAGE

FAX TO: US Patent and Trademark Office – Mail Stop ISSUE FEE
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 2(counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFO
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs:

Please forward the attached document to Mail Stop ISSUE FEE.
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph Dougherty
Reg. No. 25,851
1235 Avalon Place
Matthews, NC 28104
Phone: 704-968-8396
E-mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 1/3 * RCVD AT 5/3/2018 9:39:03 AM [Eastern Daylight Time] * SVR:W-PTOFAX-001/36 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-54

BEST AVAILABLE COPY

PAGE 2/3 * RCVD AT 5/3/2018 9:39:03 AM [Eastern Daylight Time] * SVR:W-PTOFAX-001/36 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-54

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	04/24/2018	9954207	5094	6889

162 7590 04/04/2018

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 145 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Martin Koebler, Davidson, NC;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/657,101	03/13/2015	1721	770	5094	21	3

CONFIRMATION NO. 6889

CORRECTED FILING RECEIPT

162
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

OC000000098403625

Date Mailed: 03/29/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Martin Koebler, Davidson, NC;

Applicant(s)

Martin Koebler, Davidson, NC;

Power of Attorney: The patent practitioners associated with Customer Number 00162

Domestic Priority data as claimed by applicant

This application is a CIP of 13/989,273 05/23/2013 PAT 9412994
which is a 371 of PCT/US11/01937 11/28/2011
which claims benefit of 61/458,657 11/29/2010
and claims benefit of 61/463,736 02/22/2011

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 03/25/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/657,101**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

LITHIUM BATTERY WITH SOLID STATE SWITCH

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

RECEIVED
CENTRAL FAX CENTER

FEB 2 7 2018

FAX COVER SHEET

TO	
COMPANY	
FAXNUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2018-02-27 22:06:29 GMT
RE	Docket 5094 - Issue Fees

COVER MESSAGE

FAX TO: US Patent and Trademark Office – Mail Stop ISSUE FEE
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 4 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFO
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs:

Please forward the attached documents to Mail Stop ISSUE FEE.
Thank you for your prompt attention to this matter.

Very truly yours,

Ralph H. Dougherty

Ralph H. Dougherty
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988
Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you

THIS PAGE BLANK (USPTO)

PAGE 2/5 * RCVD AT 2/27/2018 5:06:48 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/21 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):03-59

RECEIVED
CENTRAL FAX CENTER

FEB 27 2018

PTO/SB/92 (07-16)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Certificate of Mailing or Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being:

1. ☐ Deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

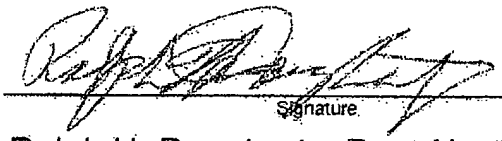
   Commissioner for Patents
   P.O. Box 1450
   Alexandria, VA 22313-1450

   on _____
   Date

2. ☑ Facsimile transmitted to the United States Patent and Trademark Office, or

   OR

3. ☐ EFS-Web transmitted to the USPTO.



Signature — 27 February 2018 (Date)

Ralph H. Dougherty, Reg. No. 25,851 — Typed or printed name

704-940-3988 — Telephone number

Note: Each paper must have its own certificate of mailing or transmission, or this certificate must identify each submitted paper.

_____

_____

_____

_____

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

RECEIVED
CENTRAL FAX CENTER
FEB 27 2018

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

102 7590 02/08/2018
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NORTH CAROLINA 28210

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

RALPH H. DOUGHERTY	(Depositor's name)
	(Signature)
2-27-2018	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

TITLE OF INVENTION: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
REGULAR	SMALL	$500	$0.00	$0.00	$500	05/08/2018

01 FC:2501 500.00 OP
02 FC:8001 30.00 OP

EXAMINER	ART UNIT	CLASS-SUBCLASS
JELSMA, JONATHAN G	1721	429-061000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1.
2 RALPH DOUGHERTY
3

3 ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☒ Advance Order - # of Copies 10

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
☐ Applicant asserting small entity status. See 37 CFR 1.27
☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date 2-27-2018
Typed or printed name RALPH H. DOUGHERTY Registration No. 25,851

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/657,101	03/13/2015	1721	770	5094	21	3

CONFIRMATION NO. 6889

CORRECTED FILING RECEIPT

162
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

OC000000097484788

Date Mailed: 02/16/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Martin Koebler, Davidson, NC;

Applicant(s)

Martin Koebler, Davidson, NC;

Power of Attorney: The patent practitioners associated with Customer Number 00162

Domestic Priority data as claimed by applicant

This application is a CIP of 13/989,273 05/23/2013 PAT 9412994
which is a 371 of PCT/US11/01937 11/28/2011
which claims benefit of 61/458,657 11/29/2010
and claims benefit of 61/463,736 02/22/2011

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 03/25/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/657,101**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Preliminary Class

429

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/657,101	Koebler, Martin
	Examiner	**Art Unit**
	JONATHAN G JELSMA	1721

CPC						
Symbol					**Type**	**Version**
H01M	/	2	/	1077	F	2013-01-01
H01M	/	2	/	34	I	2013-01-01
H01M	/	10	/	425	I	2013-01-01
H01M	/	10	/	52	I	2013-01-01
H01M	/	2010	/	4271	A	2013-01-01
H01M	/	2220	/	20	A	2013-01-01
H01M	/	2200	/	00	A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	21	
/JONATHAN G JELSMA/ Primary Examiner, Art Unit 1721	29 January 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	16

U.S. Patent and Trademark Office

Part of Paper No.: 20180129

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/657,101	Koebler, Martin
	Examiner	**Art Unit**
	JONATHAN G JELSMA	1721

INTERNATIONAL CLASSIFICATION					
CLAIMED					
H01M	/	2	/	10	

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
429	61

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/JONATHAN G JELSMA/ Primary Examiner, Art Unit 1721	29 January 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	16

U.S. Patent and Trademark Office

Part of Paper No.: 20180129

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/657,101	Koebler, Martin
	Examiner	**Art Unit**
	JONATHAN G JELSMA	1721

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/JONATHAN G JELSMA/ Primary Examiner, Art Unit 1721	29 January 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	16

U.S. Patent and Trademark Office

Part of Paper No.: 20180129

Bibliographic Data

Application No: 14657101

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /JONATHAN G JELSMA/ Examiner's Signature | Initials

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
03/13/2015	429	1721	5094
RULE			

APPLICANTS

INVENTORS

Martin Koebler, Davidson, NC, UNITED STATES

CONTINUING DATA

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

03/25/2015

STATE OR COUNTRY

UNITED STATES

ADDRESS

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210
UNITED STATES

FILING FEE RECEIVED

$770

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S100	0	(sold near2 state) near2 switch$4 with parallel	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/19 10:47
S101	1567	(solid near2 state) near2 switch$4 with parallel	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/19 10:47
S102	22	(battery electro$1chemical adj cell electro adj chemical adj cell (power energy) near2 storage) near2 pack same2 S101	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/19 10:48
S103	5294	(solid near2 state near2 switch MOSFET IGBT) with (drain source) with parallel	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 09:27
S104	162	S103 and (battery electro$1chemical adj cell electro adj chemical adj cell electro$1chemical$1cell (power energy) near2 storage) near2 (pack)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 09:28
S105	2	"8552593".pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 09:35
S106	2	"13722673"	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 12:15
S107	11	("20110115436" | "20120249055" | "20120293129" | "20130002201" | "20130214724" | "5086382" | "6664762" | "8427107" | "8541979" | "8692516" | "8710801").PN. OR ("9160185").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2018/01/22 12:18
S108	0	S103 and S107	US-PGPUB; USPAT;	OR	ON	2018/01/22 12:19

			USOCR; JPO; DERWENT			
S109	2	(solid near2 state near2 switch MOSFET IGBT) with (drain source) with parallel same balanc$4 with (battery electro$1chemical adj cell electro adj chemical adj cell electro$1chemical$1cell (power energy) near2 storage)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 12:55
S110	64	(solid near2 state near2 switch MOSFET IGBT) with (drain source) with parallel and balanc$4 with (battery electro$1chemical adj cell electro adj chemical adj cell electro$1chemical$1cell (power energy) near2 storage)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 13:00
S111	2	"20100237829".pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/22 14:27
S112	2	"20130330585".pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/23 10:51
S113	44	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$ or US-20140203786-$ or US-20100136390-$ or US-20100185405-$ or US-20120326665-$ or US-20100104928-$ or US-20120183823-$ or US-20090295169-$ or US-20090256521-$ or US-20080265844-$ or US-20090020094-$ or US-20080084182-$ or US-20140079959-$ or US-20140091751-$ or US-20110118916-$).did. or (US-20010042631-$ or US-20130187605-$ or US-20130026829-$ or US-20030160593-$ or US-20100237829-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.	US-PGPUB; USPAT	OR	ON	2018/01/23 14:23
S114	20	(parallel with switch$4) and S113	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/23 14:23
S115	1	(parallel with switch$4) and "20030160593".pn.	US-PGPUB; USPAT;	OR	ON	2018/01/23 14:24

			USOCR; JPO; DERWENT			
S116	5	("20060087280" "5635821").pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2018/01/24 13:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1597	h01m2/1077.cpc.	USPAT	OR	ON	2018/01/29 13:39
L2	1307	h01m2/34.cpc.	USPAT	OR	ON	2018/01/29 13:39
L3	1655	h01m10/425.cpc.	USPAT	OR	ON	2018/01/29 13:39
L4	2617	(solid near2 state near2 switch MOSFET IGBT) with (drain source) with parallel	USPAT	OR	ON	2018/01/29 13:40
L6	71	4 and (battery electro$1chemical adj cell electro adj chemical adj cell electro$1chemical$1cell (power energy) near2 storage) near2 (pack)	USPAT	OR	ON	2018/01/29 13:41
L7	24	(solid near2 state near2 switch MOSFET IGBT) with (drain source) with parallel and balanc$4 with (battery electro$1chemical adj cell electro adj chemical adj cell electro$1chemical$1cell (power energy) near2 storage)	USPAT	OR	ON	2018/01/29 13:42
L8	128	(solid near2 state near2 switch MOSFET IGBT) with (drain source) with parallel same (battery electro$1chemical adj cell electro adj chemical adj cell electro$1chemical$1cell (power energy) near2 storage)	USPAT	OR	ON	2018/01/29 13:43
L9	5	8 and (1 2 3)	USPAT	OR	ON	2018/01/29 13:44

1/29/2018 2:16:52 PM
C:\Users\jjelsma\Documents\EAST\Workspaces\14657101.wsp

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

162 7590 02/08/2018
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NORTH CAROLINA 28210

EXAMINER
JELSMA, JONATHAN G

ART UNIT	PAPER NUMBER
1721	

DATE MAILED: 02/08/2018

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

TITLE OF INVENTION: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
REGULAR	SMALL	$500	$0.00	$0.00	$500	05/08/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PETITIONERS Ex. 1004
27 of 304

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

162 7590 02/08/2018
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NORTH CAROLINA 28210

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

TITLE OF INVENTION: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
REGULAR	SMALL	$500	$0.00	$0.00	$500	05/08/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
JELSMA, JONATHAN G	1721	429-061000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

162 7590 02/08/2018

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NORTH CAROLINA 28210

EXAMINER	
JELSMA, JONATHAN G	

ART UNIT	PAPER NUMBER
1721	

DATE MAILED: 02/08/2018

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/657,101	Applicant(s) Koebler, Martin	
	Examiner JONATHAN G JELSMA	Art Unit 1721	AIA Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to Applicant Arguments/Remarks filed 11/13/2017 .
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____ .

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-21 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____ .
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____ .

/JONATHAN G JELSMA/
Primary Examiner, Art Unit 1721

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Reasons for Allowance

2. The following is an examiner's statement of reasons for allowance: The prior art of record does not explicitly teach or suggest a battery pack which includes a battery pack with at least one lithium based rechargeable cell and a solid state switching apparatus comprising a plurality of pairs of switches connected in parallel with each other, and that either one of the drains or source of the switches are connected to the one or more cells.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN G JELSMA whose telephone number is (571)270-5127. The examiner can normally be reached on Monday through Thursday 7:00 AM to 5:00 AM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an

interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JONATHAN G JELSMA/
Primary Examiner, Art Unit 1721

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/657,101	Koebler, Martin
	Examiner	**Art Unit**
	JONATHAN G JELSMA	1721

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/29/2016	06/08/2017	01/23/2018	01/29/2018					
	1	✓	✓	✓	=					
	2	✓	✓	✓	=					
	3	✓	✓	✓	=					
	4	✓	✓	✓	=					
	5	✓	✓	✓	=					
	6	✓	✓	✓	=					
	7	✓	✓	✓	=					
	8	✓	✓	✓	=					
	9	✓	✓	✓	=					
	10	✓	✓	✓	=					
	11	✓	✓	✓	=					
	12	✓	✓	✓	=					
	13	✓	✓	✓	=					
	14	✓	✓	✓	=					
	15	✓	✓	✓	=					
	16	✓	✓	✓	=					
	17	✓	✓	✓	=					
	18	✓	✓	✓	=					
	19	✓	✓	✓	=					
	20	✓	✓	✓	=					
	21	✓	✓	✓	=					

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/657,101	Koebler, Martin
	Examiner	Art Unit
	JONATHAN G JELSMA	1721

CPC - Searched*		
Symbol	Date	Examiner
H01M2/1077, 34, 425	12/29/2016, 06/08/2017	JGJ
H01M10/425	12/29/2016, 06/08/2017	JGJ

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor name search (EAST)	12/29/2016	JGJ
EAST (see search history)	12/29/2016, 06/07/2017, 06/08/2017	JGJ
Updated search (EAST)	01/22/2018	JGJ

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
H01M2	1077, 34	01/29/2018	JGJ
H01M10	425	01/29/2018	JGJ

PETITIONERS Ex. 1004
35 of 304

RECEIVED
CENTRAL FAX CENTER

FEB 0 7 2018

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT EXAMINING OPERATIONS

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)

Applicant: MARTIN KOEBLER

Serial No: 14/657,101

Filed: March 13, 2015

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Charlotte, North Carolina
February 7, 2018

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

SUPPLEMENTAL AMENDMENT

Supplemental to the submission dated January 24, 2018, kindly amend the above-identified application as follows:

Amendment to the Title appears on page 2.

Remarks begin on page 3 of this paper.

PAGE 3/5 * RCVD AT 2/7/2018 8:46:53 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/37 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-54

Serial Number 14/657,101
Attorney's Docket 5094
Art Unit 1721

In the Title:

Please change the Title to read - - LITHIUM BATTERY WITH SOLID STATE SWITCH - - .

PAGE 4/5 * RCVD AT 2/7/2018 8:46:53 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/37 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-54

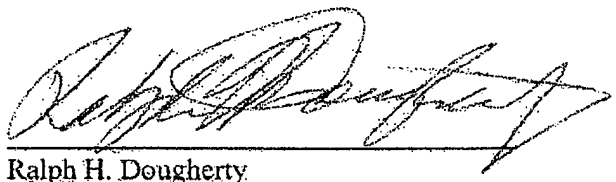
RECEIVED
CENTRAL FAX CENTER
FEB 0 7 2018

Serial Number 14/657,101
Attorney's Docket 5094
Art Unit 1721

REMARKS

Upon review of the sublject application, it is noted that the title is the same as appeared in the parent case, but the claims are quite different. Accordingly the Applicant requests that the title be changed to read - - LITHIUM BATTERY WITH SOLID STATE SWITCH - - which more accurately describes the invention.

Respectfully submitted,



Ralph H. Dougherty
Agent for Applicant
Registration No. 25,851
4219 Kronos Place
Charlotte, North Carolina 28210
Telephone: (704) 940-3988
Facsimile: (704) 631-4996

Attorney's
Docket 5094

PAGE 5/5 * RCVD AT 2/7/2018 8:46:53 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/37 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-54

RECEIVED
CENTRAL FAX CENTER

FEB 0 7 2018

FAX COVER SHEET

TO	
COMPANY	
FAX NUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2018-02-08 01:42:46 GMT
RE	Dkt 5094: Title -Examiner Jonathan G. JELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 4 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached Supplemental Amendment to Examiner Jonathan G. JELSMA, Art Unit 1721.
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Reg. No. 25,851
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988
Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution

or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

THIS PAGE BLANK (USPTO)

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	14/657,101	KOEBLER, MARTIN	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 1/24/18	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
jean proctor

U.S. Patent and Trademark Office

RECEIVED
CENTRAL FAX CENTER

JAN 2 4 2018

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 5094

In re Application of: MARTIN KOEBLER

Application No.: 14/657,101

Filed: March 13, 2015

For: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

The applicant, MARTIN KOEBLER, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 9,412,994 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 25,851

Signature — 01-24-2018 Date

RALPH H. DOUGHERTY
Typed or printed name

Agent of Record — Title

704-940-3988 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

01/25/2018 STANN1 00000008 14657101

01 FC:2814 160.00 OP

RECEIVED
CENTRAL FAX CENTER

JAN 2 4 2018

FAX COVER SHEET

TO	
COMPANY	
FAXNUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2018-01-24 20:24:26 GMT
RE	Dkt 5094: Terminal Disclaimer -Examiner Jonathan G. JELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 3 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY,
WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached Terminal Disclaimer documents to Examiner Jonathan G. JELSMA, Art Unit 1721.
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Reg. No. 25,851
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988
Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

PAGE 1/4 * RCVD AT 1/24/2018 3:24:47 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/30 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):03-10

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 2/4 * RCVD AT 1/24/2018 3:24:47 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/30 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):03-10

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT EXAMINING OPERATIONS

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)

Applicant: MARTIN KOEBLER

Serial No: 14/657,101

Filed: March 13, 2015

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Charlotte, North Carolina
November 10, 2017

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

AMENDMENT

Responsive to the Official Action dated June 13, 2017, kindly amend the above-identified application as follows:

Amendments to the Drawings begin on page 2.

Amendments to the Claims begin on page 3.

Remarks begin on page 9 of this paper.

PAGE 5/24 * RCVD AT 11/10/2017 12:09:12 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/22 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):17-13

In the drawings:

Please substitute the attached 22 Replacement Sheets containing Figures 1 through 49 for the drawing figures originally filed.

In the claims:

The claim status is now:

1. (Currently Amended) A battery pack having positive and negative terminals for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system, said battery pack comprising:

a battery pack housing; ~~and~~

at least one lithium-based rechargeable cell within said housing; and

a solid state switching apparatus comprising a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches, each switch having a source and a drain, the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected, and said parallel configuration being connected with one or more cells between the positive and negative terminals,

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

2. (Original) A battery pack according to claim 1 wherein the lithium-based cell is selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoA1O_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

3. (Original) A battery pack according to claim 1, wherein said battery pack comprises from three to sixteen lithium-based rechargeable cells in series in said housing.

4. (Original) A battery pack according to claim 1, further comprising a protection circuit board within said battery housing, said protection circuit board including at least one of a solid state switch, MOSFET, diode, or relay, which protects against temperature, reverse polarity, undervoltage or overvoltage.

5. (Currently Amended) A battery pack according to claim 1, ~~further comprising a~~ wherein the solid state switching apparatus for one or more of said lithium based cells ~~in said battery pack~~ is encased in said battery pack housing, ~~said battery pack having a positive terminal and a negative terminal,~~ each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch ~~within said battery pack housing, such switch being connected between the battery pack and a terminal;~~

~~said solid state switch~~ being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

6. (Original) Apparatus according to claim 5, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

7. (Original) Apparatus according to claim 5, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoA1O_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

8. (Currently Amended) A battery pack according to claim 1, ~~further comprising a~~ wherein the solid state switching apparatus for one or more of said lithium based cells ~~in said battery pack~~ is encased in said battery pack housing, ~~said battery pack having a positive terminal and a negative terminal,~~ each of said cells having a positive pole and a negative pole, said apparatus

comprising:

at least one solid state switch ~~within said battery pack housing, such switch being connected between the battery pack and a terminal;~~

~~said solid state switch~~ being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

9. (Original) Apparatus according to claim 8, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

10. (Original) Apparatus according to claim 8, wherein said one or more cells are selected from the group consisting of $LiFePO$, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoA1O_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

11. (Currently Amended) Apparatus according to claim 1, wherein the operating system of said internal combustion engine includes a battery, said apparatus further comprising a pair of cables, each cable situated in a cable housing, one end of each cable ~~connecting~~ connectable to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack, and at least one of a MOSFET, diode, or relay being situated within one of said cable housings.

12. (Currently Amended) A deep cycle battery having positive and negative terminals in a 6 volt to 800 volt operating system, comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing;

a battery management system including a processor and a circuit board ~~having a MOSFET~~

~~arrangement~~ which protects from one of overvoltage, undervoltage, reverse polarity, short circuit, and extremes of temperature;

wherein said circuit board comprises a solid state switching apparatus comprising a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches, each switch having a source and a drain, the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected, and said parallel configuration being connected with one or more cells between the positive and negative terminals,

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

13. (Original) A deep cycle battery according to claim 12 wherein the lithium-based cell is selected from the group consisting of $LiFePO_4$, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoA1O_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

14. (Original) A deep cycle battery according to claim 12, wherein said battery comprises from two to 250 lithium-based rechargeable cells in series in one or more of said housings.

15. (Currently Amended) A deep cycle battery according to claim 12, ~~further comprising a~~ wherein the solid state switching apparatus for one or more of said lithium based cells ~~in said battery pack~~ is encased in said battery pack housing, ~~said battery pack having a positive terminal and a negative terminal,~~ each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch ~~within said battery pack housing, such switch being connected between the battery pack and a terminal;~~

~~said solid state switch being~~ connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

16. (Original) Apparatus according to claim 15, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

17. (Original) Apparatus according to claim 15, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoA1O_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

18. (Currently Amended) ~~A deep cycle battery according to claim 12, further comprising a~~ wherein the solid state switching apparatus for one or more of said lithium based cells ~~in said battery pack~~ is encased in said battery pack housing, ~~said battery pack having a positive terminal and a negative terminal~~, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch ~~within said battery pack housing, such switch being connected between the battery pack and a terminal;~~

~~said solid state switch being~~ connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

19. (Original) Apparatus according to claim 18, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

PAGE 11/24 * RCVD AT 11/10/2017 12:09:12 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/22 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):17-13

20. (Original) Apparatus according to claim 18, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

21. (Currently Amended) A battery pack having positive and negative terminals for driving a battery device in a 12 volt to 120 volt internal combustion engine, said battery pack comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing, the total discharging amount of each lithium-based cell in the battery pack being from three (3) Ah to 5000 Ah, and charging voltage per one cell being 3.0 to 4.2 V;

a pair of cables, each cable having a cable housing in which it is situated; one end of each cable being provided with and connected to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack; and

~~at least one of~~ a solid state switching apparatus ~~switch, MOSFET, diode, or relay~~ being situated within one of said cable housings and comprising a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches, each switch having a source and a drain, the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected, and said parallel configuration being connected with one or more cells between the positive and negative terminals.

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

REMARKS

The drawings are objected to by the Examiner. Replacement Sheets containing Figures 1 through 49 have been re-prepared, are submitted herewith, and are believed to correct all informalities. There are no extraneous marks on the drawings as they are being prepared for transmission.

The Examiner has indicated that, although the priority was properly claimed in the specification upon filing, the Application Data Sheet filed on 08/06/2015 is cosidered improper in that it fails to list the provisional applications upon which priority is based. Accordingly, a replacement ADS is submitted herewith indicating all previous applications in the chain of applications as listed in Paragraph 0001 of the Specification.

As to the claims, the Official Action rejects Claims 1, 3 and 4 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent Application Publication No. US 2009/0020094 to Ono ("Ono") in view of U.S. Patent Application Publication No. US 2010/0136390 to Ueda ("Ueda"). The Official Action rejects Claim 2 under 35 U.S.C. § 103 as being unpatentable over Ono in view of Ueda and in further view of U.S. Patent Application Publication No. US 2009/0123813 to Chiang ("Chiang"). Claims 5, 6, 8 and 9 are rejected under 35 U.S.C. § 103 as being unpatentable over Ono in view of Ueda and in further view of U.S. Patent No . 5,552,642 to Dougherty ("Dougherty"). The Official Action rejects Claims 7 and 10 under 35 U.S.C. § 103 as being unpatentable over Ono in view of Ueda and Dougherty and further in view of Chiang. Claims 11 and 21 are rejected under 35 U.S.C. § 103 as being unpatentable over Ono in view of Ueda and in further view of U.S. Patent No. 4,166,241 to Grant ("Grant"). Claims 12 and 14 are rejected under 35 U.S.C. § 103 as being unpatentable over Ono in view of Ueda and further in view of U.S. Patent Application Publication No. US 2008/0084182 to Oberlin ("Oberlin"). Claim 13 was rejected under 35 U.S.C. § 103 as being unpatentable over Ono in view of Ueda and Oberlin and in further view of Chiang. Claims 15, 16, 18 and 19 were rejected under 35

PAGE 13/24 * RCVD AT 11/10/2017 12:09:12 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/22 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):17-13
PETITIONERS Ex. 1004
53 of 304

U.S.C. § 103 as being unpatentable over Ono in view of Ueda and Oberlin and in further view of Dougherty. Finally, Claims 17 and 20 were rejected under 35 U.S.C. § 103 as being unpatentable over Ono in view Ueda, Oberlin and Dougherty and in further view of Chiang.

As described below, the independent claims have been amended in order to be further patentably distinct from the cited references, taken either individually or in any proper combination. As a result of the amendments to the independent claims 1 and 12, dependent Claims 5, 8, 15 and 18 have been correspondingly amended. Additionally, dependent Claim 11 has been amended to correct a typographical error. Based on the foregoing amendments and the following remarks, reconsideration of the present application and allowance of the amended set of claims are respectfully requested.

Each of the independent claims has been amended to recite, in one form or another, a solid state switching apparatus comprising a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches. The independent claims, as amended, further define the switches such that each switch has a source and a drain with the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected. The independent claims have further been amended to recite that the parallel configuration of the plurality of solid state switches is connected with the one or more cells between the positive and negative terminals of the battery pack. Support for these amendments are provided at least by Figures 16-23 and the corresponding text of the present application. In this regard, Figures 16, 17, 20 and 21 and the corresponding text disclose embodiments in which the drains of a pair of switches are connected, while Figures 18, 19, 22 and 23 and the corresponding text describe embodiments in which the sources of a pair of switches are connected.

None of the cited references teaches or suggests a battery pack as recited by independent Claims 1 and 21 or a deep cycle battery as recited by independent Claim 12. In particular, none of the cited

references teaches or suggests a solid state switching apparatus as now defined by the amended independent claims. Dependent Claims 5, 8, 15 and 18 previously introduced a solid state switching apparatus, albeit in a different form and at a different level of detail relative to that now set forth by the amended independent claims. On pages 6 and 11 of the Official Action in conjunction with the rejection of original dependent Claims 5 and 8 and Claims 15 and 18, respectively, the Official Action notes that the primary reference Ono does not disclose a solid state switching apparatus. As such, the Official Action cites Dougherty for its disclosure of a protection system that includes a control circuit having a switching device connected between cells in order to control the number of cells that are connected in order to start an electric vehicle. The switching device of Dougherty is configured to switch between three poles designated S1, S2 and S4. S1 is tied to a positive battery terminal, S2 is tied to terminal 30 of battery portion 26 and S4 is connected to ground. However, the switching device of Dougherty does not include a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches as now recited by the amended independent claims. In addition, the switching device of Dougherty is not configured such that either the drains of the switches or the sources of the switches of a pair of switches are connected as also recited by the amended independent claims. Further, the switching device of Dougherty is not positioned such that the parallel configuration of the solid state switches is connected with the one or more cells between the positive and negative terminals of the battery pack as further recited by the amended independent claims. Instead, the switching device of Dougherty is a single switch having three distinct terminals that can be selected.

None of the other cited references teaches or suggests a solid state switching device as now recited by the amended independent claims and, indeed, none of the other references were cited for this proposition. Since none of the cited references teaches or suggests a solid state switching device as now defined by the amended independent claims, it logically follows that no proper combination of the cited references teaches or suggests such a solid state switching device. Thus, the rejections of the

independent claims, as amended, are overcome.

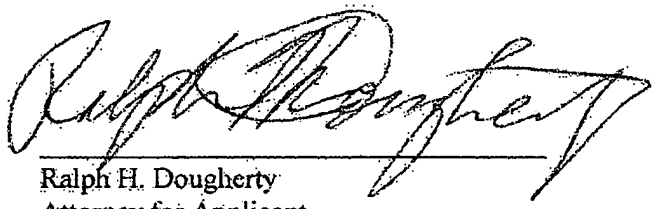
Because each of the dependent claims includes each of the recitations of a respective independent base claim, Applicant further submits that the dependent claims are patentably distinct from the cited references, taken alone or in combination, for at least those reasons as discussed above. Accordingly, Applicant respectfully submits that the rejections of the dependent claims are overcome and the dependent claims are in condition for allowance. As the patentability of the independent claims has been established as set forth above, Applicant will not take this opportunity to argue the merits of the rejection with regard to specific dependent claims. However, Applicant does not concede that the dependent claims are not independently patentable and reserves the right to argue the patentability of dependent claims at a later date if necessary.

No new matter is presented in the claims.

Since this amendment does not add more claims than previously paid for, no additional claim fee is required. However, a two-month extension of time fee is submitted herewith.

In view of the foregoing amendment and these remarks, this application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicant. The Examiner is invited to call Applicant's undersigned attorney if, in the opinion of the Examiner, a telephone conference will expedite prosecution of this application.

Respectfully submitted,



Ralph H. Dougherty
Attorney for Applicant
Registration No. 25,851
RALPH H. DOUGHERTY, P.A.
4219 Kronos Place
Charlotte, North Carolina 28210
Telephone: (704) 940-3988
Facsimile: (704) 631-4996

Enclosures - 22 Replacement Sheets of Drawings
Replacement ADS

Attorney's
Docket 5094

PAGE 17/24 * RCVD AT 11/10/2017 12:09:12 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/22 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):17-13

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	MARTIN		KOEBLER	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	DAVIDSON	State/Province	NC	Country of Residence	US

Mailing Address of Inventor:

Address 1	530 Portside Drive		
Address 2			
City	Davidson	State/Province	NC
Postal Code	28036	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	00162		
Email Address	ralph@ralphdougherty.com	Add Email	Remove Email

Application Information:

Title of the Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR		
Attorney Docket Number	5094	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	24	Suggested Figure for Publication (if any)	

Filing By Reference :

EFS Web 2.2.12

RECEIVED
CENTRAL FAX CENTER

NOV 13 2017

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	00162		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14657101	Continuation in part of	13989273	2013-05-23
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13989273	a.371 of international	PCT/US2011/001937	2011-11-28
Prior Application Status	Pending		Remove

EFS Web 2.2.12

RECEIVED
CENTRAL FAX CENTER

NOV 13 2017

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US2011/001937	Claims benefit of provisional	61458657	2010-11-29
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US2011/001937	Claims benefit of provisional	61463736	2011-02-22

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[1] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[1]	Filing Date (YYYY-MM-DD)	Access Code[1] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

RECEIVED
CENTRAL FAX CENTER

NOV 13 2017

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY; WITH SOLID STATE SWITCH THEREFOR	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US2011/001937	Claims benefit of provisional	61458657	2010-11-29
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US2011/001937	Claims benefit of provisional	61463736	2011-02-22

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[1] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[1]	Filing Date (YYYY-MM-DD)	Access Code[1] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the Add button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

RECEIVED
CENTRAL FAX CENTER

NOV 13 2017

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

○ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Mailing Address Information For Applicant:			
Address 1	530 Portside Drive		
Address 2			
City	Davidson	State/Province	NC
Country	US	Postal Code	28036
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		State/Province	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature	/RALPH H. DOUGHERTY/			Date (YYYY-MM-DD)	2017-11-10
First Name	RALPH	Last Name	DOUGHERTY	Registration Number	26851

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

FAX COVER SHEET

TO	
COMPANY	
FAXNUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2017-11-10 17:07:56 GMT
RE	Docket 5094: Examiner Jonathan G. SELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 23 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY,
WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached documents to Examiner Jonathan G. JELSMA, Art Unit 1721.
The file containing Replacement Drawings is too large for the server and is being sent separately.
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Ralph H. Dougherty, P.A.
Patent, Trademark, Copyright Law
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988

PAGE 1/24 * RCVD AT 11/10/2017 12:09:12 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/22 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):17-13

Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 2/24 * RCVD AT 11/10/2017 12:09:12 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/22 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):17-13

PTO/SB/97 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Certificate of Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office

on November 10, 2017
Date


Signature

RALPH H. DOUGHERTY
Typed or printed name of person signing Certificate

25,851
Registration Number, if applicable

704-940-3988
Telephone Number

Note: Each paper must have its own certificate of transmission, or this certificate must identify each submitted paper.

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO-2038 (05-2012)
Approved for use through 11/30/2014. OMB 0651-0043
United States Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Credit Card Payment Form

(Do not submit this form electronically via EFS-Web)

Please Read Instructions before Completing this Form

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

11/13/2017 JVONG1 00000010 14657101

01 FC:2252 300.00 OP

Payment Amount (US Dollars): $ 300.00

Cardholder Signature: [signature] Date (mm/dd/yyyy): 11/10/2017

Refund Policy: The USPTO may refund a fee paid by mistake or in excess of that required. A change of purpose after the payment of a fee will not entitle a party to a refund of such fee. The USPTO will not refund amounts of $25.00 or less unless a refund is specifically requested and will not notify the payor of such amounts (37 CFR 1.26). Refund of a fee paid by credit card will be issued as a credit to the credit card account to which the fee was charged.

Maximum Daily Limit: Effective June 30, 2012, the daily limit per credit card account will decrease from $99,999.99 to $49,999.99, and the daily limit for debit cards will be eliminated.

Credit Card Billing Address

Street Address 1: 4219 Kronos Place

Street Address 2:

City: Charlotte

State/Province: NC Zip/Postal Code: 28210

Country: US

Daytime Phone #: 704-940-3988 Fax #: 704-631-4996

Request and Payment Information

Description of Request and Payment Information:

Small Entity 2-month Extension of Time Fee

☑ Patent Fee	☐ Patent Maintenance Fee	☐ Trademark Fee	☐ Other Fee
Application No. 14/657,101	Application No.	Application No.	IDON Customer No.
Patent No.	Patent No.	Registration No.	
Attorney Docket No. 5094		Identify or Describe Mark	

If the cardholder includes a credit card number on any form or document other than the Credit Card Payment Form or submits this form electronically via EFS-Web, the United States Patent and Trademark Office will not be liable in the event that the credit card number becomes public knowledge.

RECEIVED
CENTRAL FAX CENTER

NOV 1 3 2017

FAX COVER SHEET

TO	
COMPANY	
FAX NUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2017-11-10 17:15:06 GMT
RE	Docket 5094: Dwgs -Examiner Jonathan G. SELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 24 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY,
WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached documents to Examiner Jonathan G. JELSMA, Art Unit 1721. This file contains Replacement Drawings which should accompany the amendment filed separately today,
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Ralph H. Dougherty, P.A.
Patent, Trademark, Copyright Law
4219 Kronos Place
Charlotte, NC 28210 USA

PTO/SB/97 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Certificate of Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office

on November 10, 2017
Date


Signature

RALPH H. DOUGHERTY
Typed or printed name of person signing Certificate

25,851
Registration Number, if applicable

704-940-3988
Telephone Number

Note: Each paper must have its own certificate of transmission, or this certificate must identify each submitted paper.

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

REPLACEMENT SHEET

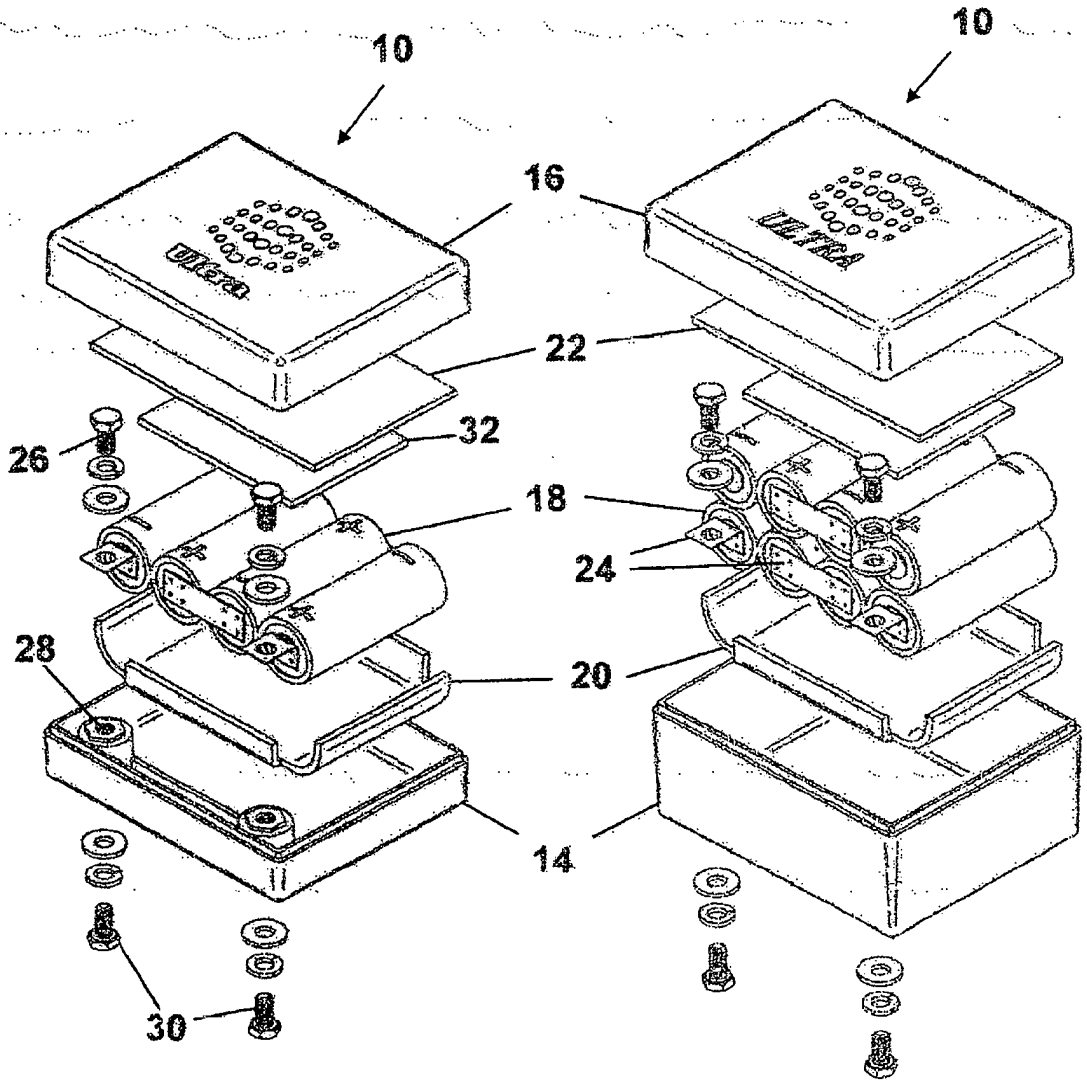


Fig. 1

Fig. 2

REPLACEMENT SHEET

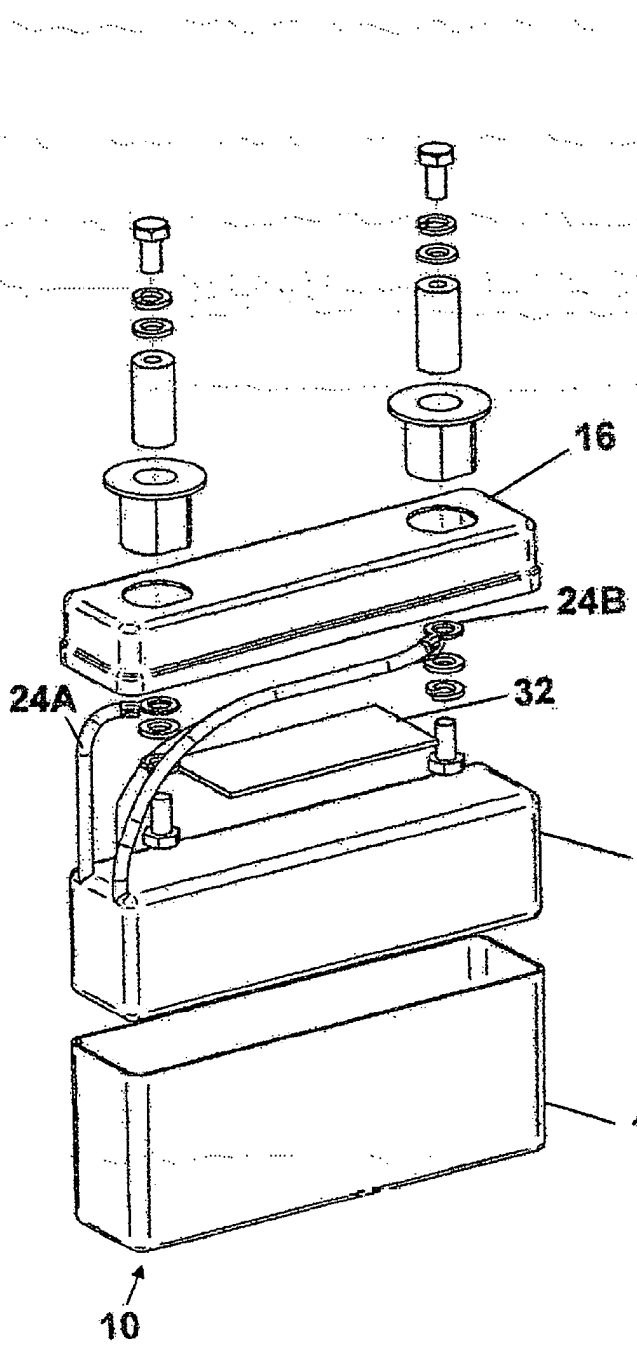


Fig. 3

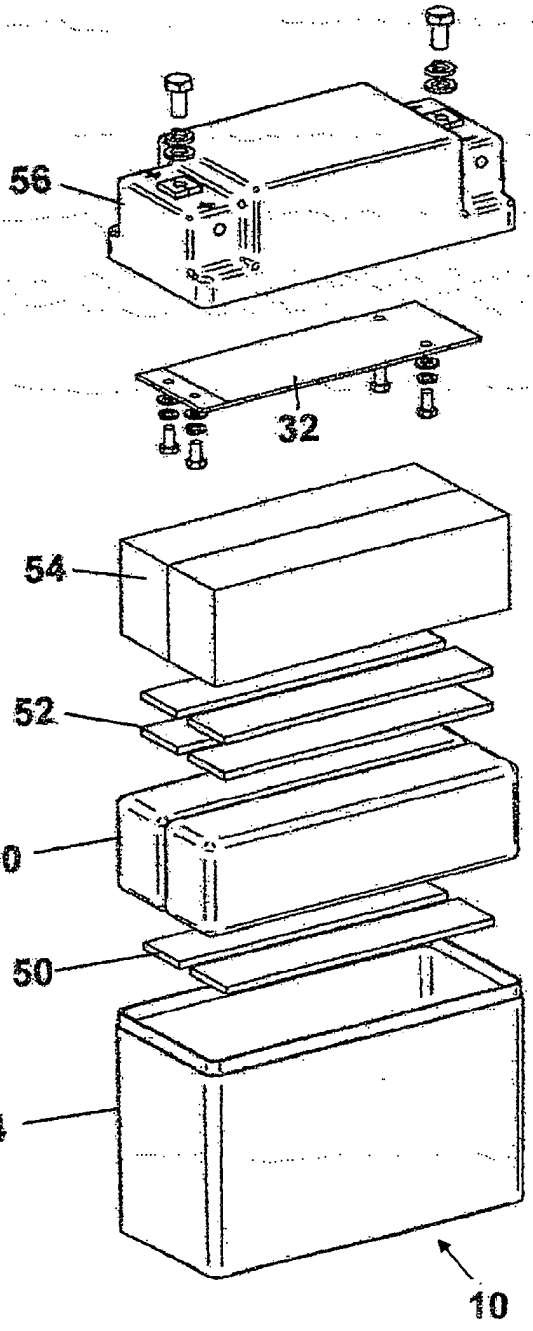


Fig. 13

REPLACEMENT SHEET

Fig. 5

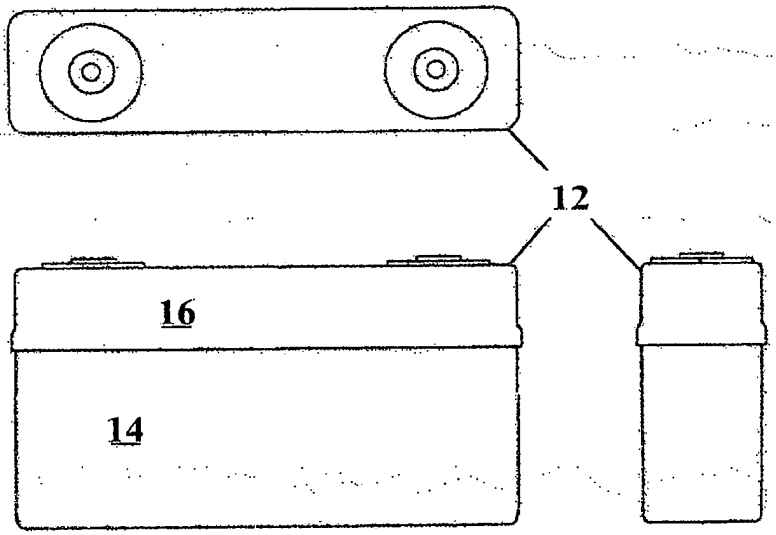


Fig. 4

Fig. 6

Fig. 7

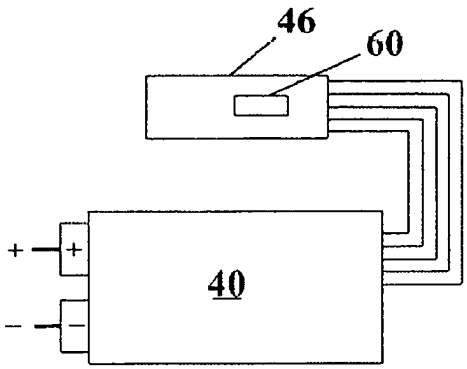
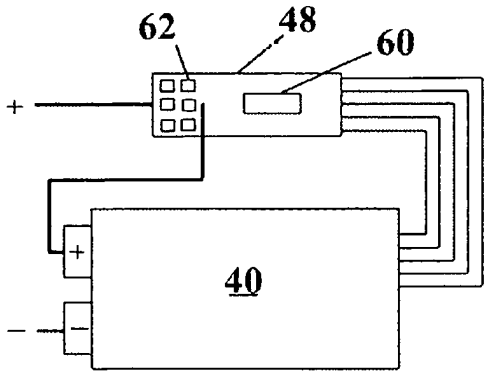


Fig. 8



REPLACEMENT SHEET

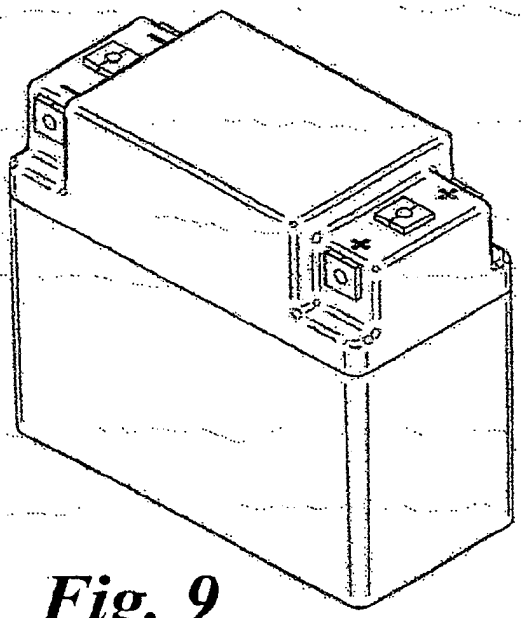


Fig. 9

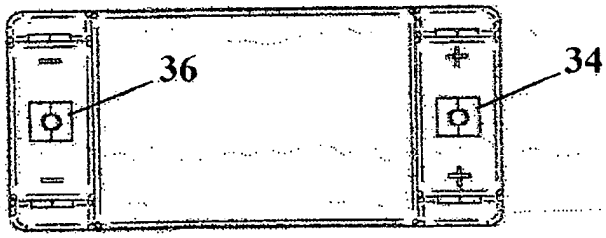


Fig. 10

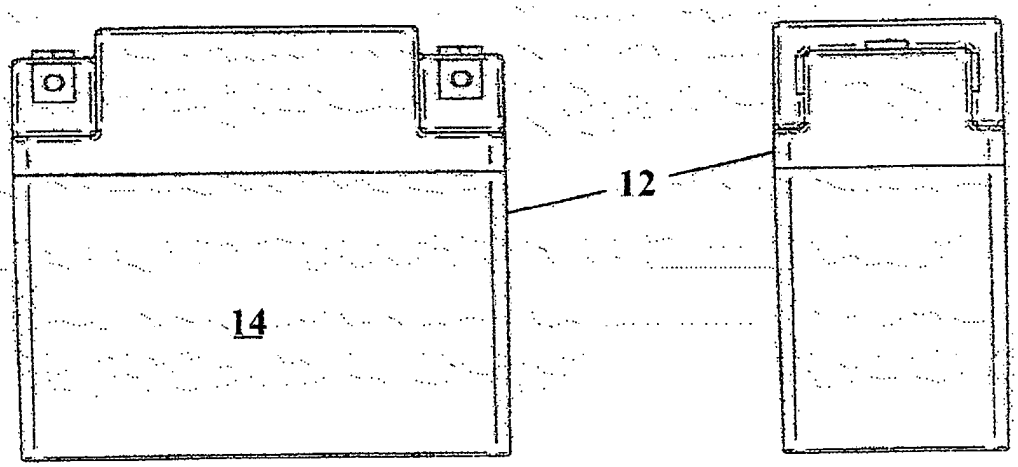


Fig. 11

Fig. 12

REPLACEMENT SHEET

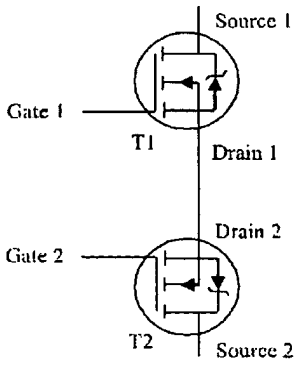


Fig. 14

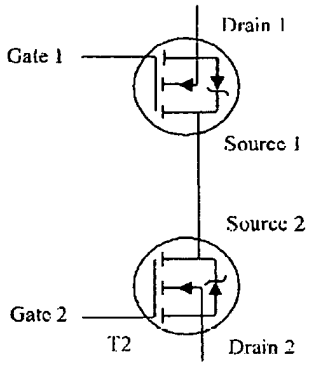


Fig. 15

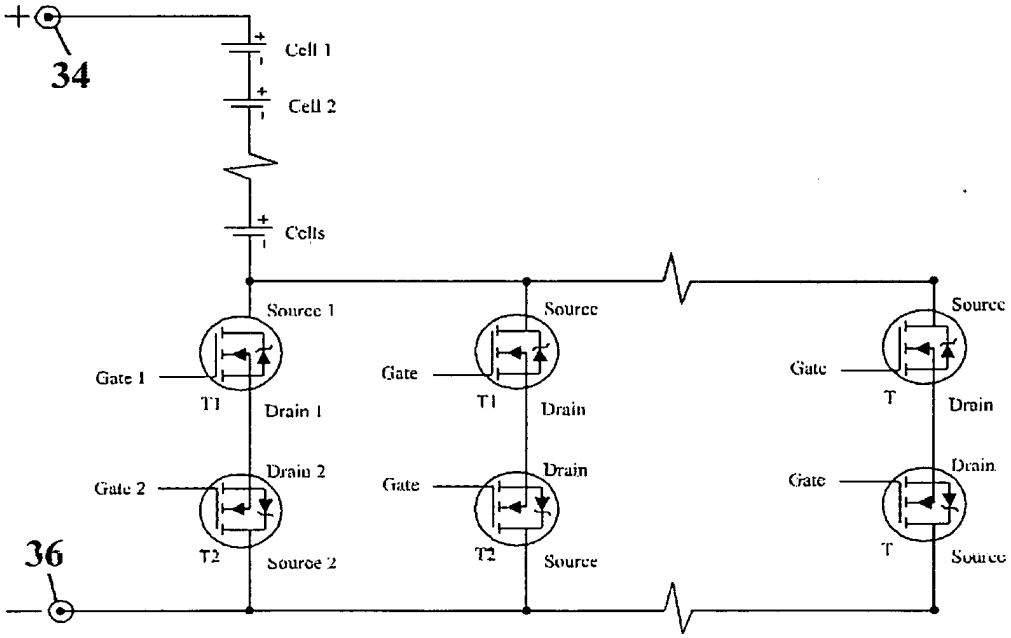


Fig. 16

REPLACEMENT SHEET

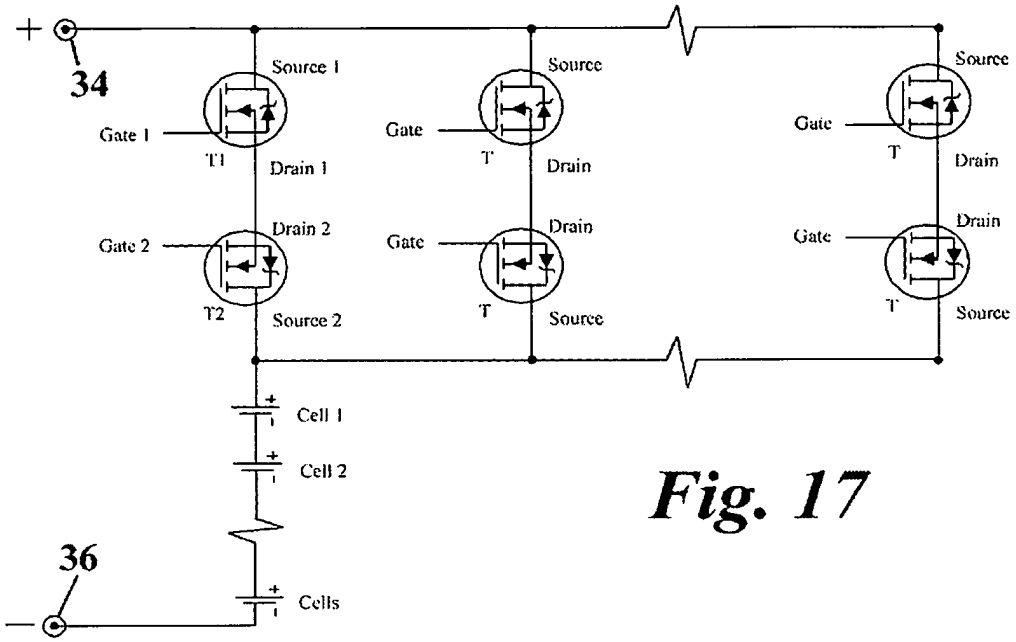


Fig. 17

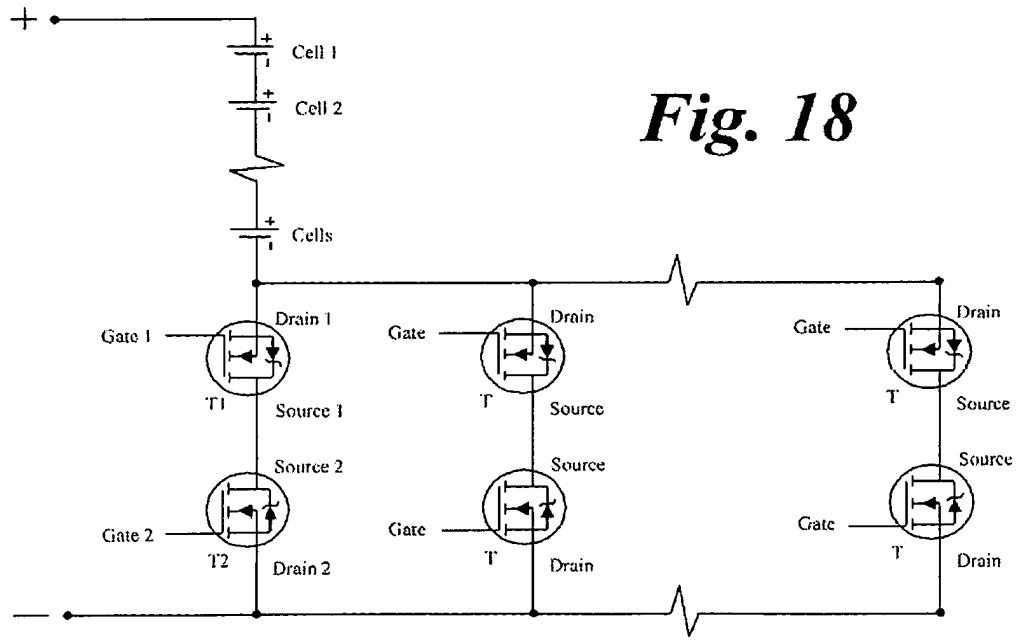


Fig. 18

REPLACEMENT SHEET

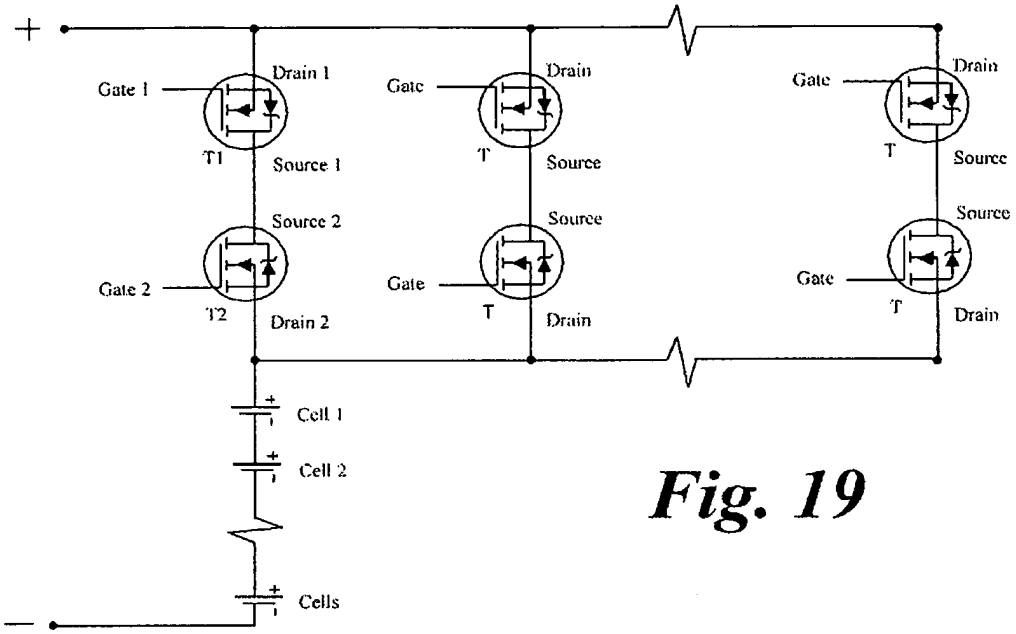


Fig. 19

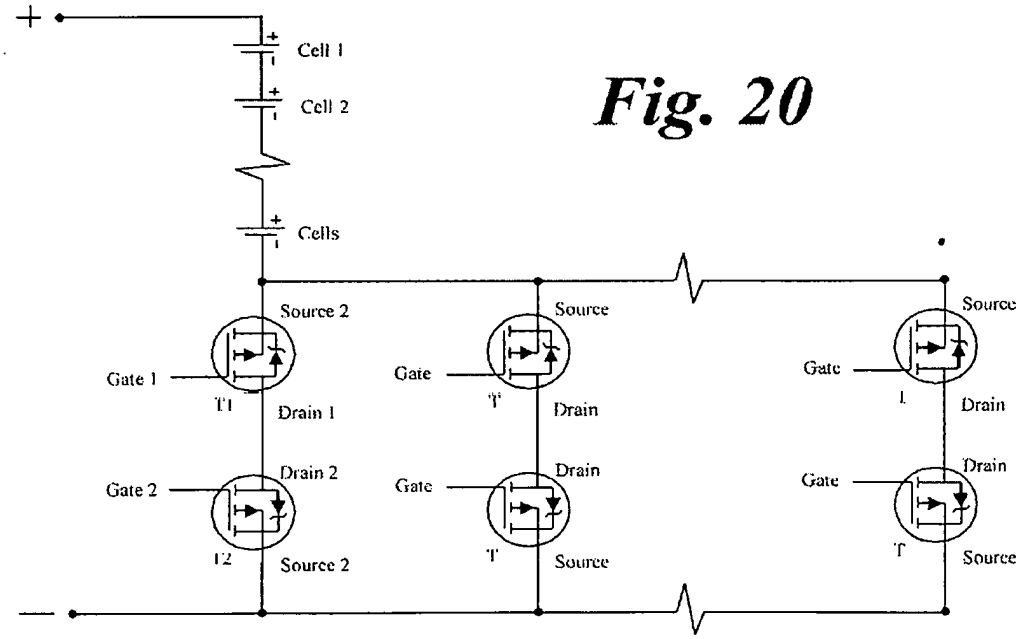


Fig. 20

REPLACEMENT SHEET

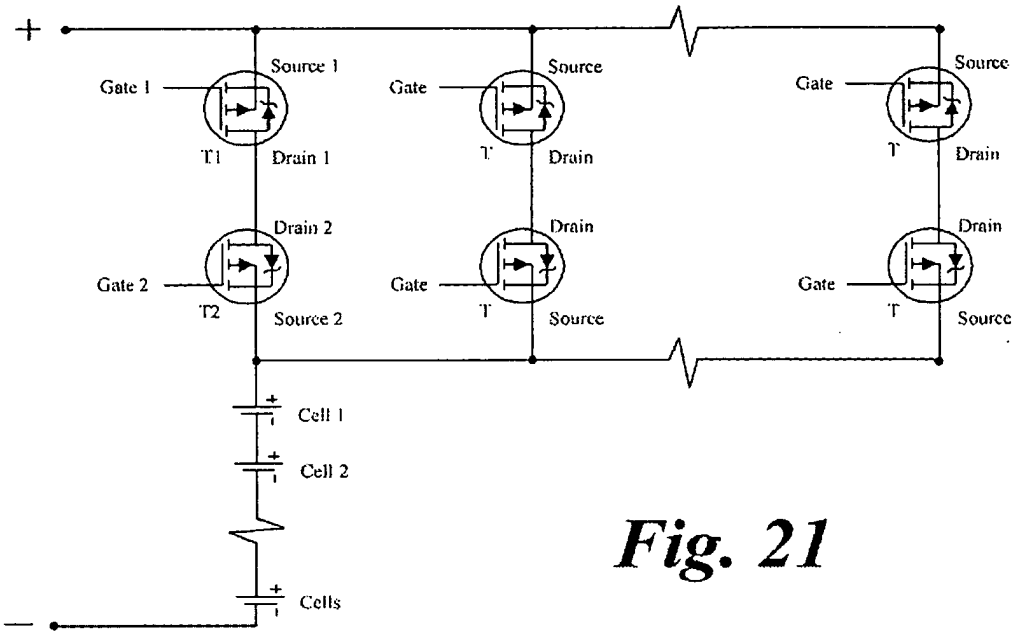


Fig. 21

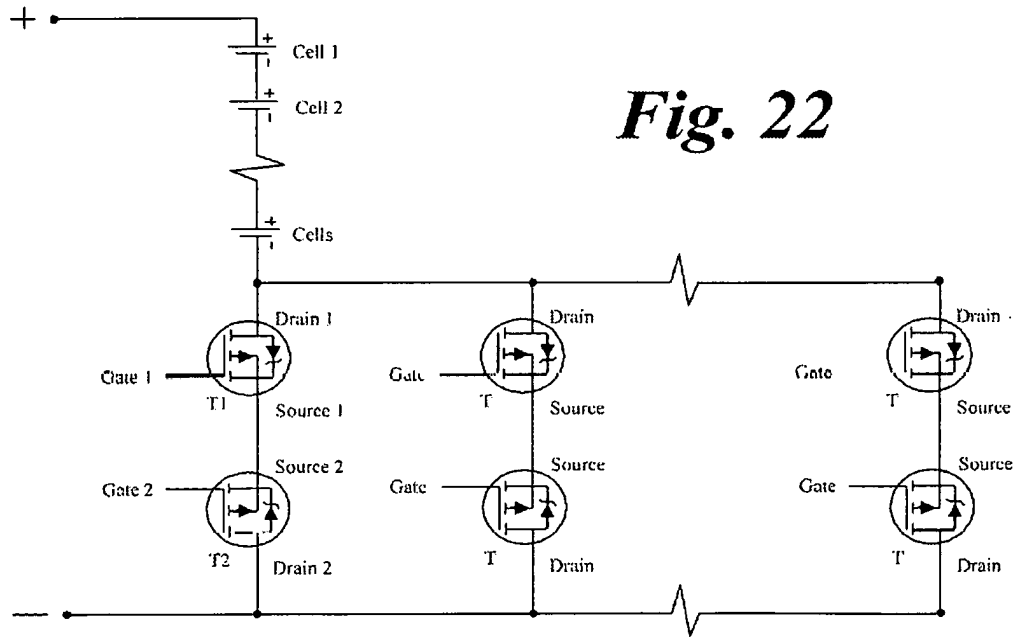


Fig. 22

REPLACEMENT SHEET

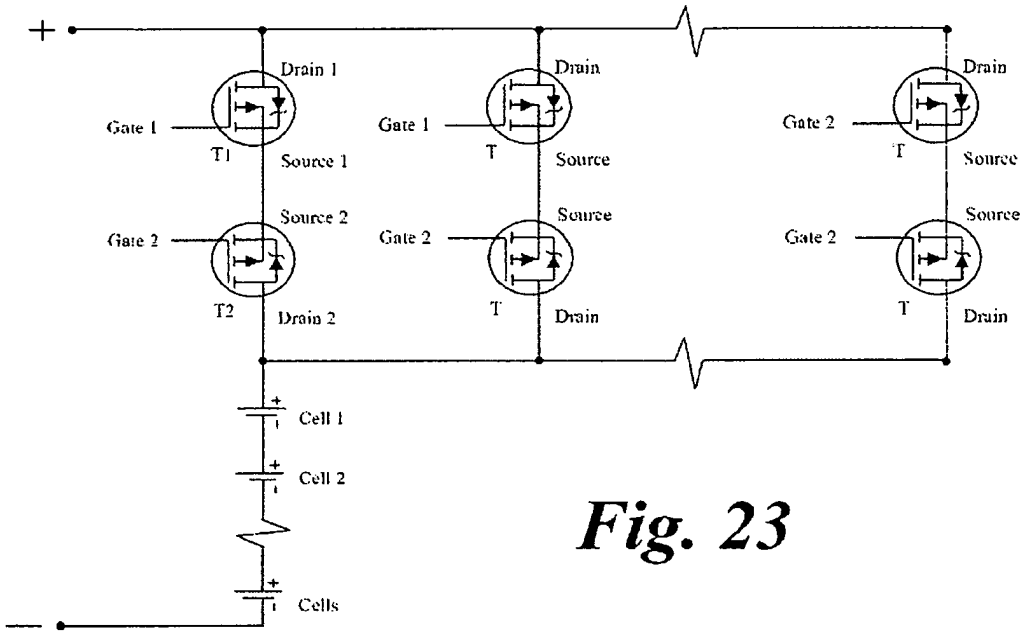


Fig. 23

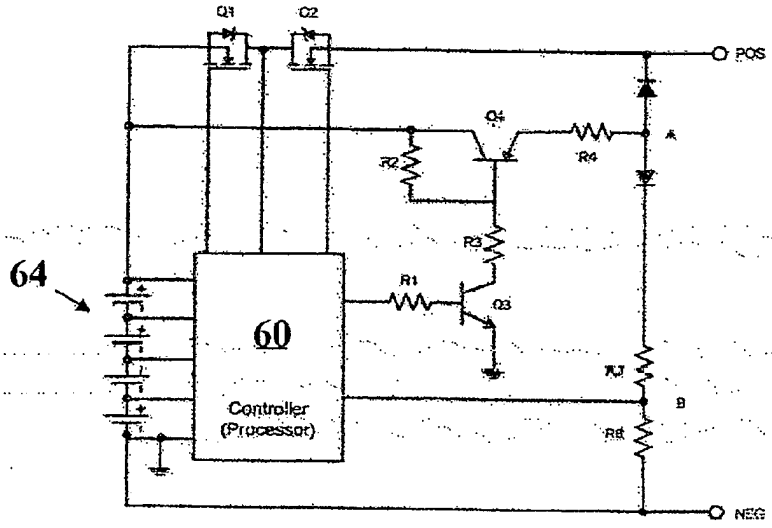


Fig. 24

REPLACEMENT SHEET

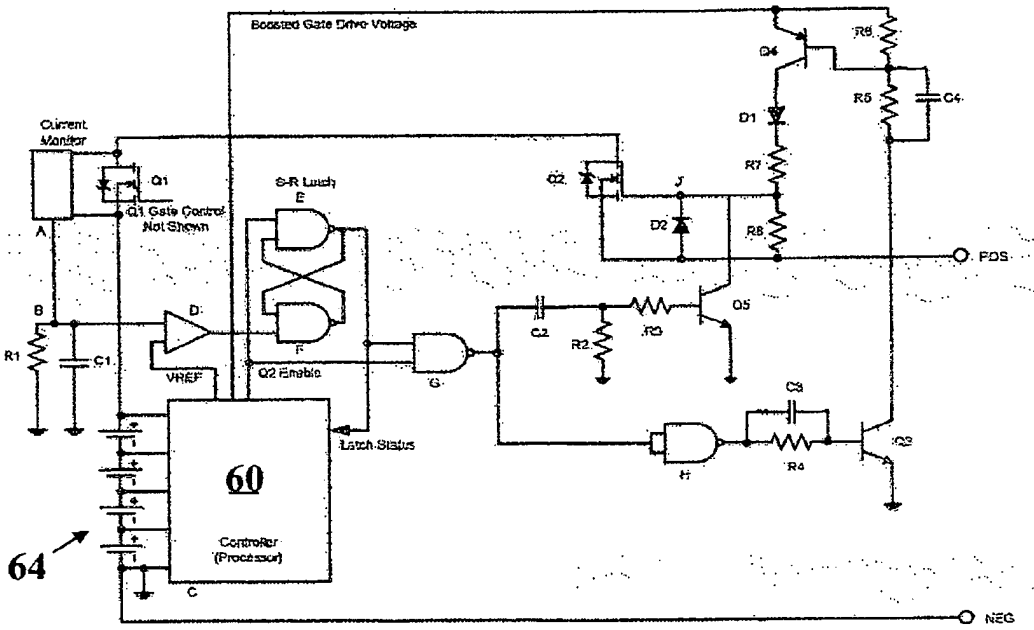


Fig. 25

REPLACEMENT SHEET

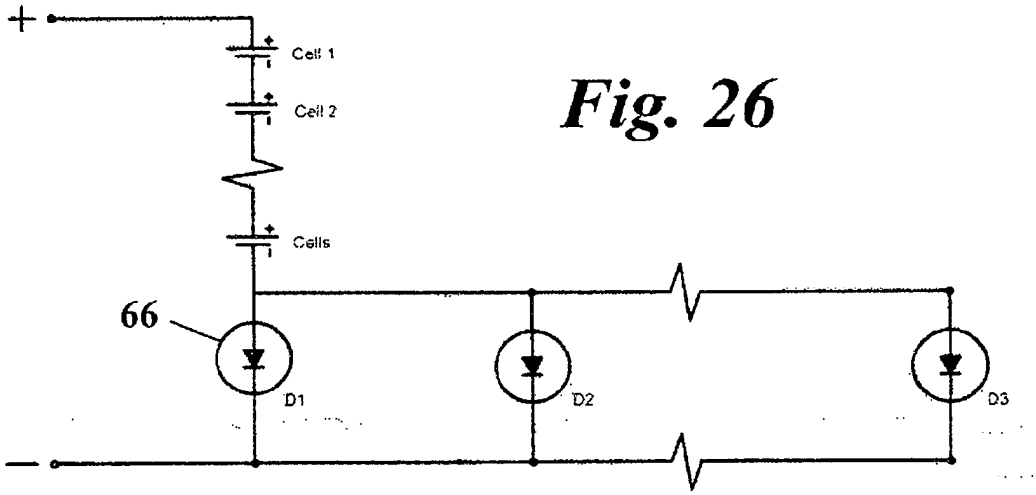


Fig. 26

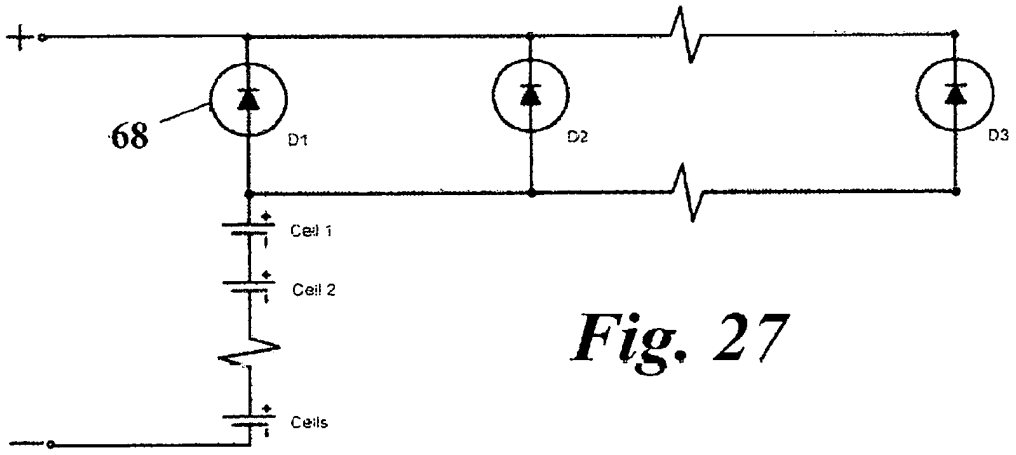


Fig. 27

REPLACEMENT SHEET

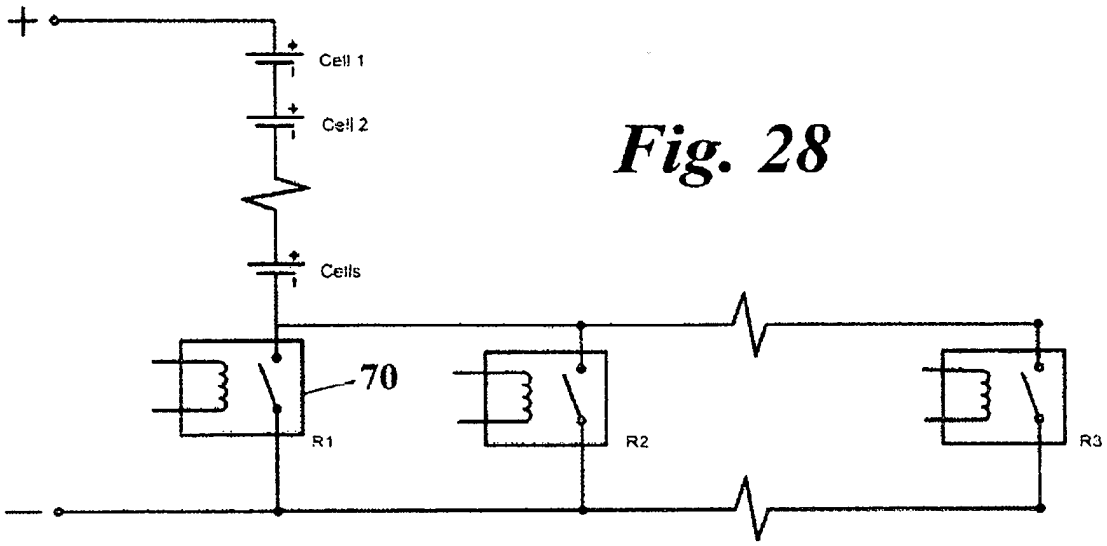


Fig. 28

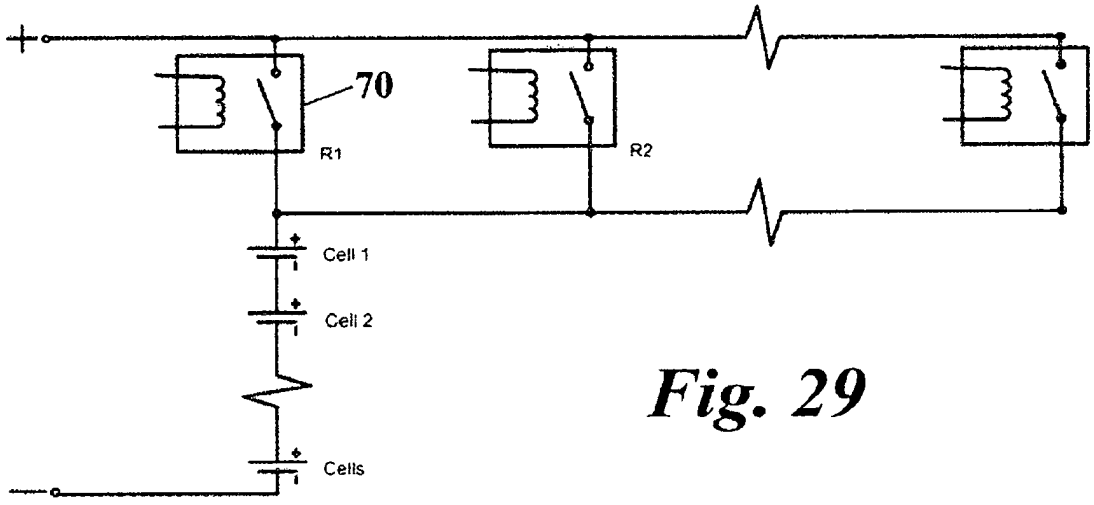


Fig. 29

REPLACEMENT SHEET

Fig. 30

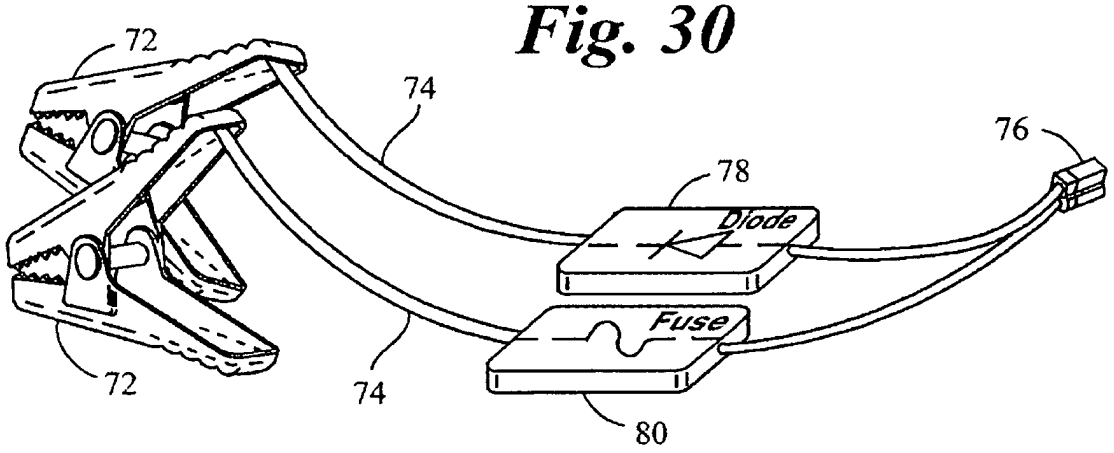


Fig. 31

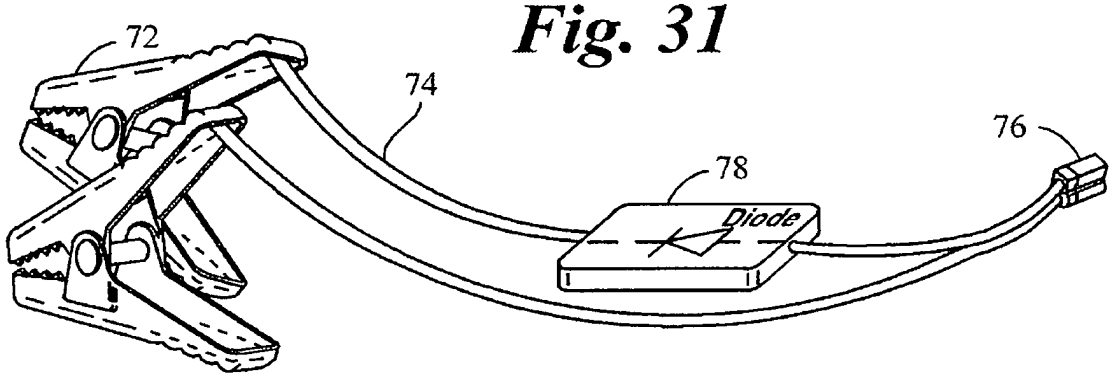
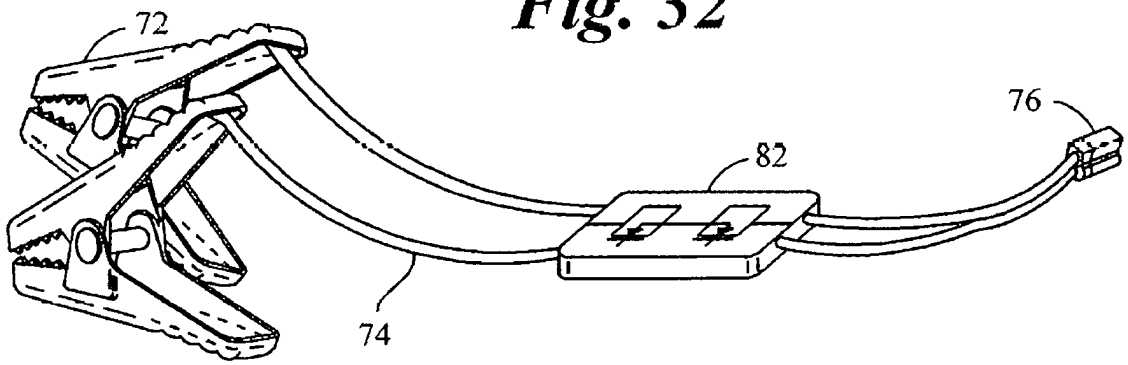


Fig. 32



REPLACEMENT SHEET

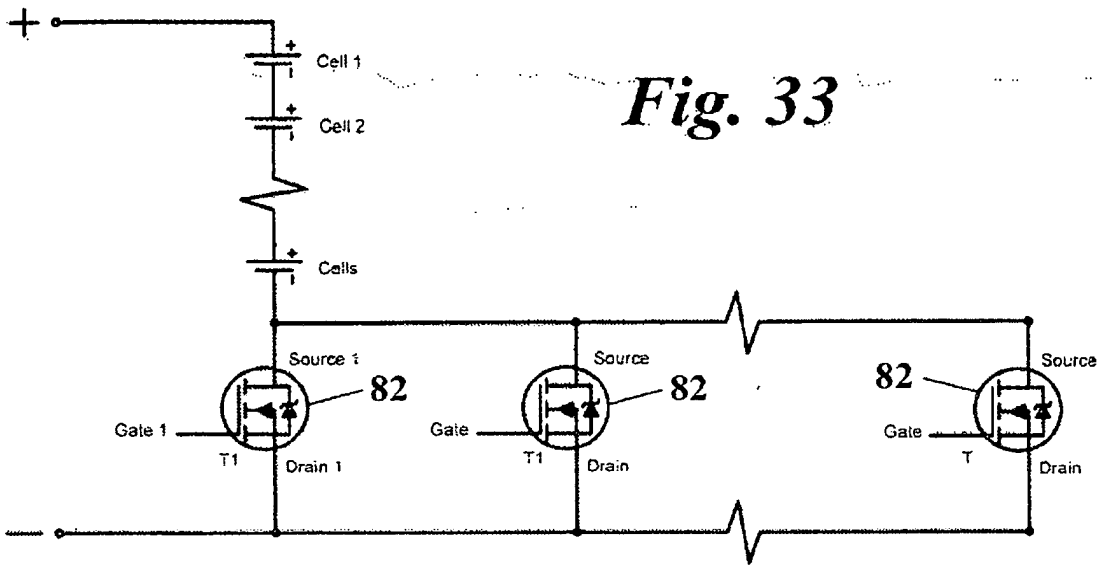


Fig. 33

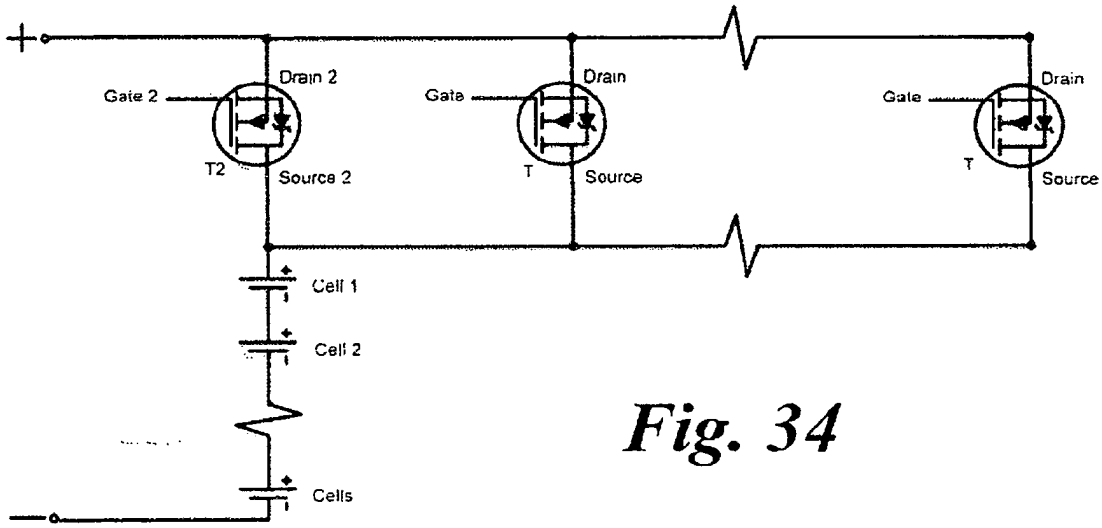


Fig. 34

REPLACEMENT SHEET

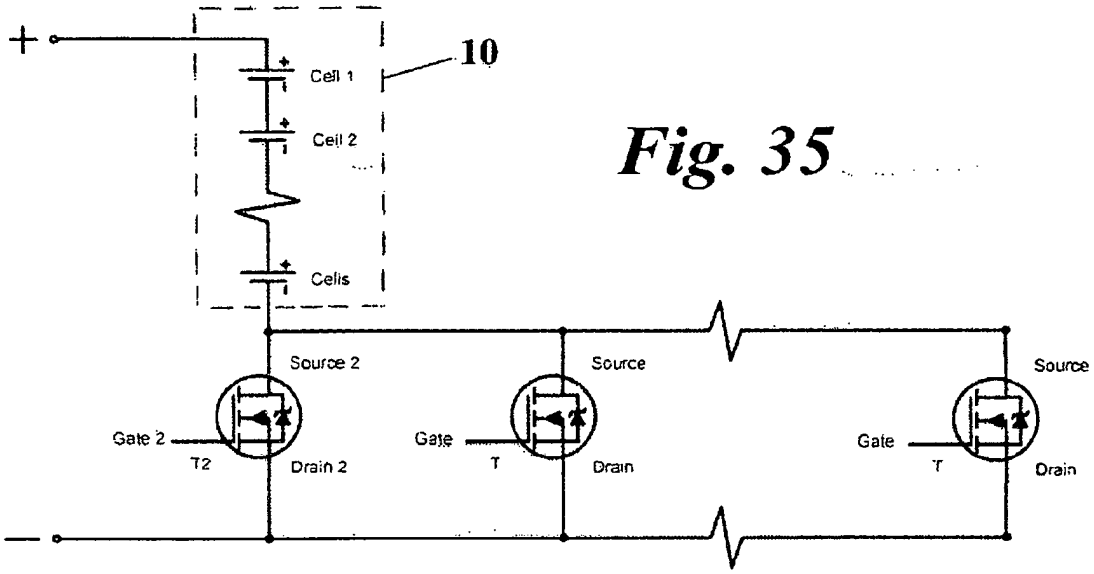


Fig. 35

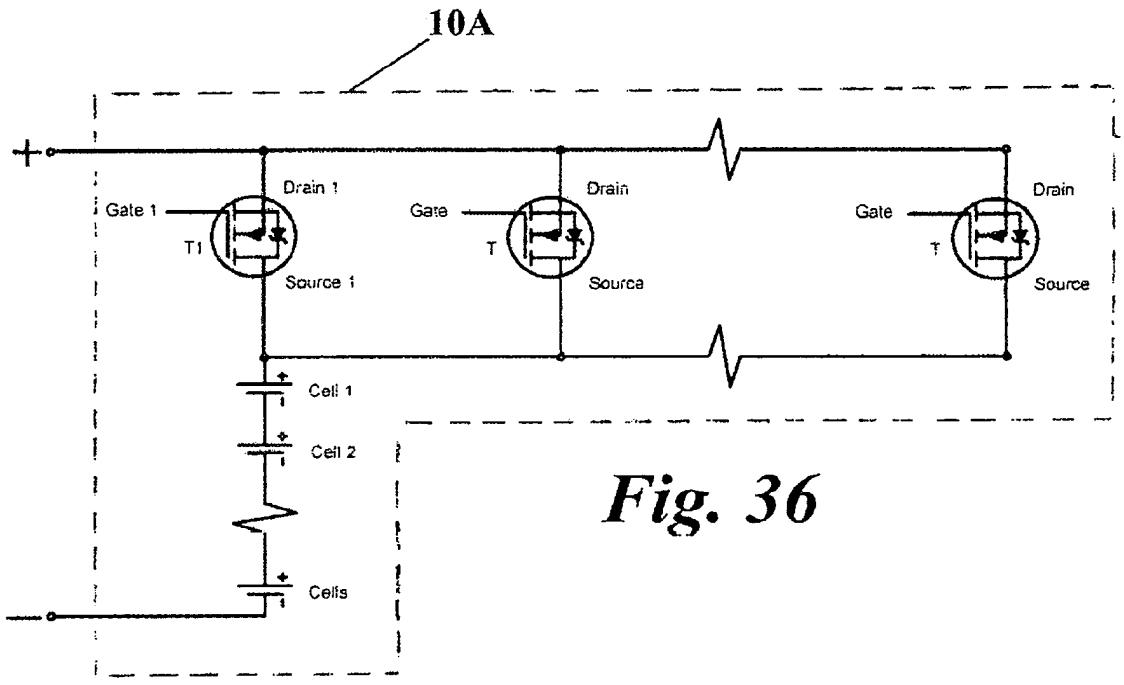


Fig. 36

REPLACEMENT SHEET

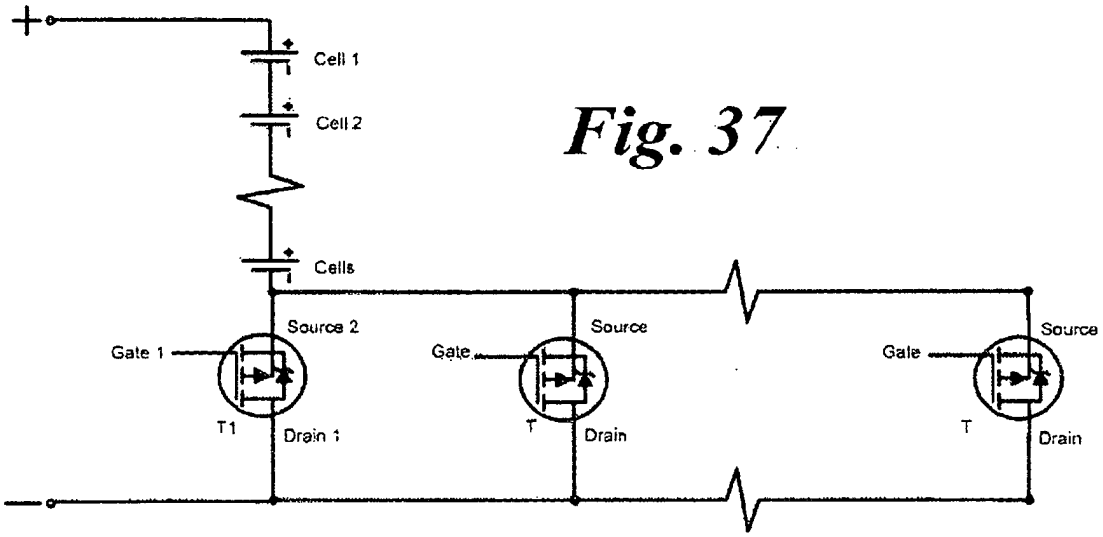


Fig. 37

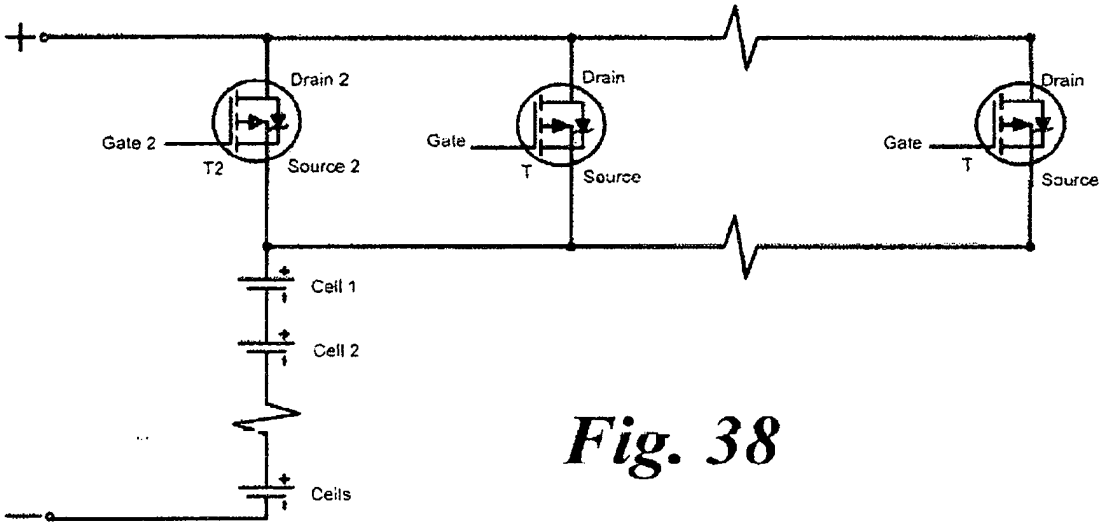


Fig. 38

REPLACEMENT SHEET

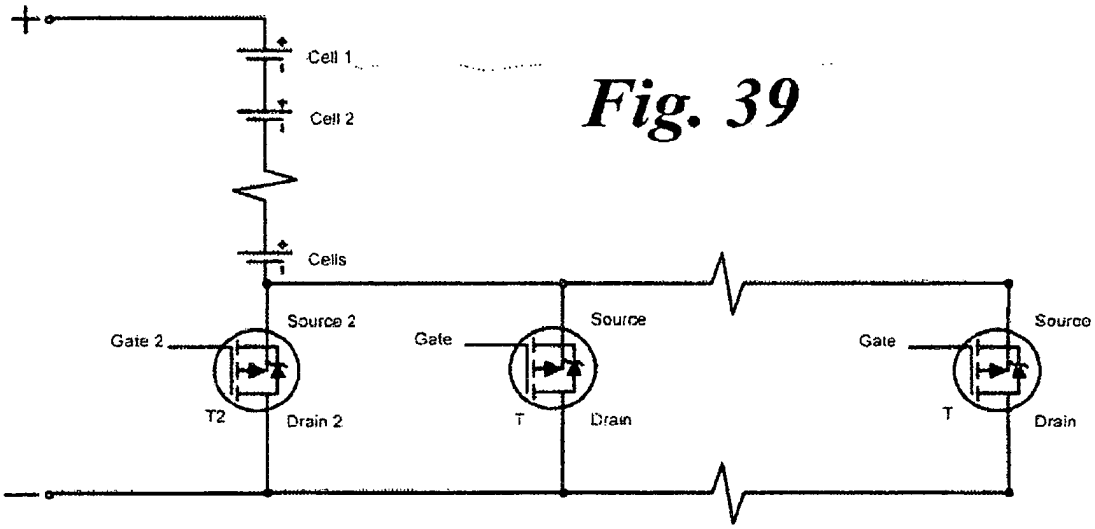


Fig. 39

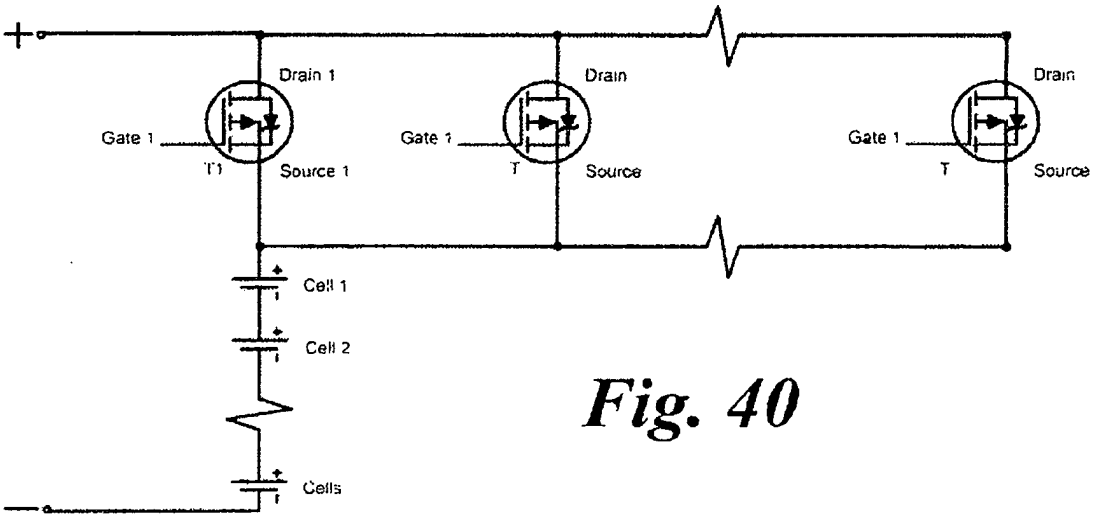


Fig. 40

REPLACEMENT SHEET

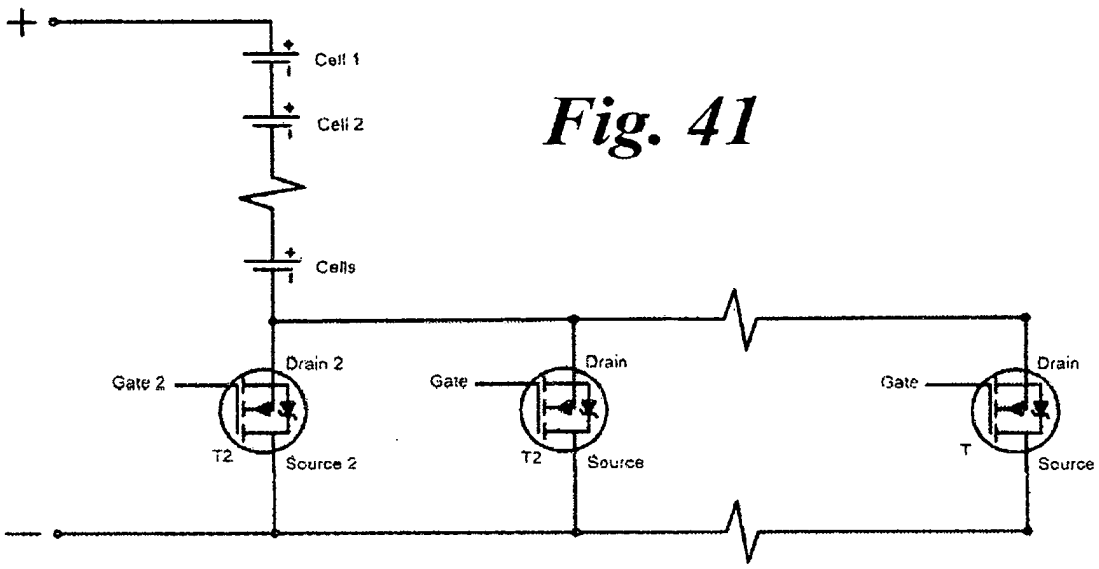


Fig. 41

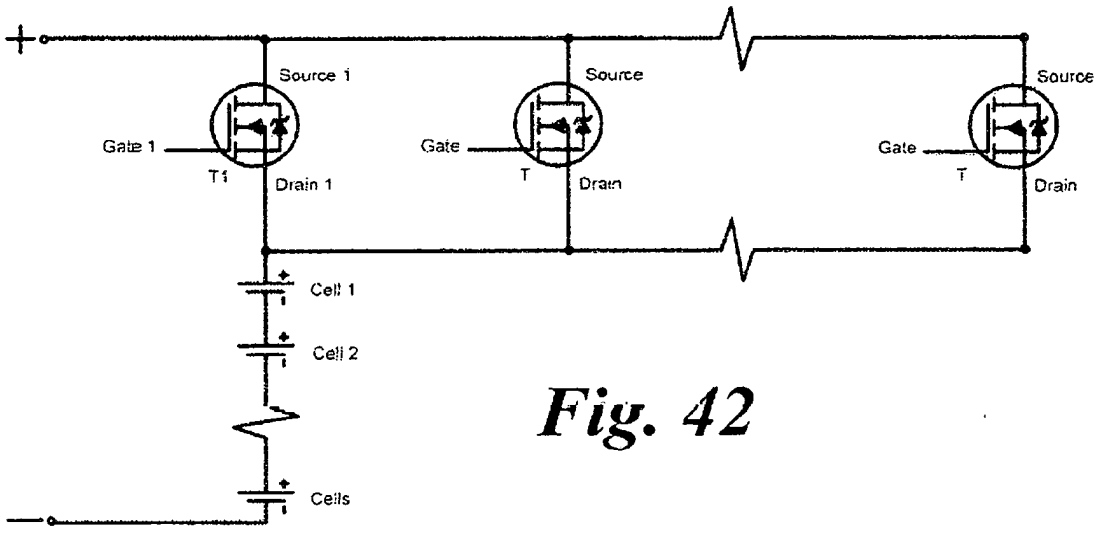


Fig. 42

REPLACEMENT SHEET

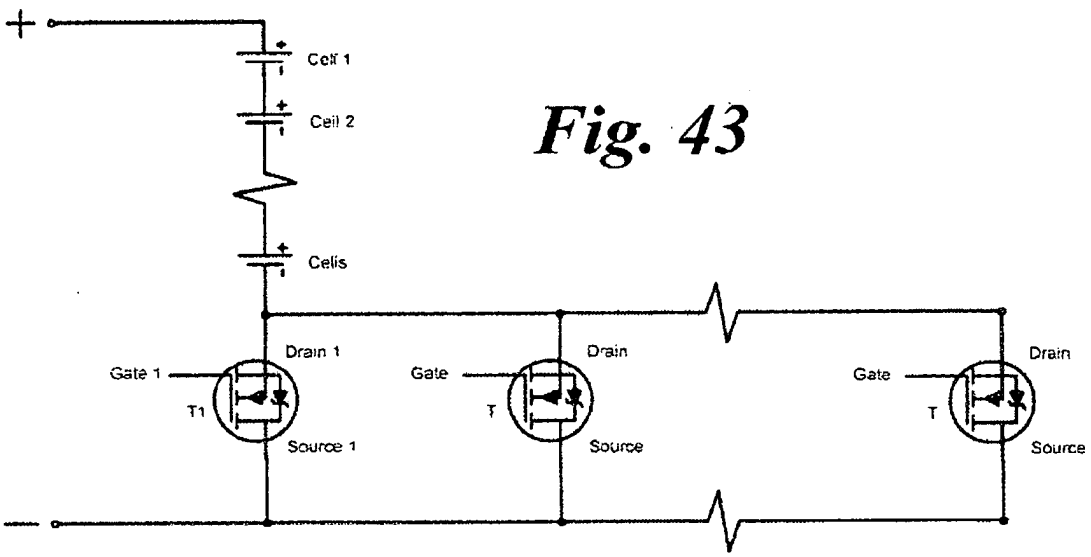


Fig. 43

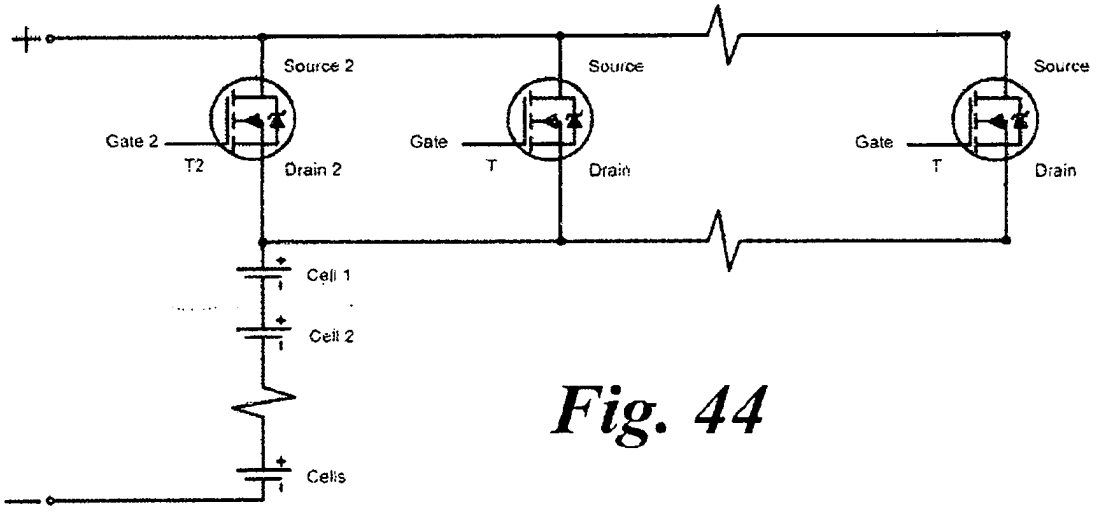


Fig. 44

REPLACEMENT SHEET

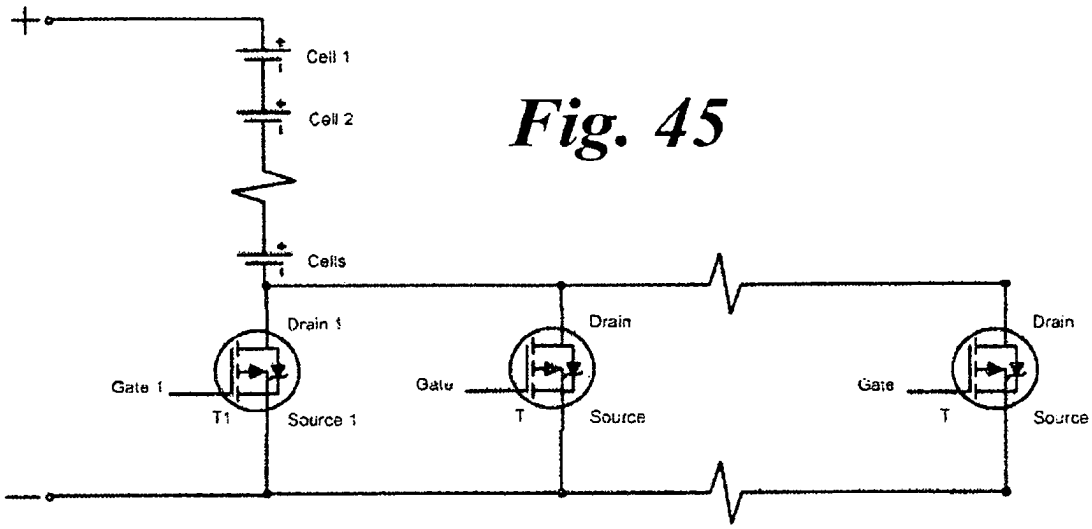


Fig. 45

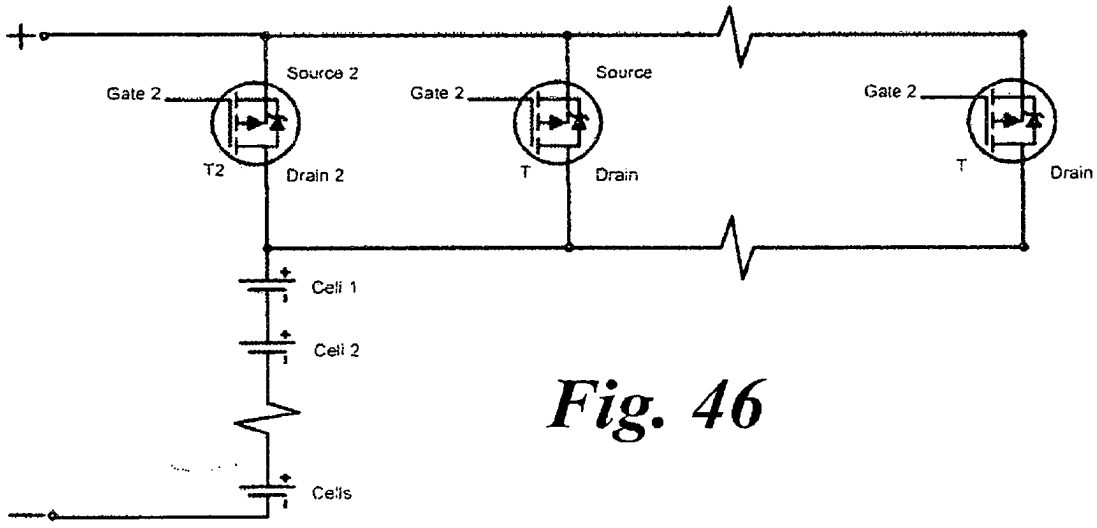


Fig. 46

REPLACEMENT SHEET

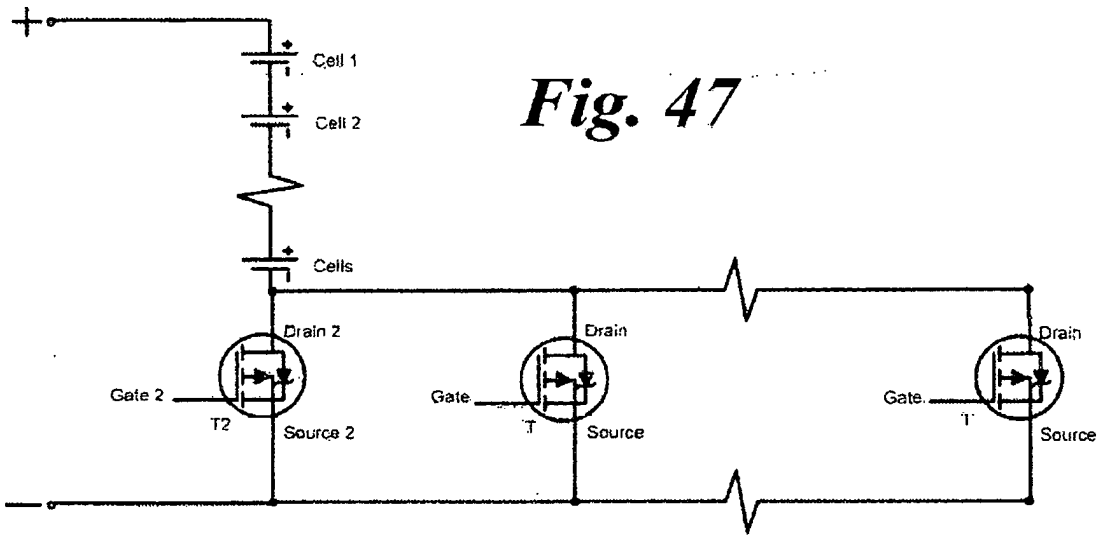


Fig. 47

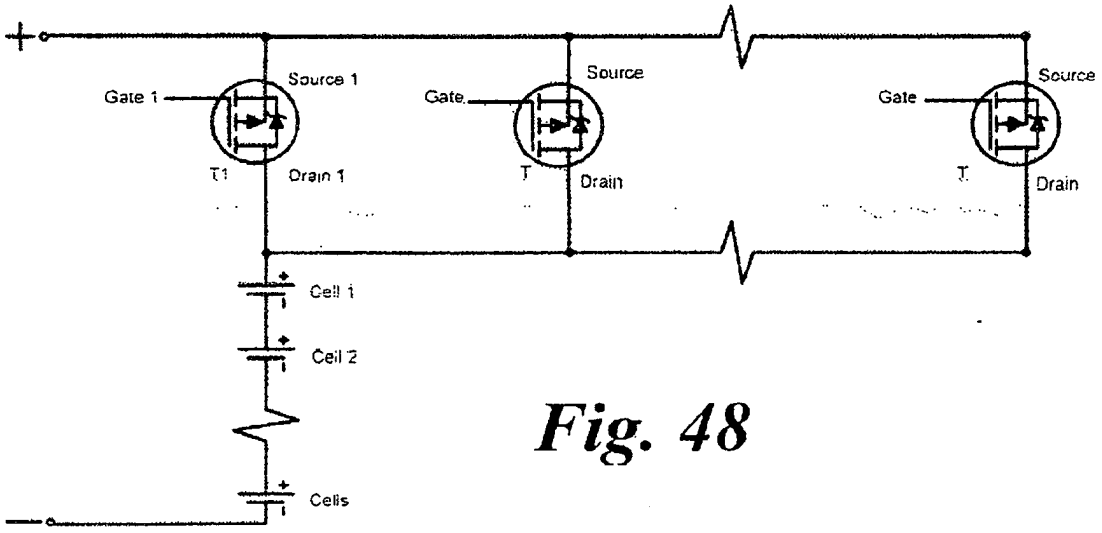


Fig. 48

REPLACEMENT SHEET

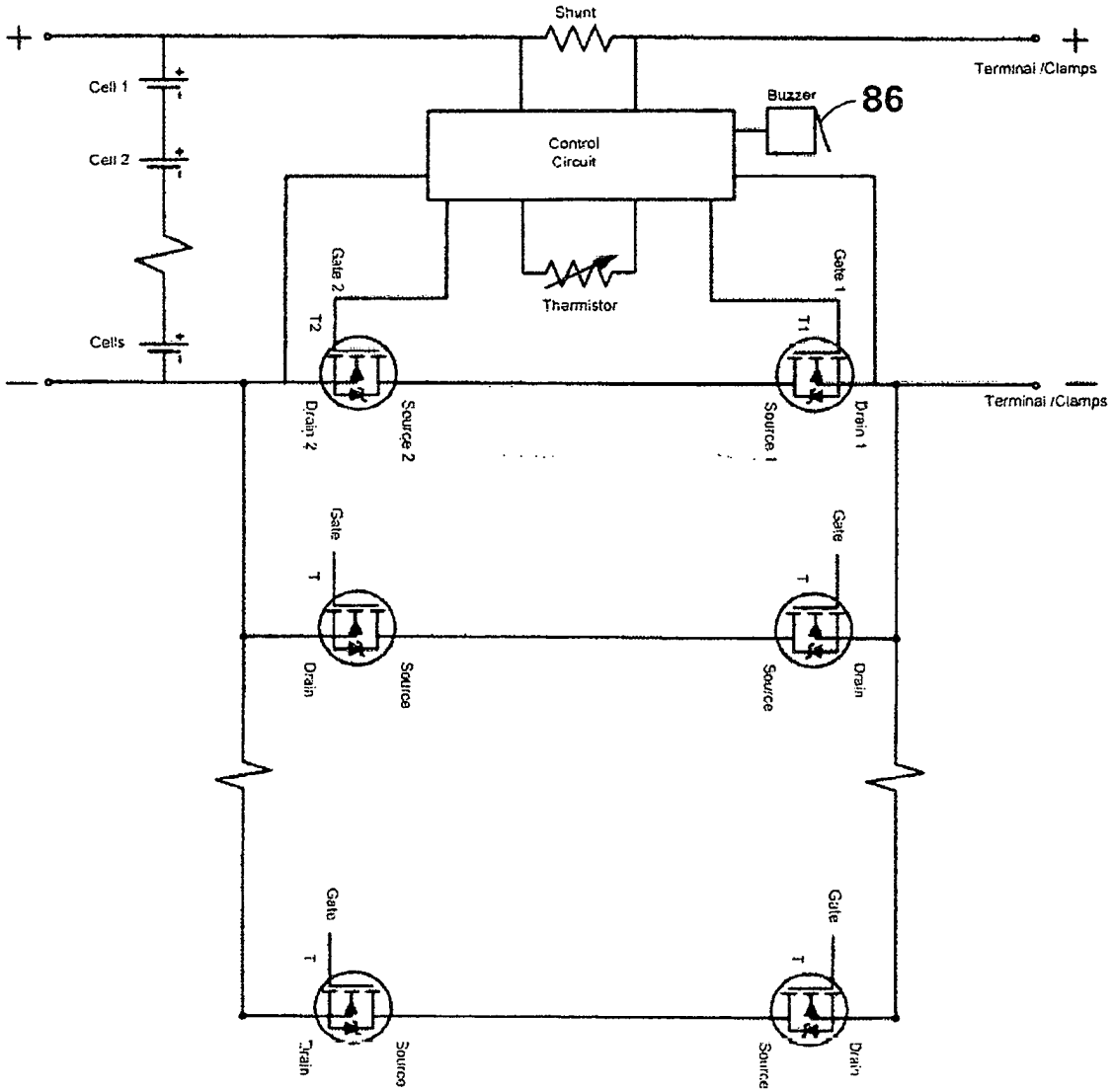


Fig. 49

RECEIVED
CENTRAL FAX CENTER
NOV 13 2017

FAX COVER SHEET

TO	
COMPANY	
FAXNUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2017-11-10 17:15:06 GMT
RE	Docket 5094: Dwgs -Examiner Jonathan G. SELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 24 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY,
WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached documents to Examiner Jonathan G. JELSMA, Art Unit 1721. This file contains Replacement Drawings which should accompany the amendment filed separately today,
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Ralph H. Dougherty, P.A.
Patent, Trademark, Copyright Law
4219 Kronos Place
Charlotte, NC 28210 USA

PAGE 1/3 * RCVD AT 11/10/2017 12:16:25 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/46 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-38

Phone: 704-940-3988
Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 2/3 * RCVD AT 11/10/2017 12:16:25 PM [Eastern Standard Time] * SVR:W-PTOFAX-002/46 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):01-38

PTO/SB/97 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Certificate of Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office.

on November 10, 2017
Date


Signature

RALPH H. DOUGHERTY
Typed or printed name of person signing Certificate

25,851
Registration Number, if applicable

704-940-3988
Telephone Number

Note: Each paper must have its own certificate of transmission, or this certificate must identify each submitted paper.

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/657,101	Filing Date 03/13/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **11/13/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
TAMMY D. MCBETH BROWN

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

162 7590 06/13/2017

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

EXAMINER
JELSMA, JONATHAN G

ART UNIT	PAPER NUMBER
1721	

MAIL DATE	DELIVERY MODE
06/13/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/657,101	Applicant(s) KOEBLER, MARTIN	
	Examiner JONATHAN JELSMA	Art Unit 1721	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03/27/2017*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-21* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-21* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *03/27/2017* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1) The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Summary

1. This is the second Office Action based on Application 14/657,101 and is in response to Applicant Arguments/Remarks filed 03/27/2017.

2. Claims 1-21 are previously pending, no claims have been amended. Claims 1-21 are currently pending and have been fully considered.

Drawings

3. The drawings were received on 03/27/2017. These drawings are unacceptable.

4. The drawings are objected to because the writing in the drawings is not clear, and in many cases cannot be clearly determined. The newly filed drawings did not rectify this problem, and in many cases have artifacts which makes the image worse, and are taken to be submitted with poor quality. Specifically the writing in Figures 14-29 and 33-49 cannot be determined. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1 and 3-4 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1).

8. With respect to claim 1. ONO teaches a start device comprising an electric motor driven by a battery (paragraph 0022). The battery may include a battery pack incorporated in the casing of the engine start, or may be accommodated outside of the casing in a switch box (paragraph 0023). The batteries may be lithium secondary batteries including at least two cells, and a self-discharge protection circuit and over-current prevention circuit connected to the batteries (paragraph 0024). The lithium secondary batteries have a discharge capacity of 1000 mAh, and an output voltage of 3.8 V (paragraph 0026). The electric motor has an output of 7.6V (paragraph 0026).

9. As noted above ONO teaches an electrochemical cell with an output voltage of 3.8 V and a discharge capacity of 1 Ah. Therefore ONO does not explicitly teach discharge amount from 3 Ah to 2000 Ah.

10. UEDA teaches a battery storage system including a plurality of battery modules electrically connected in series and in parallel, each comprising a plurality of battery cells (abstract). The battery cells are lithium manganese complex oxides as their positive electrode active material and amorphous carbon as their negative electrode active material, with their nominal output voltage of 3.6 V and capacity of 5.5 Ah (paragraph 0134).

11. At the time of the invention one having ordinary skill in the art would have been motivated to substitute the battery cells of ONO with the battery cells of UEDA, as this is a simple substitution of one known prior art element for another in order to achieve

predictable results, as both ONO and UEDA teaches battery cells in a battery pack, and ONO further teaches that the battery cells are chose in order to achieve sufficient capacity for a power source used to drive the other circuits (paragraph 0026).

12. With respect to claim 3. ONO teaches the lithium batteries include at least two cells (paragraph 0024). This is taken to mean that ONO contemplates the use of additional cells beyond two cells. Therefore at the time of the invention one having ordinary skill in the art would have been motivated to include more than two cells, such as three cells, as ONO teaches that more than two cells are contemplated, and the exact number may be determined as a matter of scale in order to achieve the desired capacity (paragraphs 0024 and 0026).

13. With respect to claim 4. ONO teaches the battery pack further include at least a protection circuit which may include a start switch relay circuit (paragraph 0024).

14. Claim 2 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) as applied to claim 1 above, and further in view of CHIANG (US 2009/0123813 A1).

15. Claim 2 is dependent upon claim 1, which is rejected above under 35 U.S.C. 103 in view of ONO and UEDA. UEDA teaches the battery cells may be lithium manganese complex oxides, but neither ONO nor UEDA explicitly teaches the lithium based cell is one selected from the claimed group.

16. CHIANG teaches electroactive compositions for use in lithium ion battery electrodes, the compositions provide an electrochemical cell having a plurality of open

circuit voltages at different states of charge, and afford improved state of charge monitoring, overcharge protection, or over discharge protection for lithium ion batteries (abstract). Such compounds may be olivine lithium metal phosphates (paragraph 0021). Examples include LiFePO4 (paragraphs 0104-0106) and in another example Li4Ti5O12 (paragraph 0149).

17. At the time of the invention one having ordinary skill in the art would have been motivated to substitute the active material compound of CHIANG for those of ONO and UEDA, as CHIANG teaches the benefits to such compound are that they provide a plurality of open circuit voltages at different states of charge (abstract).

18. Claim 5-6, and 8-9 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) as applied to claim 1 above, and further in view of DOUGHERTY (US 5,552,642).

19. Claims 5 and 8 are dependent upon claim 1, both of which are rejected above under 35 U.S.C. 103 in view of ONO and UEDA and claim 6 is dependent upon claim 5, and claim 9 is dependent upon claim 8. ONO teaches the battery pack may include a protection circuit with a start switch relay circuit (paragraph 0024). However, ONO does not explicitly teach a solid state switching apparatus as claimed.

20. DOUGHERTY teaches a protection system that includes a control circuit with a switching device connected between cells (abstract). The switching device 34 may be a relay or a solid state switch, and is connected in circuit with the battery cells between

the positive and negative terminals (column 4 lines 24-27). The switching circuit may include at least a transistor, such as a MOSFET (column 6 lines 11-15).

21. At the time of the invention one having ordinary skill in the art would have been motivated to include the switch of DOUGHERTY for the battery pack and system of ONO and UEDA, as this is a simple combination of known prior art elements in order to achieve predictable results.

22. Claim 7, and 10 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) and DOUGHERTY (US 5,552,642) as applied to claims 5 and 8 above, and further in view of CHIANG (US 2009/0123813 A1).

23. Claim 7 is dependent upon claim 5, and claim 10 is dependent upon claim 8, both of which are rejected above under 35 U.S.C. 103 in view of ONO, UEDA, and DOUGHERTY. UEDA teaches the battery cells may be lithium manganese complex oxides, but neither ONO nor UEDA explicitly teaches the lithium based cell is one selected from the claimed group.

24. CHIANG teaches electroactive compositions for use in lithium ion battery electrodes, the compositions provide an electrochemical cell having a plurality of open circuit voltages at different states of charge, and afford improved state of charge monitoring, overcharge protection, or over discharge protection for lithium ion batteries (abstract). Such compounds may be olivine lithium metal phosphates (paragraph

0021). Examples include LiFePO4 (paragraphs 0104-0106) and in another example Li4Ti5O12 (paragraph 0149).

25. At the time of the invention one having ordinary skill in the art would have been motivated to substitute the active material compound of CHIANG for those of ONO and UEDA, as CHIANG teaches the benefits to such compound are that they provide a plurality of open circuit voltages at different states of charge (abstract).

26. Claims 11 and 21 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) as applied to claim 1 above, and further in view of GRANT (US 4,166,241).

27. Claim 11 is dependent upon claim 1 which is rejected above under 35 U.S.C. 103 in view of ONO and UEDA. However, ONO does not explicitly teaches a cable with a cable housing that includes a MOSFET, diode, or relay as claimed.

28. GRANT teaches an apparatus for jumpering a first battery to a second battery using jumper cables (column 2 lines 30-36). The jumpering cable includes first and second cables J1 and J2 connected to the batteries (column 2 lines 49-54). The jumper cables are connected into a case, and connected to at least a relay (column 3 lines 5-26). The case includes a cover, a switch in the case, as well as the relay (see Figures 1-3). The end of the cables include a first and second clamps (Figure 1). The other end of the cable is connected to the terminal of a battery B1 (Figure 1).

29. At the time of the invention one having ordinary skill in the art would have been motivated to include the cable and cable housing with the relay as taught by GRANT to

connect to the battery of ONO in order to have the beneficial result of charging a dead battery without harmful sparks being created at the terminals of the battery (column 2 lines 30-54).

30. With respect to claim 21. The rejection above in view of claim 1 in view of ONO and UEDA is repeated here, as well as the further rejection with respect to claim 11 in view of GRANT is repeated here.

31. Claims 12, 14 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) and OBERLIN (US 2008/0084182 A1).

32. With respect to claims 12 and 14. The rejection above of claim 1 in view of ONO and UEDA is repeated here. ONO teaches the battery pack further include at least a protection circuit which may include a start switch relay circuit (paragraph 0024). However neither ONO nor UEDA explicitly teaches a battery management system including a processor and a circuit board having a MOSFET arrangement.

33. OBERLIN teaches that a plurality of lithium cells must be monitored closely and balanced to avoid overcharge (paragraph 0032). A battery management system 43 is included which controls charging of the batteries (paragraph 0032). This may be accomplished by MOSFETs (paragraph 0032). The battery management system may be implemented as software executed by a microprocessor controller (paragraph 0034).

34. At the time of the invention one having ordinary skill in the art would have been motivated to further include the battery management system of OBERLIN for the

protection circuit of ONO, as this is a simple substitution of one known prior art element for another in order to achieve predictable results.

35. Claim 13 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) and OBERLIN (US 2008/0084182 A1) as applied to claim 12 above, and further in view of CHIANG (US 2009/0123813 A1).

36. Claim 13 is dependent upon claim 12, which is rejected above under 35 U.S.C. 103 in view of ONO, UEDA, and OBERLIN. However none of ONO, UEDA, or OBERLIN explicitly teaches the claimed active material compounds.

37. CHIANG teaches electroactive compositions for use in lithium ion battery electrodes, the compositions provide an electrochemical cell having a plurality of open circuit voltages at different states of charge, and afford improved state of charge monitoring, overcharge protection, or over discharge protection for lithium ion batteries (abstract). Such compounds may be olivine lithium metal phosphates (paragraph 0021). Examples include LiFePO4 (paragraphs 0104-0106) and in another example Li4Ti5O12 (paragraph 0149).

38. At the time of the invention one having ordinary skill in the art would have been motivated to substitute the active material compound of CHIANG for those of ONO and UEDA, as CHIANG teaches the benefits to such compound are that they provide a plurality of open circuit voltages at different states of charge (abstract).

39. Claims 15-16 and 18-19 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1) and OBERLIN (US 2008/0084182 A1) as applied to claim 12 above, and further in view of DOUGHERTY (US 5,552,642).

40. Claims 15 and 18 are dependent upon claim 12, both of which are rejected above under 35 U.S.C. 103 in view of ONO, UEDA, and OBERLIN, and claim 16 is dependent upon claim 15, and claim 19 is dependent upon claim 18. ONO teaches the battery pack may include a protection circuit with a start switch relay circuit (paragraph 0024). However, ONO does not explicitly teach a solid state switching apparatus as claimed.

41. DOUGHERTY teaches a protection system that includes a control circuit with a switching device connected between cells (abstract). The switching device 34 may be a relay or a solid state switch, and is connected in circuit with the battery cells between the positive and negative terminals (column 4 lines 24-27). The switching circuit may include at least a transistor, such as a MOSFET (column 6 lines 11-15).

42. At the time of the invention one having ordinary skill in the art would have been motivated to include the switch of DOUGHERTY for the battery pack and system of ONO and UEDA, as this is a simple combination of known prior art elements in order to achieve predictable results.

43. Claims 17 and 20 is/are rejected under 35 U.S.C. 103 as being unpatentable over ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1), OBERLIN

(US 2008/0084182 A1) and DOUGHERTY (US 5,552,642) as applied to claim 15 above, and further in view of CHIANG (US 2009/0123813 A1).

44. Claim 17 is dependent upon claim 15, and claim 20 is dependent upon claim 18, both of which are rejected above under 35 U.S.C. 103 in view of ONO, UEDA, OBERLIN, and DOUGHERTY. UEDA teaches the battery cells may be lithium manganese complex oxides, but neither ONO nor UEDA explicitly teaches the lithium based cell is one selected from the claimed group.

45. CHIANG teaches electroactive compositions for use in lithium ion battery electrodes, the compositions provide an electrochemical cell having a plurality of open circuit voltages at different states of charge, and afford improved state of charge monitoring, overcharge protection, or over discharge protection for lithium ion batteries (abstract). Such compounds may be olivine lithium metal phosphates (paragraph 0021). Examples include LiFePO4 (paragraphs 0104-0106) and in another example Li4Ti5O12 (paragraph 0149).

46. At the time of the invention one having ordinary skill in the art would have been motivated to substitute the active material compound of CHIANG for those of ONO and UEDA, as CHIANG teaches the benefits to such compound are that they provide a plurality of open circuit voltages at different states of charge (abstract).

Response to Arguments

47. Applicant's arguments, see pages 8-9 of Applicant Arguments/Remarks, filed 03/27/2017, with respect to the rejection(s) of claim(s) 1-10, and 12-20 in view of

KOEBLER under 35 U.S.C. 102(a1) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of ONO (US 2009/0020094 A1) in view of UEDA (US 2010/0136390 A1).

48. Applicant argues that the present application is a continuation in part of the reference of KOEBLER as noted in the ADS filed August 6, 2015. Therefore Applicant argues that this removes KOEBLER as a reference. This argument is persuasive, and the grounds of rejection in view of KOEBLER have been withdrawn. Since the priority was properly claimed in the specification upon filing, this does not require a petition for a delayed claim to priority. However, the ADS filed 08/06/2015 is still considered improper in that it doesn't list the provisional applications upon which Applicant wants priority. Therefore a new corrected ADS listing all previous applications, not just the CIP parent should be filed.

Conclusion

49. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN JELSMA whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 8:00 a.m. - 5:00 p.m.

50. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an

interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

51. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

52. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JONATHAN JELSMA/
Primary Examiner, Art Unit 1721

JGJ

Notice of References Cited	Application/Control No. 14/657,101	Applicant(s)/Patent Under Reexamination KOEBLER, MARTIN	
	Examiner JONATHAN JELSMA	Art Unit 1721	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2009/0020094 A1	01-2009	Ono; Ryou	F02N11/0866	123/179.28
*	B	US-2010/0136390 A1	06-2010	UEDA; Masahiro	H01M10/482	429/61
*	C	US-5,552,642 A	09-1996	Dougherty; Thomas J.	B60R25/04	180/287
*	D	US-2008/0084182 A1	04-2008	Oberlin; Richard Paul	H01M10/052	320/116
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14657101	KOEBLER, MARTIN
	Examiner	Art Unit
	JONATHAN JELSMA	1721

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/29/2016	06/08/2017							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21	✓	✓							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	35	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$ or US-20140203786-$ or US-20100136390-$ or US-20100185405-$ or US-20120326665-$ or US-20100104928-$ or US-20120183823-$ or US-20090295169-$ or US-20090256521-$ or US-20080265844-$ or US-20090020094-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.	US-PGPUB; USPAT	OR	ON	2017/06/09 12:47
L2	6	L1 and (deep near2 cycle near2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 12:48
L3	48823	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour capacity) with (voltage V)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 12:53
L4	190	L3 and (deep near2 cycle near2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 12:53
L5	21	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) same MOSFET and 4	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 12:56
L6	3	circuit near2 board with (MOSFET) same processor and (deep near2 cycle near2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO;	OR	ON	2017/06/09 13:03

			DERWENT			
L7	6	circuit near2 board with (MOSFET) same processor and ((lead adj acid lead$1acid pb$1acid pb adj acid) near2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 13:06
L8	17	circuit near2 board with (MOSFET) same processor same2 ((battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 13:07
L10	2	circuit near2 board with (MOSFET) same processor and 1	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 13:31
L11	177	circuit near2 board same processor same (over$1voltage over adj voltage under$1voltage under adj voltage reverse adj polarity short adj circuit)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 13:35
L12	3	11 and (deep near2 cycle near2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 13:35
L13	83	11 and ((battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 13:36
L14	1252	(battery near2 management) with processor	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 14:11
L15	7579	MOSFET same (over$1voltage over adj voltage under$1voltage under adj voltage reverse adj polarity short adj circuit)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 14:11
L16	11	14 and 15	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 14:11
S21	6	("20060087280" | "20070080662" | "20090123813" | "20100320961" | "20120139456" | "5635821").PN. OR ("9412994").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/06/07 16:56
S22	4	("20060087280" "20100320961").pn.	US-	OR	ON	2017/06/07

			PGPUB; USPAT; USOCR; JPO; DERWENT			17:05
S23	2369132	(battery (power energy) near2 storage (electro adj chemical electro$1chemical) adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/07 17:07
S24	31298	(start$4) near2 (battery (power energy) near2 storage (electro adj chemical electro$1chemical) adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/07 17:08
S25	963	(battery (power energy) near2 storage (electro adj chemical electro$1chemical) adj cell) near2 pack with S24	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/07 17:08
S26	9259	(protection near2 circuit) with (solid near2 state near2 switch MOSFET diod relay PTC)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/07 17:11
S27	192	S24 same S25 same switch	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/07 17:25
S28	19	S27 and (ah mah)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/07 17:27
S29	11	("5083076" | "5982138").PN. OR ("6400121").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/06/07 17:27
S30	154	("1868208" | "20020047419" | "20040009075" | "20040012204" | "2816535" | "2831352" | "2838938" | "2865358" | "2901911" | "3297010" | "3331363" | "3500085" | "3518445" | "3645247" | "3657696" | "3675696" | "3757194" | "3882293" | "3883789" | "3885544" | "3911663" | "3942027" | "3952239" | "3963972" | "3969796" | "3973179" | "4032806" | "4050003" | "4064447" | "4084123" | "4110629" | "4122354" | "4191917" | "4300087" | "4309622" | "4321522" | "4365596" | "4372263" | "4389166" | "4391882" | "4399782" | "4431245" | "4481458" | "4507566" | "4514477" | "4531482" |	US-PGPUB; USPAT; USOCR	OR	ON	2017/06/07 17:31

		"4559768" | "4569315" | "4616169" | "4667141" | "4730089" | "4751452" | "4791347" | "4830412" | "4835410" | "4843298" | "4870811" | "4876490" | "4883973" | "5022587" | "5054563" | "5065086" | "5077513" | "5083076" | "5085043" | "5111127" | "5132604" | "5146160" | "5157267" | "5175439" | "5208525" | "5345900" | "5370091" | "5444352" | "5689174" | "5739675" | "5751070" | "5764025" | "5793185" | "5886497" | "5890460" | "5899174" | "5929537" | "5967304" | "5982138" | "5998976" | "6002235" | "6008545" | "6018200" | "6065942" | "6066937" | "6104157" | "6140798" | "6160373" | "6202776" | "6215273" | "6222342" | "6265091" | "6265786" | "6310404" | "6313543" | "6321707" | "6384573" | "6400121" | "6426606" | "6459175" | "6476509" | "6479964" | "6525430" | "6560131" | "6565381" | "6597150" | "6608401" | "6636015" | "6665158" | "6799993" | "6849962" | "6872905" | "RE36250").PN. OR ("7148580").URPN.				
S31	32736	(start$4 jump$1start$4 booster) near2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:31
S32	19480	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage) near2 (cylindrical)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:34
S33	183709	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage) near2 (module pack)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:34
S34	1987	S32 same S33	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:35
S35	3	S31 same2 S34	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:35
S36	104	S31 and S34	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:41
S37	3478	(battery electro adj chemical adj cell	US-	OR	ON	2017/06/08

		electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour) with (voltage V)	PGPUB; USPAT; USOCR; JPO; DERWENT			10:45
S38	9	S36 and S37	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:45
S39	17552	(start$4 jump$1start$4 booster) adj2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:46
S40	8	S39 and S32 and S37	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:47
S41	25	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.	US-PGPUB; USPAT	OR	ON	2017/06/08 10:48
S42	5	S37 and S41	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:48
S43	6	S39 same S32	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:49
S44	1223	S39 same S33	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:51
S45	56	S44 and S37	US-PGPUB; USPAT; USOCR; JPO;	OR	ON	2017/06/08 10:51

			DERWENT			
S46	2	"20060087280".pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 10:54
S47	128839	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour C capacity) with (voltage V)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:07
S48	5014	S33 same cylindrical	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:29
S49	730	S48 and S47	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:30
S50	68	S49 and S39	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:30
S51	58	S50 not S45	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:30
S52	28784	(MOSFET over$1voltage under$1voltage reverse adj polarity short adj circuit temperature) same S33	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:42
S53	334	S32 same S47	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:43
S54	57	S52 and S53	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 11:43
S55	48823	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour capacity) with (voltage V)	US-PGPUB; USPAT; USOCR; JPO;	OR	ON	2017/06/08 12:00

			DERWENT			
S56	663	S48 and S55	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 12:01
S57	7553	h01m2/1077.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/08 12:01
S58	4428	h01m2/34.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/08 12:01
S59	6956	h01m10/425.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/08 12:01
S60	219	S56 and (S57 S58 S59)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/06/08 12:01
S61	31	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$ or US-20140203786-$ or US-20100136390-$ or US-20100185405-$ or US-20120326665-$ or US-20100104928-$ or US-20120183823-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.	US-PGPUB; USPAT	OR	ON	2017/06/08 12:59
S62	11	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour) with (voltage V) and S61	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:00
S63	2	("20100136390" "20100185405").pn. and (protection near2 circuit circuit)	US-PGPUB; USPAT; USOCR; JPO;	OR	ON	2017/06/08 13:05

			DERWENT			
S64	1658	(start$4 jump$1start$4 booster) adj2 (battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage) same (IC combustion near2 engine)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:11
S65	132	S33 same S64	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:12
S66	4	S61 and S65	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:12
S67	34	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$ or US-20140203786-$ or US-20100136390-$ or US-20100185405-$ or US-20120326665-$ or US-20100104928-$ or US-20120183823-$ or US-20090295169-$ or US-20090256521-$ or US-20080265844-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.	US-PGPUB; USPAT	OR	ON	2017/06/08 13:32
S68	7	S65 and S67	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:32
S69	2232	(electric near2 motor) with (v volt) and (IC adj engine combustion near2 engine)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:35
S70	7	S60 and S67	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:36
S71	3	S69 and S67	US-PGPUB; USPAT;	OR	ON	2017/06/08 13:40

			USOCR; JPO; DERWENT			
S72	6	S48 and S69	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 13:52
S73	35	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$ or US-20140203786-$ or US-20100136390-$ or US-20100185405-$ or US-20120326665-$ or US-20100104928-$ or US-20120183823-$ or US-20090295169-$ or US-20090256521-$ or US-20080265844-$ or US-20090020094-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.	US-PGPUB; USPAT	OR	ON	2017/06/08 15:31
S74	36	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour) with (voltage V) and S64	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 15:32
S75	11	(battery electro adj chemical adj cell electro$1chemical adj cell (power energy) near2 storage cell) with (ah ampere adj hour) with (voltage V) and S73	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/08 15:32
S76	2232	(electric near2 motor) with (v volt) and (IC adj engine combustion near2 engine)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 08:15
S77	35	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$ or US-20060145655-$ or US-20050110467-$ or US-20020030466-$ or US-20140203786-$ or US-20100136390-$ or US-20100185405-$ or US-20120326665-$ or US-20100104928-$ or US-20120183823-$ or US-20090295169-$ or US-	US-PGPUB; USPAT	OR	ON	2017/06/09 08:15

		20090256521-$ or US-20080265844-$ or US-20090020094-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$ or US-6527585-$ or US-5984718-$ or US-4897044-$ or US-4166241-$ or US-7148580-$ or US-4309622-$ or US-6426606-$ or US-5083076-$ or US-6265091-$).did.				
S78	4	S76 and S77	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 08:15
S79	2	("20090020094" "20100136390").pn. and (circuit with (solid near2 state MOSFET diode relay))	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 08:26
S80	8	S77 and (solid near2 state near2 switch$4)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 08:34
S81	1	"5552642".pn. and (transistor FET MOSFET IGBT JFET BJT CMOS VMOS TMOS DMOS HEXFET)	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 08:46
S82	6	(cable with clamp) same (MOSFET diode relay) and S77	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 09:03
S83	3	"4166241".pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 09:21
S84	4	("20080087280" "20050110467").pn.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	ON	2017/06/09 09:35

EAST Search History (Interference)

<This search history is empty>

6/9/2017 3:02:49 PM
C:\Users\jjelsma\Documents\EAST\Workspaces\14657101.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14657101	KOEBLER, MARTIN
	Examiner	Art Unit
	JONATHAN JELSMA	1721

CPC- SEARCHED		
Symbol	Date	Examiner
H01M2/1077, 34, 425	12/29/2016, 06/08/2017	JGJ
H01M10/425	12/29/2016, 06/08/2017	JGJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name search (EAST)	12/29/2016	JGJ
EAST (see search history)	12/29/2016, 06/07/2017, 06/08/2017	JGJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

162 7590 04/03/2017

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

EXAMINER
JELSMA, JONATHAN G

ART UNIT	PAPER NUMBER
1721	

MAIL DATE	DELIVERY MODE
04/03/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/657,101	KOEBLER, MARTIN	
	Examiner	Art Unit	
	JONATHAN JELSMA	1721	

All participants (applicant, applicant's representative, PTO personnel):

(1) *JONATHAN JELSMA*. (3)_____.

(2) *Ralph Dougherty*. (4)_____.

Date of Interview: *23 March 2017*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☐103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *KOEBLER (US 2013/0241498 A1)*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant noted that an ADS was filed on 08/06/2015 that established Domestic Benefit, such as this application being a CIP of 13/989,273. However, the Applicant noted that the most recent Office Action filed 01/04/2017 relied upon the PGPUB of Application 13/989,273 as prior art. The Examiner confirmed the presence of the ADS in the case file. However the Examiner indicated that the updated continuity information had not been entered into PALM. The Examiner indicated that he would look into the matter in order to update the continuity information, or to determine if there was any problem or issue with the filing of the ADS that would prevent such an update .

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/JONATHAN JELSMA/ Primary Examiner, Art Unit 1721	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER
MAR 27 2017

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT EXAMINING OPERATIONS

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)

Applicant: MARTIN KOEBLER

Serial No: 14/657,101

Filed: March 13, 2015

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Charlotte, North Carolina
March 24, 2017

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

AMENDMENT

Responsive to the Official Action dated January 4, 2017, kindly amend the above-identified application as follows:

Amendments to the Drawings begin on page 2.

Status of the Claims begin on page 3.

Remarks begin on page 8 of this paper.

Best Available Copy

In the drawings:

Please substitute the attached 22 Replacement Sheets containing Figures 1 through 49 for the drawing figures originally filed.

PAGE 27/34 * RCVD AT 3/27/2017 1:45:46 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/46 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):24-28

Best Available Copy

In the claims:

The claim status is now:

1. (Original) A battery pack for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system, said battery pack comprising:

a battery pack housing; and

at least one lithium-based rechargeable cell within said housing;

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

2. (Original) A battery pack according to claim 1 wherein the lithium-based cell is selected from the group consisting of $LiFePO_2$, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

3. (Original) A battery pack according to claim 1, wherein said battery pack comprises from three to sixteen lithium-based rechargeable cells in series in said housing.

4. (Original) A battery pack according to claim 1, further comprising a protection circuit board within said battery housing, said protection circuit board including at least one of a solid state switch, MOSFET, diode, or relay, which protects against temperature, reverse polarity, undervoltage or overvoltage.

5. (Original) A battery pack according to claim 1, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive

Best Available Copy

pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

6. (Original) Apparatus according to claim 5, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

7. (Original) Apparatus according to claim 5, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

8. (Original) A battery pack according to claim 1, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

PAGE 29/34 * RCVD AT 3/27/2017 1:45:46 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/46 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):24-28
PETITIONERS EX. 1004
132 of 304

Best Available Copy

9. (Original) Apparatus according to claim 8, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

10. (Original) Apparatus according to claim 8, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

11. (Original) Apparatus according to claim 1, wherein the operating system of said internal combustion engine includes a battery, said apparatus further comprising a pair cables, each cable situated in a cable housing, one end of each cable connecting to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack, and at least one of a MOSFET, diode, or relay being situated within one of said cable housings.

12. (Original) A deep cycle battery in a 6 volt to 800 volt operating system, comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing;

a battery management system including a processor and a circuit board having a MOSFET arrangement which protects from one of overvoltage, undervoltage, reverse polarity, short circuit, and extremes of temperature;

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

13. (Original) A deep cycle battery according to claim 12 wherein the lithium-based cell is selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

Best Available Copy

14. (Original) A deep cycle battery according to claim 12, wherein said battery comprises from two to 250 lithium-based rechargeable cells in series in one or more of said housings.

15. (Original) A deep cycle battery according to claim 12, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

16. (Original) Apparatus according to claim 15, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

17. (Original) Apparatus according to claim 15, wherein said one or more cells are selected from the group consisting of $LiFePO_4$, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

18. (Original) A deep cycle battery according to claim 12, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

PETITIONER'S EX. 1004
134 of 304

Best Available Copy

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

19. (Original) Apparatus according to claim 18, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

20. (Original) Apparatus according to claim 18, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

21. (Original) A battery pack for driving a battery device in a 12 volt to 120 volt internal combustion engine, said battery pack comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing, the total discharging amount of each lithium-based cell in the battery pack being from three (3) Ah to 5000 Ah, and charging voltage per one cell being 3.0 to 4.2 V;

a pair cables, each cable having a cable housing in which it is situated;

one end of each cable being provided with and connected to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack; and

at least one of a solid state switch, MOSFET, diode, or relay being situated within one of said cable housings.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER

MAR 2 7 2017

REMARKS

The drawings are objected to by the Examiner. Replacement Sheets containing Figures 1 through 49 have been prepared, and are submitted herewith correcting all informalities.

Claims 1-10 and 12 through 20 currently stand rejected under 35 USC 103 over Koebler Published US Patent Application 2013/0241498, which is the parent Application No. 13,989,273, from which the present application is a Continuation in part, as set forth in paragraph 0001 of the Specification. On August 6, 2015, long prior to examination of the present application, it was noted that the Application Data Sheet for this case had inadvertlently been omitted from the submissions at the time of filing the present application. Accordingly, the appropriate Application Data Sheet was filed that day, August 6, 2015. In a telephone conversation with Examiner Jelsma on March 23, 2017, he confirmed that the appropriate Application Data Sheet (ADS) had been filed.

In view of the prior submission of the ADS for the present case, which removes the Koebler US Published Patent Application 2013/0241498 (US Appln. No. 13/989,273) as a reference in this case, it is respectfully requested that the rejections of Claims 1 through 10 and 12 through 20 be withdrawn.

Claims 11 and 21 stand rejected under 35 USC 103 as unpatentable over Koebler in view of Grant USP 4,166,241. Claim 11 depends from claim 1, and upon withdrawal of the Koebler reference, claim 1 is clearly patentable. Therefore, claim 11 is equally patentable with claim 1.

Claim 21 is written independent form, and upon withdrawal of the Koebler reference there are insufficient teachings in Grant to render claim 21 obvious. Accordingly, it is submitted that both claims 11 and 21 are patentable within the meaning of 35 USC 103.

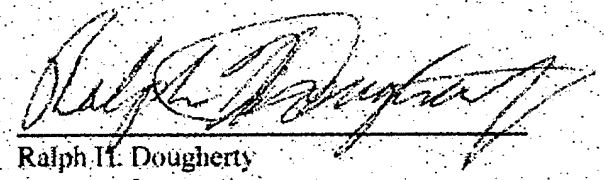
Best Available Copy

Since there is no amendment to the claims, no new matter is presented in the claims.

Since this amendment does not add more claims than previously paid for, no additional claim fee is required.

In view of the foregoing amendment and these remarks, this application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicant. The Examiner is invited to call Applicant's undersigned attorney if, in the opinion of the Examiner, a telephone conference will expedite prosecution of this application.

Respectfully submitted,



Ralph H. Dougherty
Attorney for Applicant
Registration No. 25,851
RALPH H. DOUGHERTY, P.A.
4219 Kronos Place
Charlotte, North Carolina 28210
Telephone: (704) 940-3988
Facsimile: (704) 631-4996

Enclosures - 22 Replacement Sheets of Drawings

Attorney's
Docket 5094

RECEIVED
CENTRAL FAX CENTER

MAR 2 7 2017

FAX COVER SHEET

TO	
COMPANY	
FAXNUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2017-03-27 17:42:19 GMT
RE	Docket 5094: Examiner Jonathan G. SELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 33 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY,
WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached documents to Examiner Jonathan G. JELSMA, Art Unit 1321.
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Ralph H. Dougherty, P.A.
Patent, Trademark, Copyright Law
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988

PAGE 1/34 * RCVD AT 3/27/2017 1:45:46 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/46 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):24-28

Best Available Copy

Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 2/34 * RCVD AT 3/27/2017 1:45:46 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/46 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):24-28

Best Available Copy

REPLACEMENT SHEET

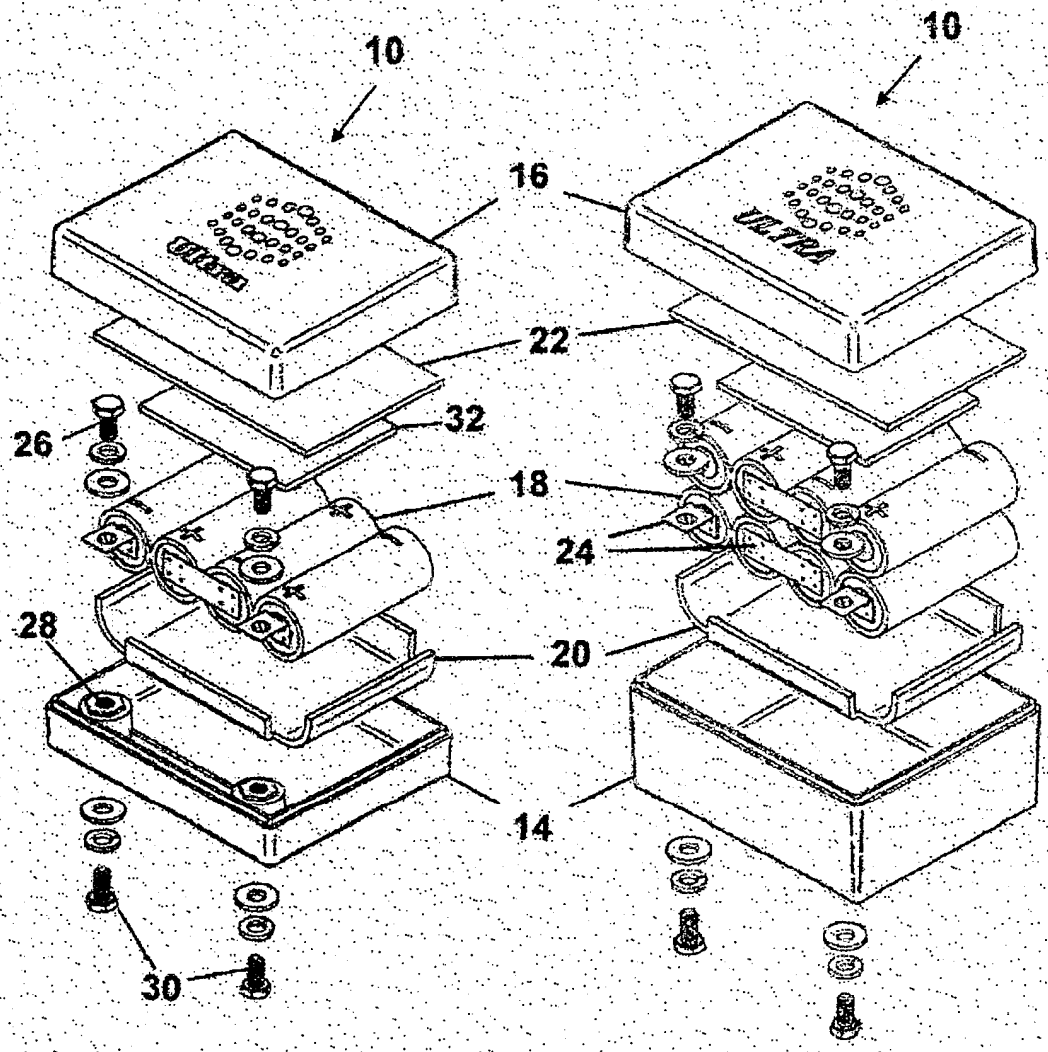


Fig. 1 *Fig. 2*

Best Available Copy

REPLACEMENT SHEET

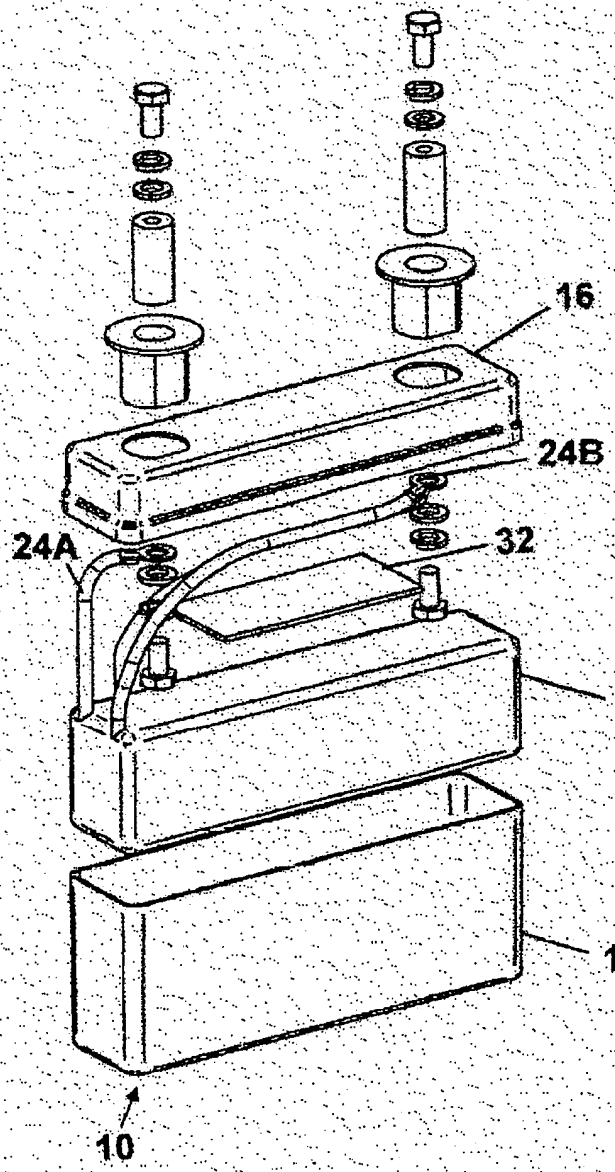


Fig. 3

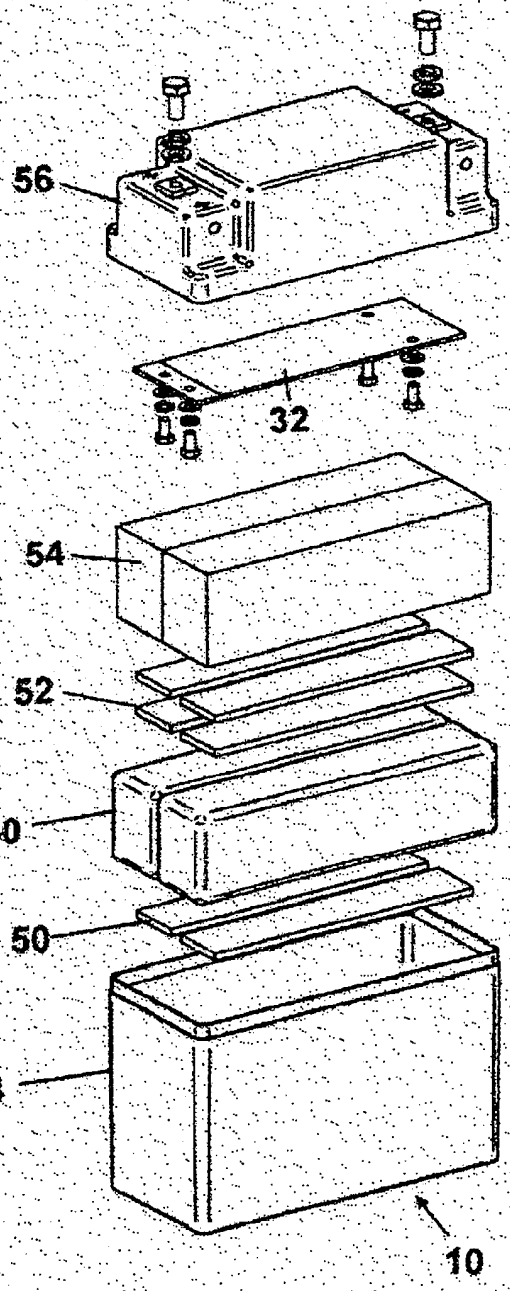


Fig. 13

Best Available Copy

REPLACEMENT SHEET

Fig. 5

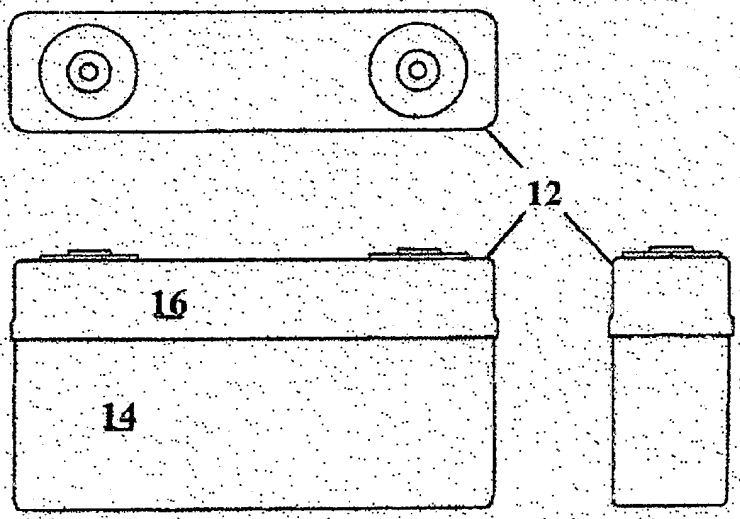


Fig. 4

Fig. 6

Fig. 7

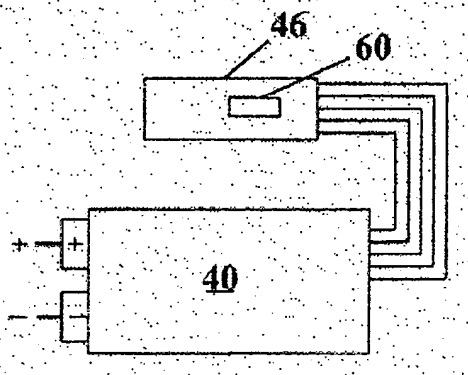
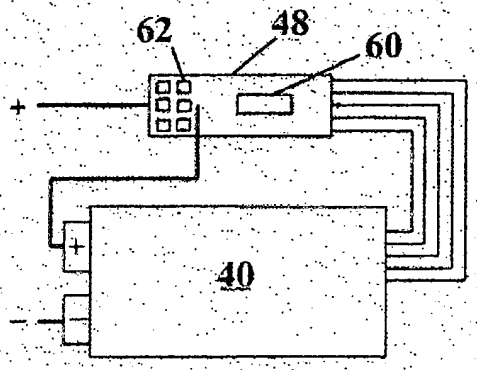


Fig. 8



Ex. 1004

Best Available Copy

REPLACEMENT SHEET

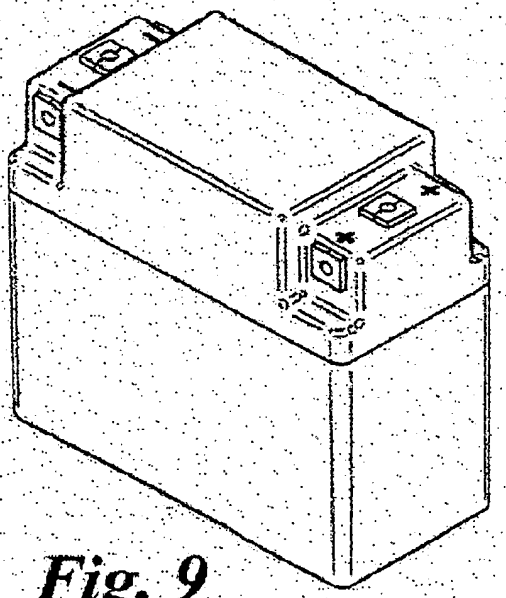


Fig. 9

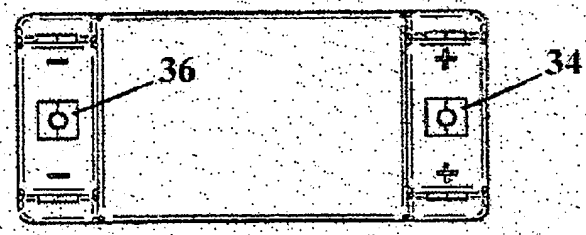


Fig. 10

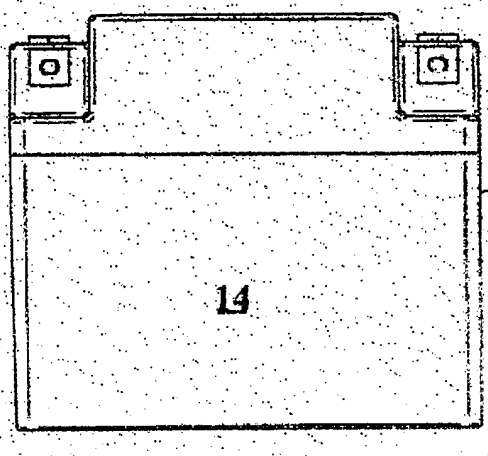


Fig. 11

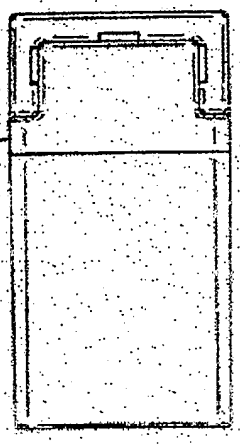


Fig. 12

Best Available Copy

REPLACEMENT SHEET

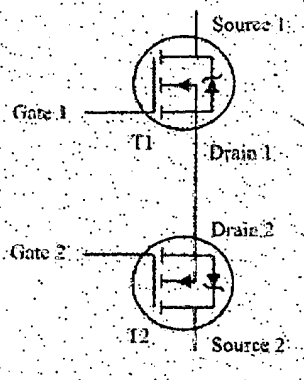


Fig. 14

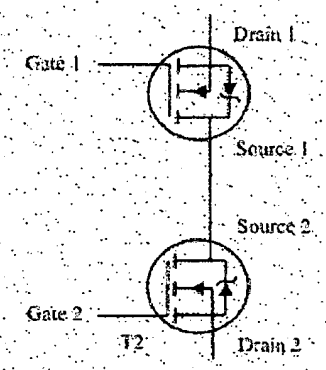


Fig. 15

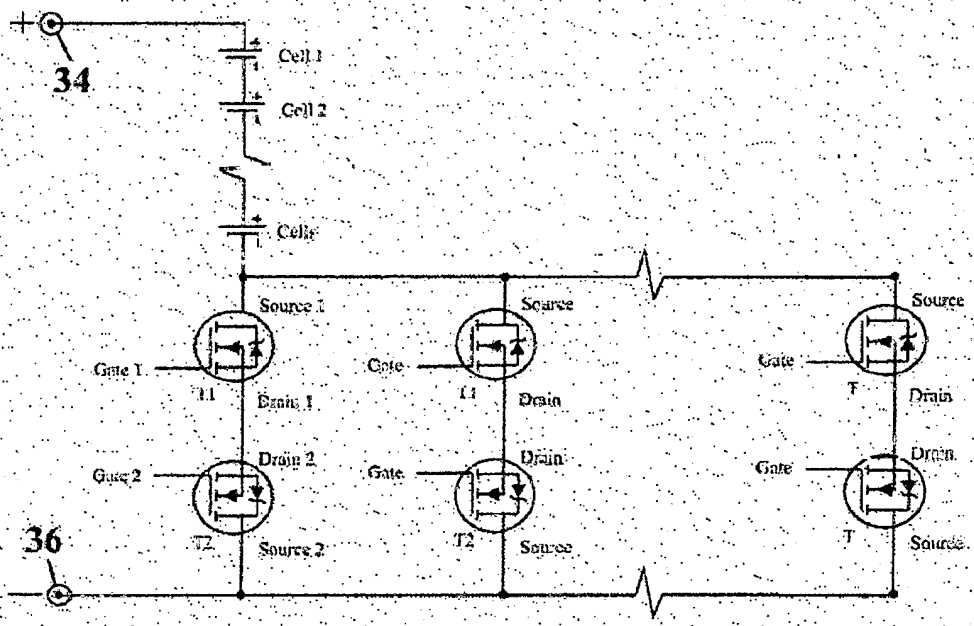


Fig. 16

Best Available Copy

REPLACEMENT SHEET

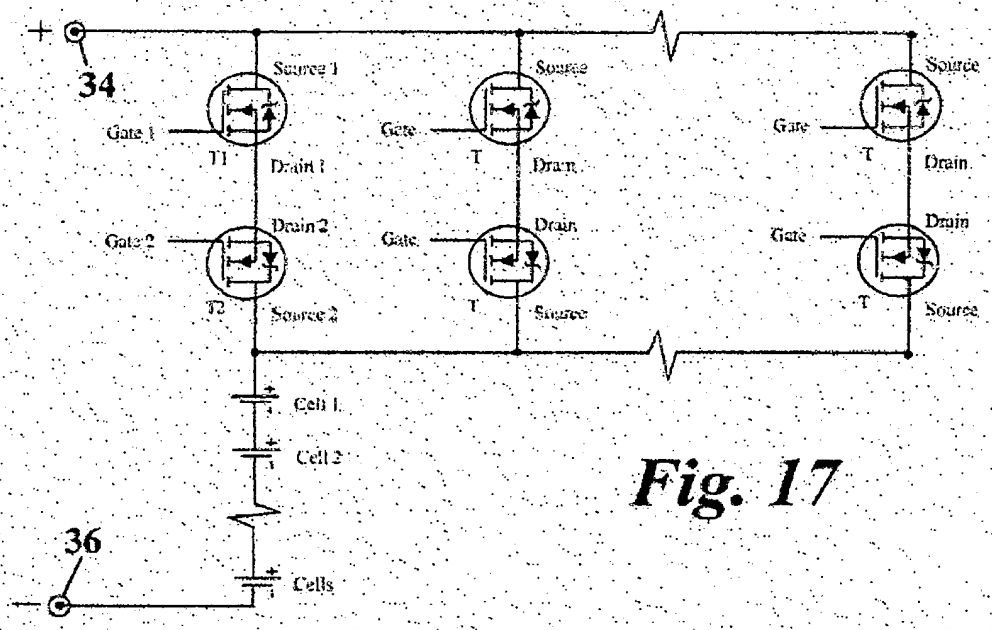


Fig. 17

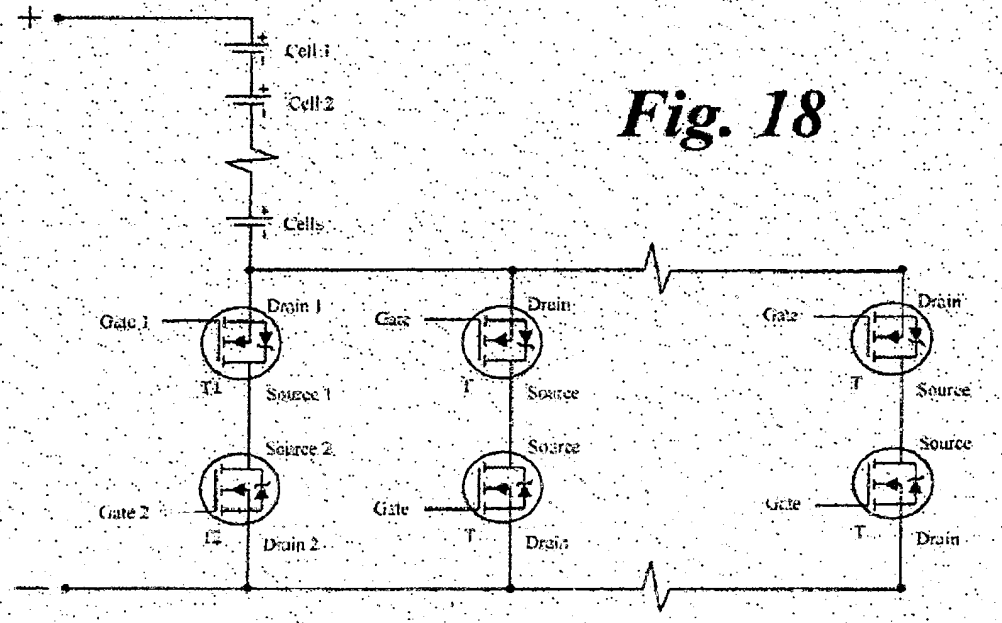


Fig. 18

Best Available Copy

REPLACEMENT SHEET

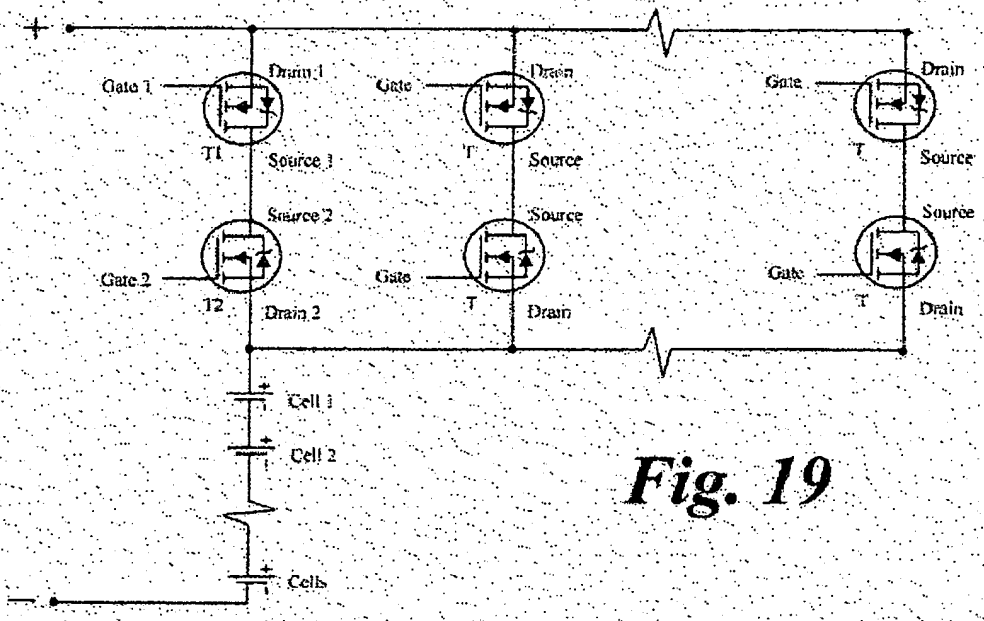


Fig. 19

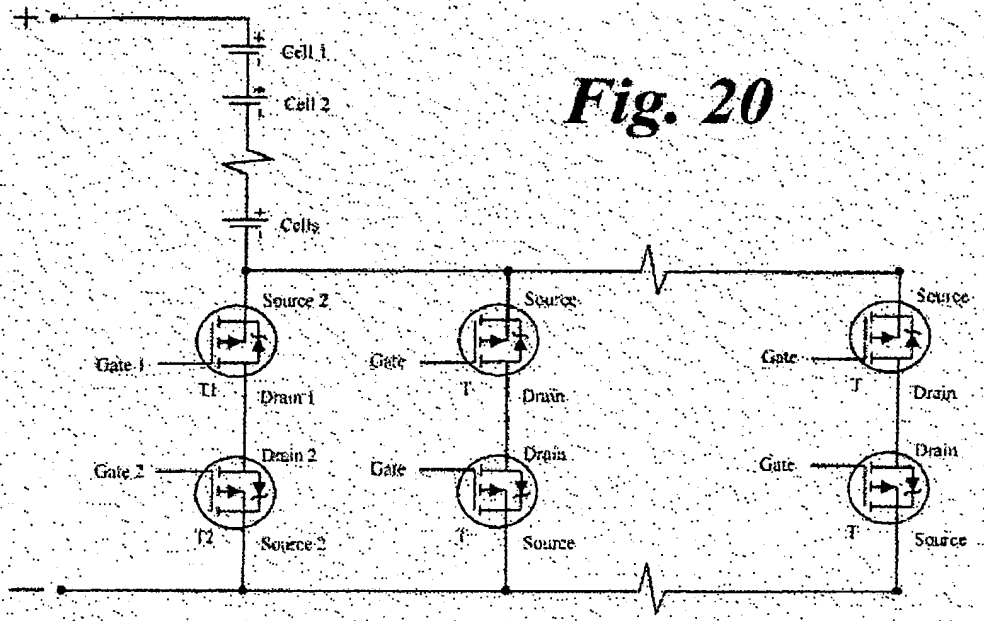


Fig. 20

Best Available Copy

REPLACEMENT SHEET

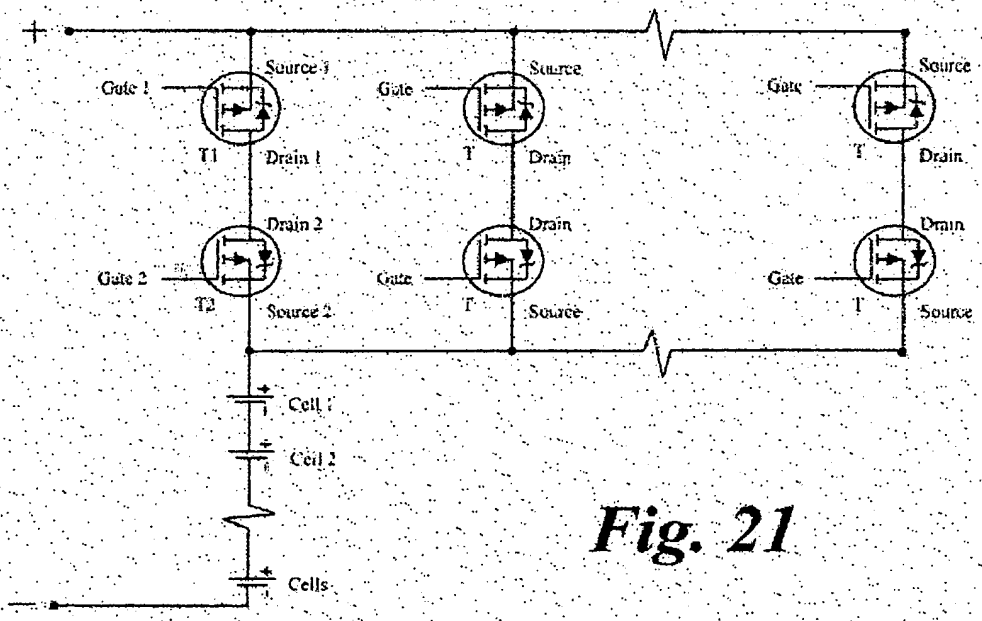


Fig. 21

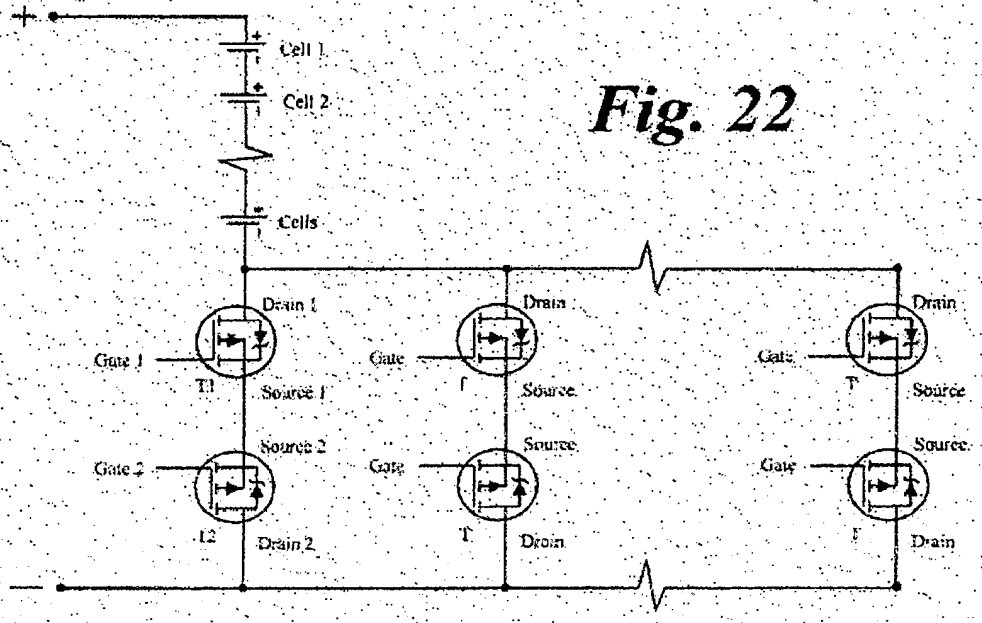


Fig. 22

Best Available Copy

REPLACEMENT SHEET

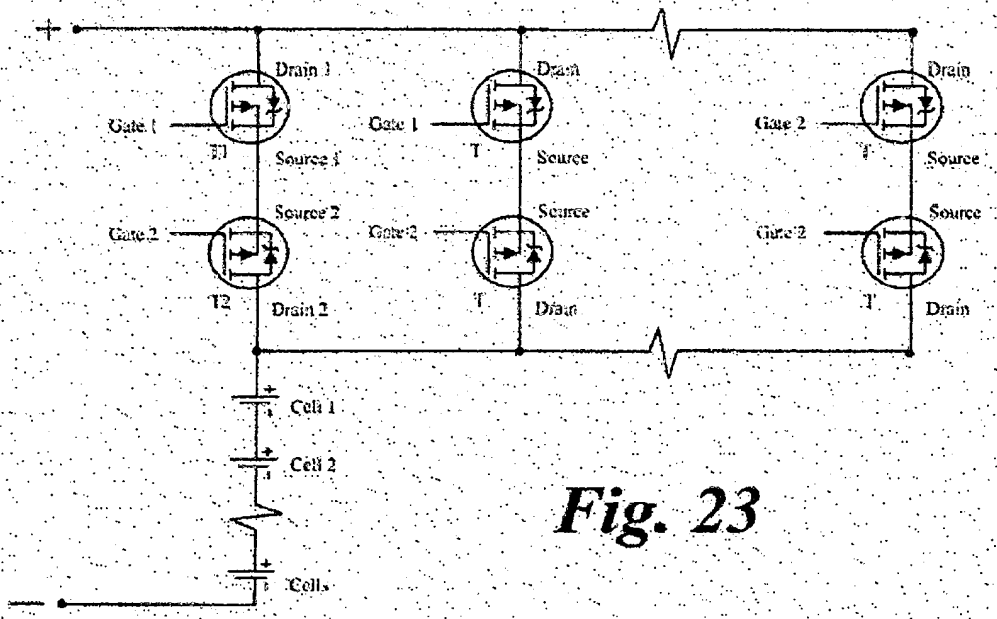


Fig. 23

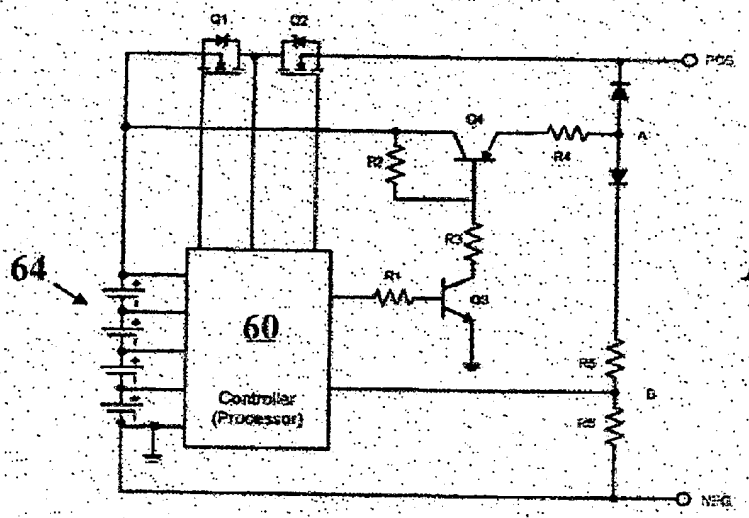


Fig. 24

Best Available Copy

REPLACEMENT SHEET

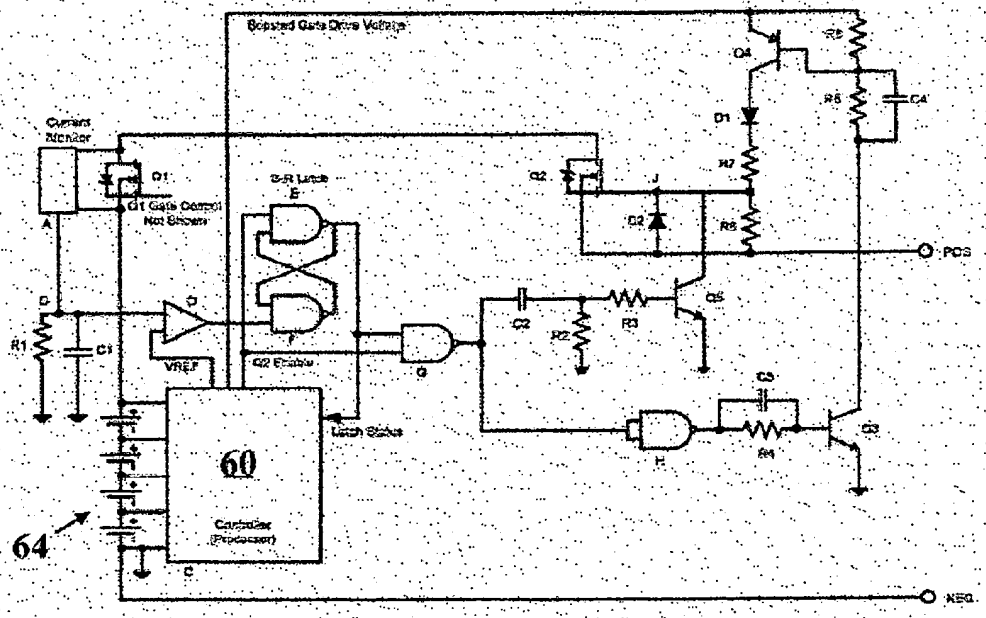


Fig. 25

Best Available Copy

REPLACEMENT SHEET

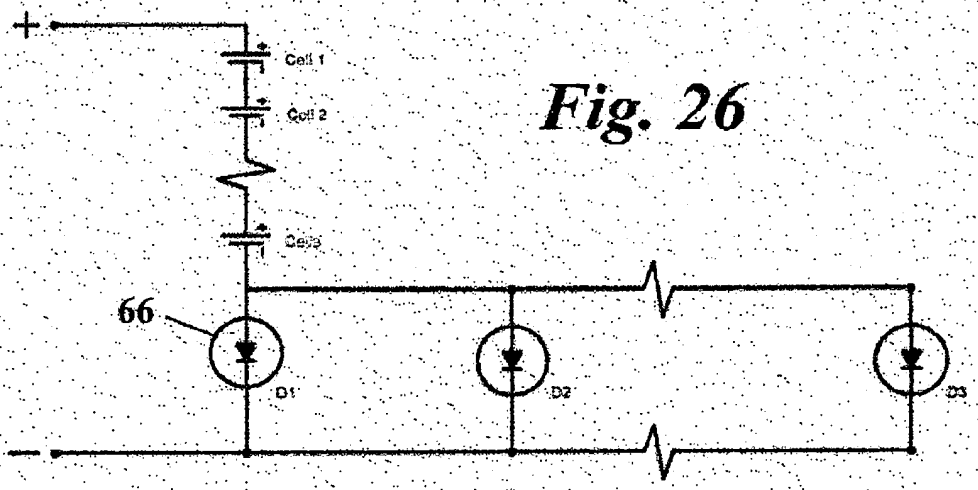


Fig. 26

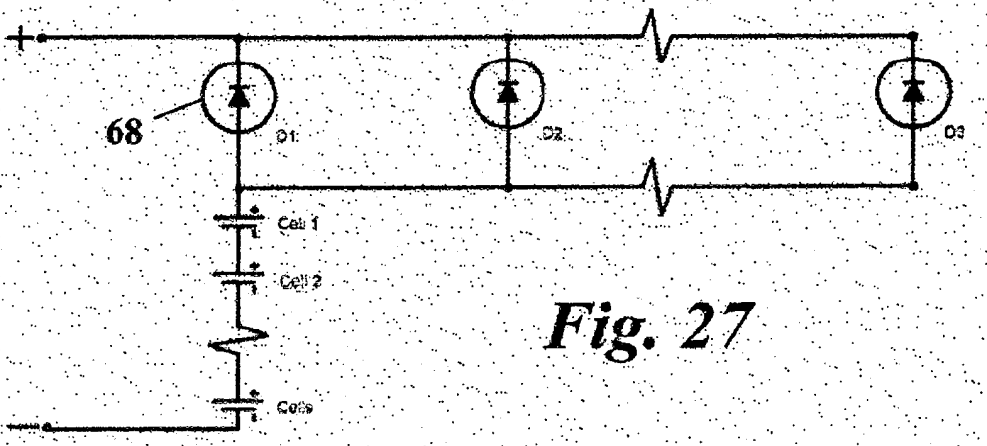


Fig. 27

Best Available Copy

REPLACEMENT SHEET

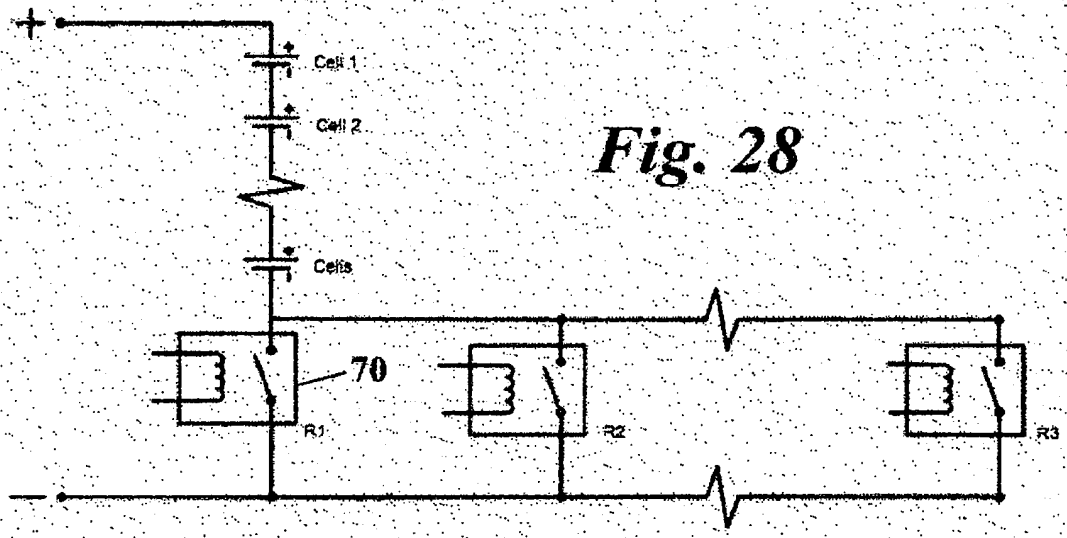


Fig. 28

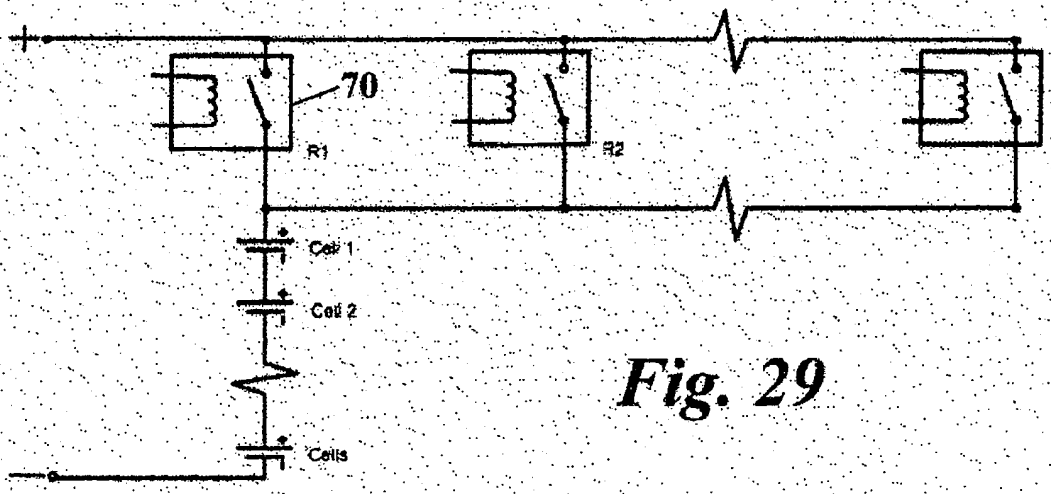


Fig. 29

Best Available Copy

REPLACEMENT SHEET

Fig. 30

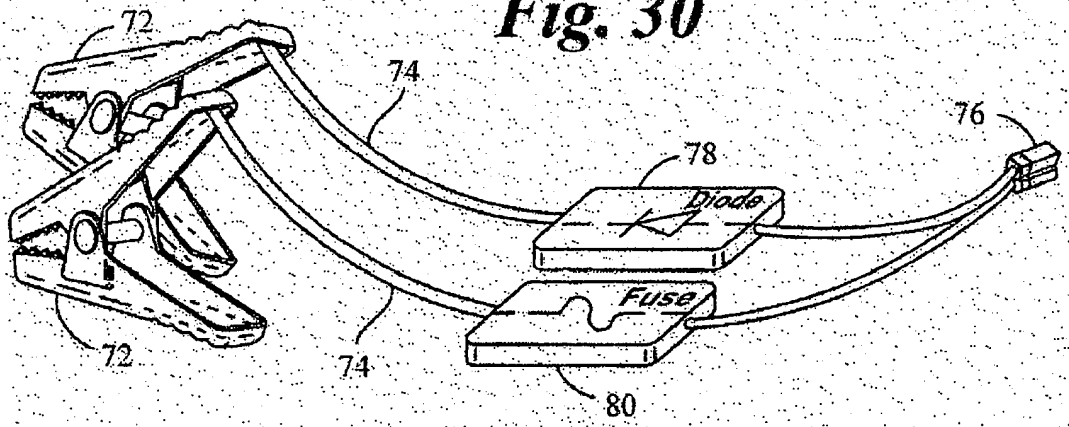


Fig. 31

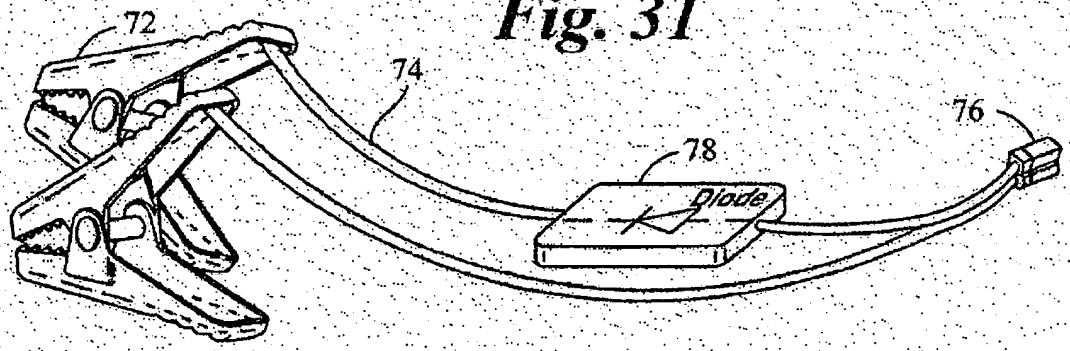
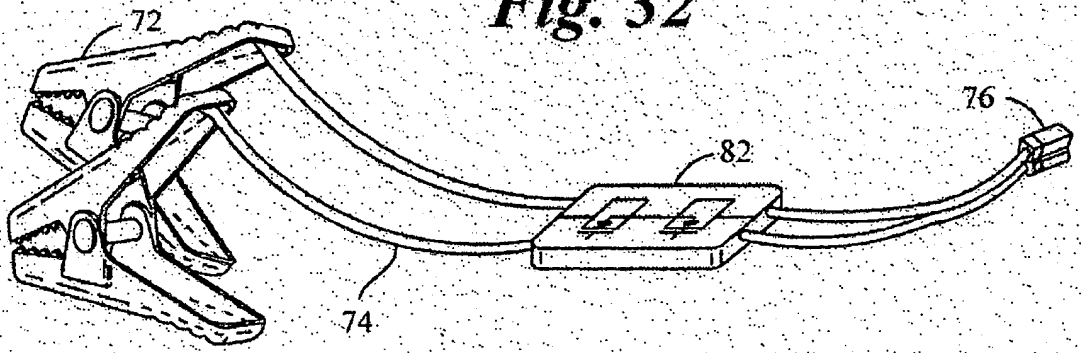


Fig. 32



Best Available Copy

REPLACEMENT SHEET

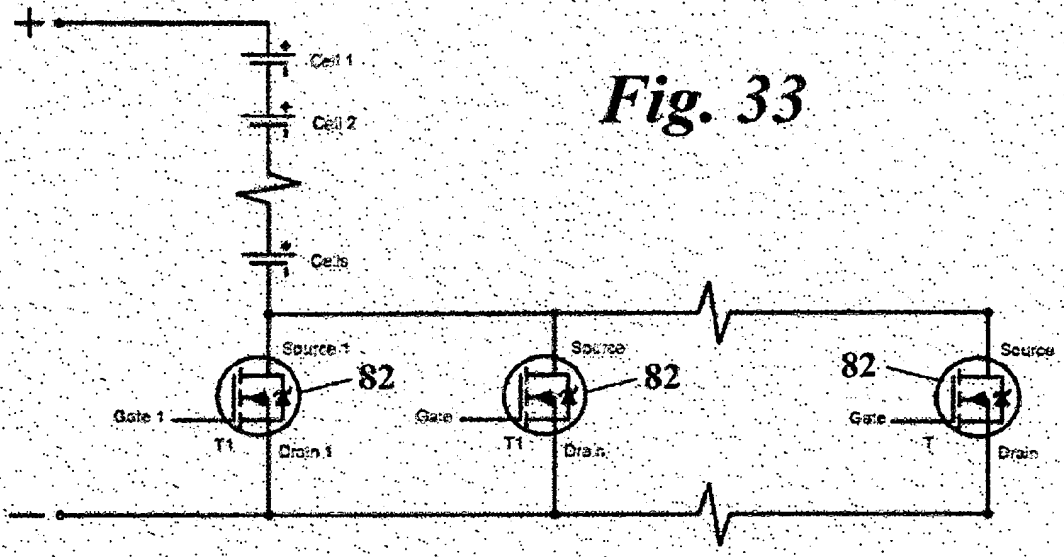


Fig. 33

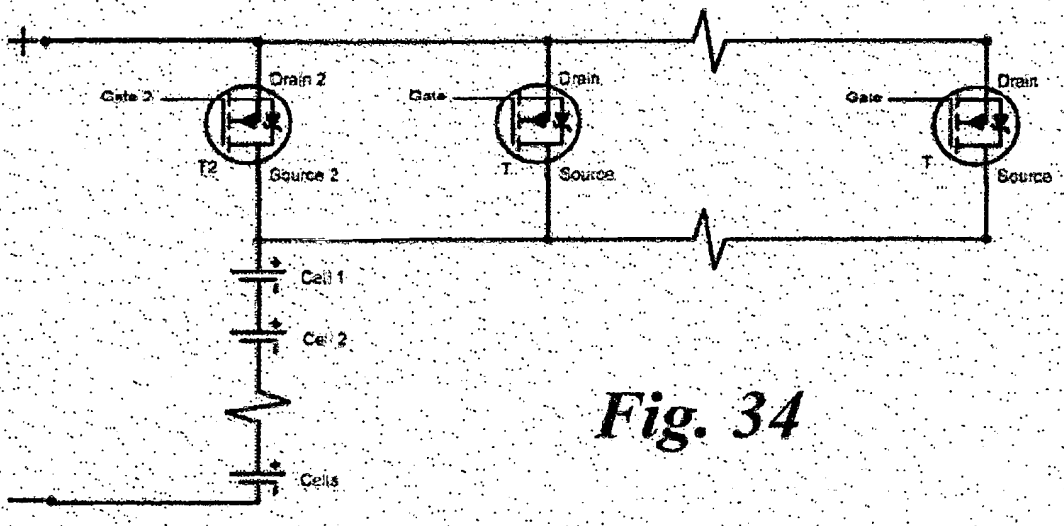


Fig. 34

Best Available Copy

REPLACEMENT SHEET

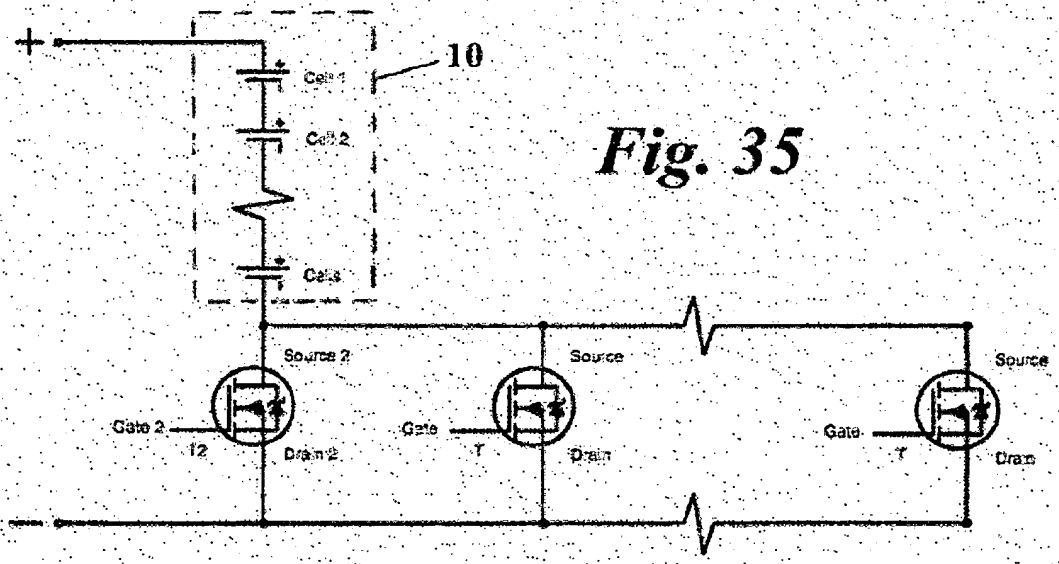


Fig. 35

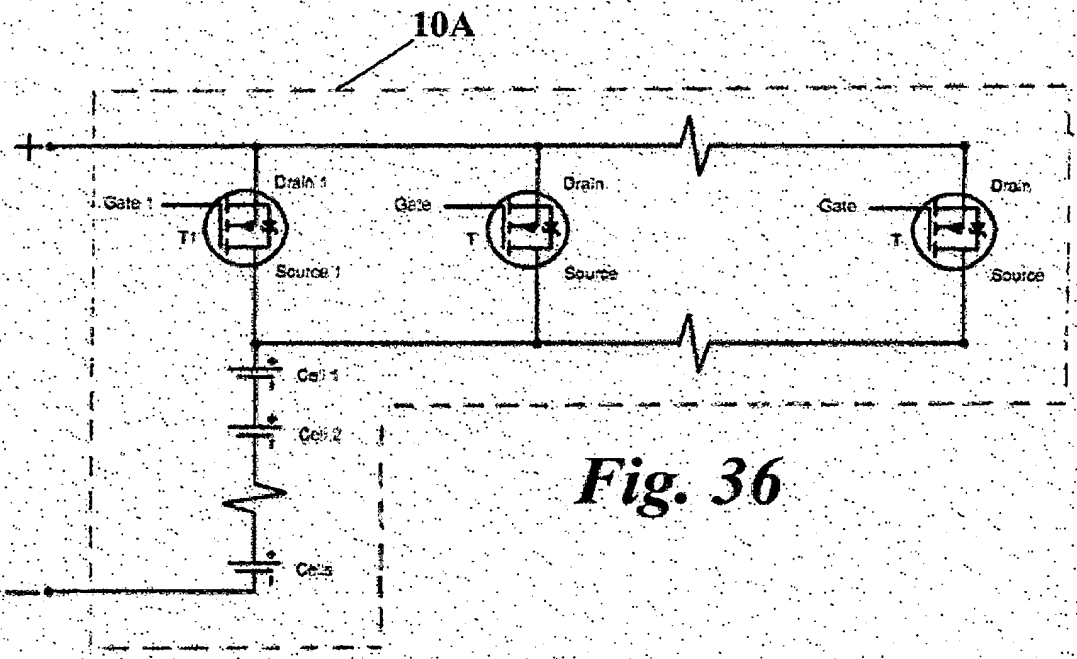


Fig. 36

Best Available Copy

REPLACEMENT SHEET

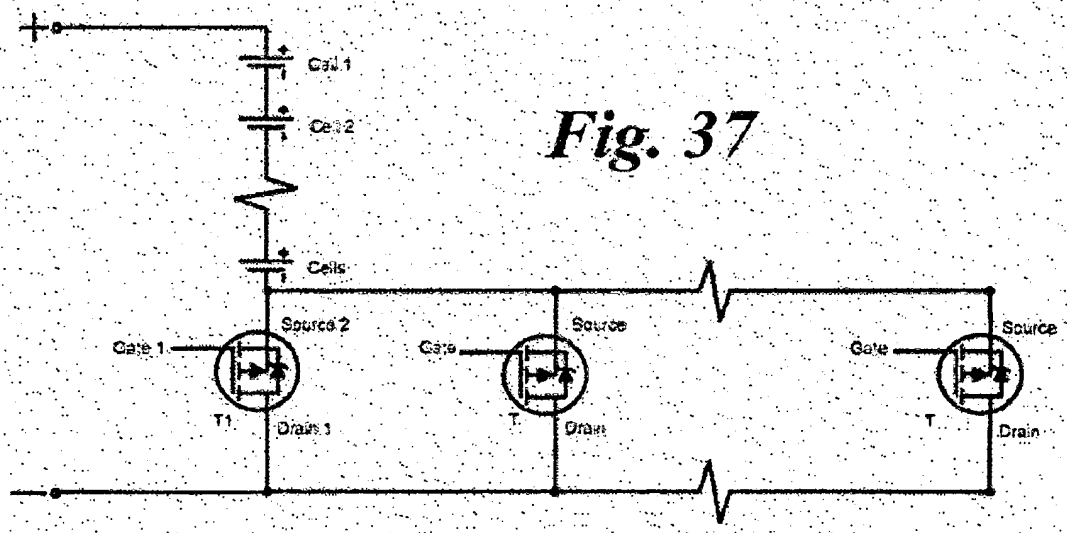


Fig. 37

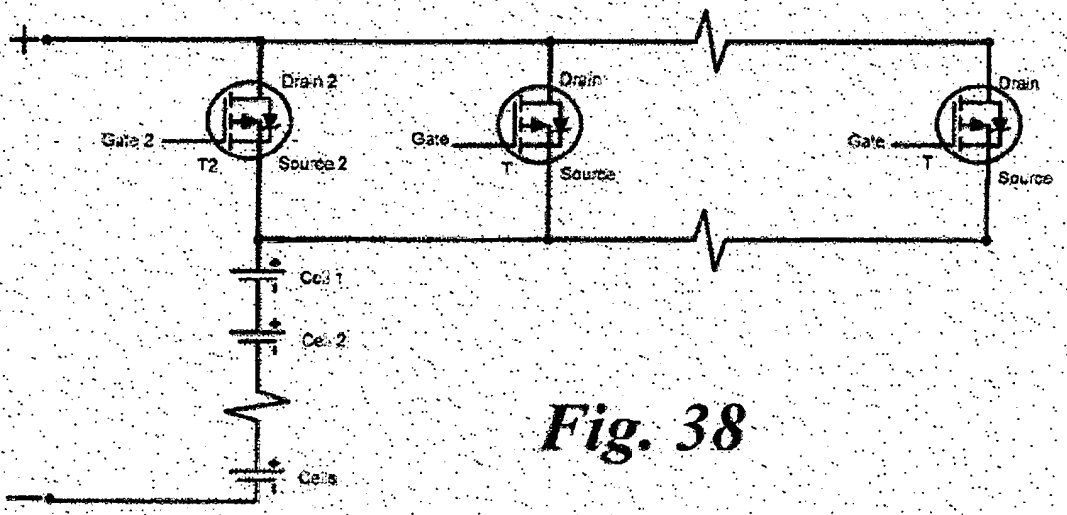


Fig. 38

Best Available Copy

REPLACEMENT SHEET

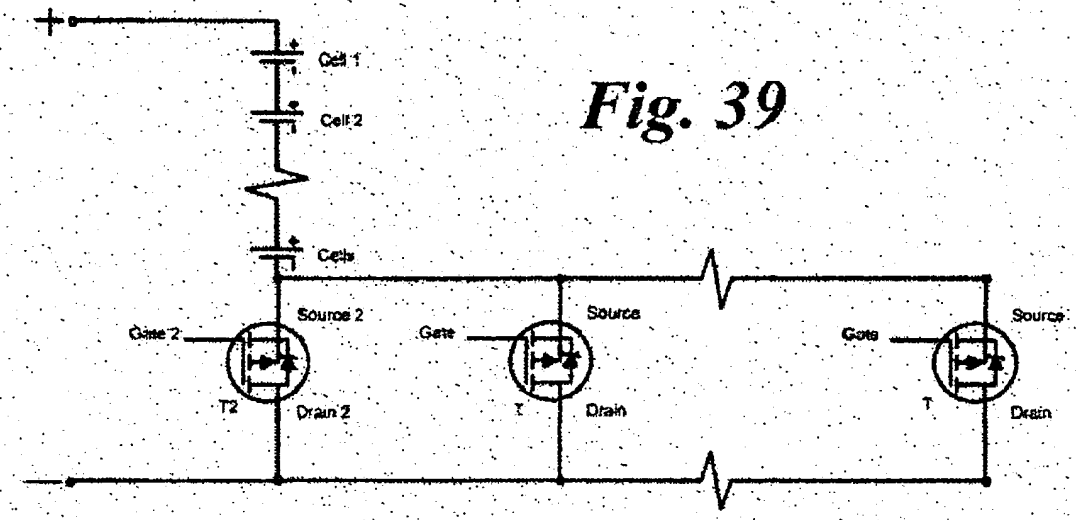


Fig. 39

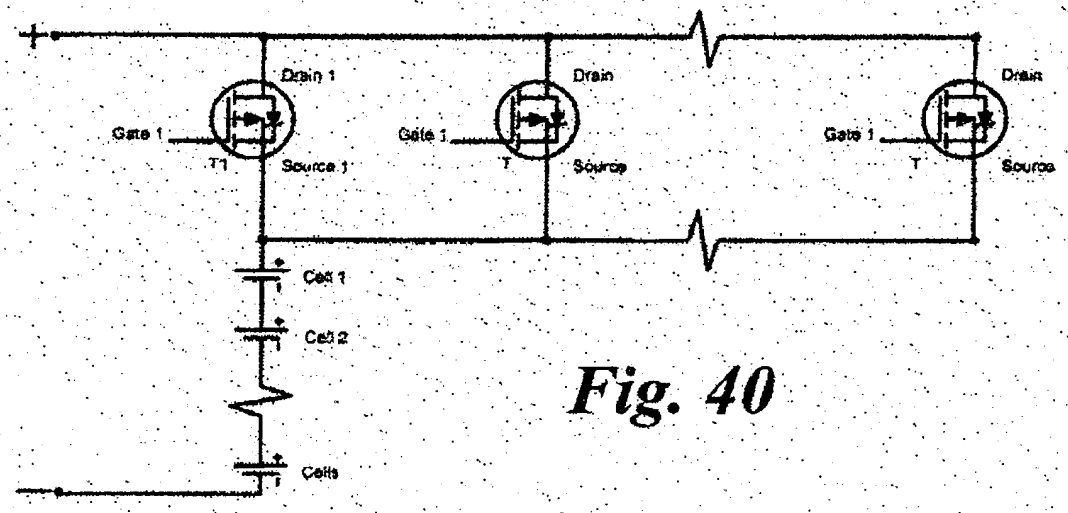


Fig. 40

Best Available Copy

REPLACEMENT SHEET

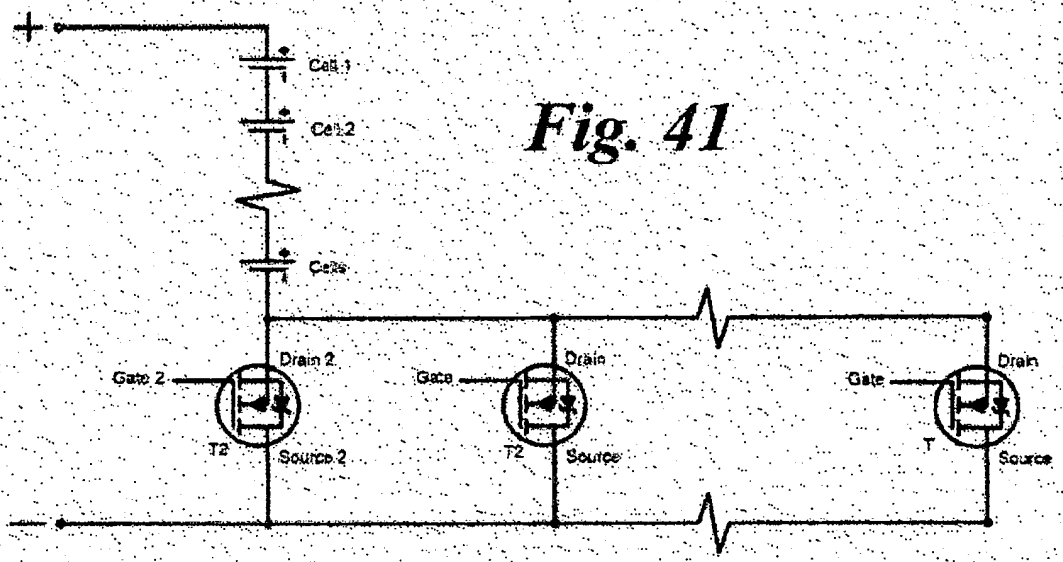


Fig. 41

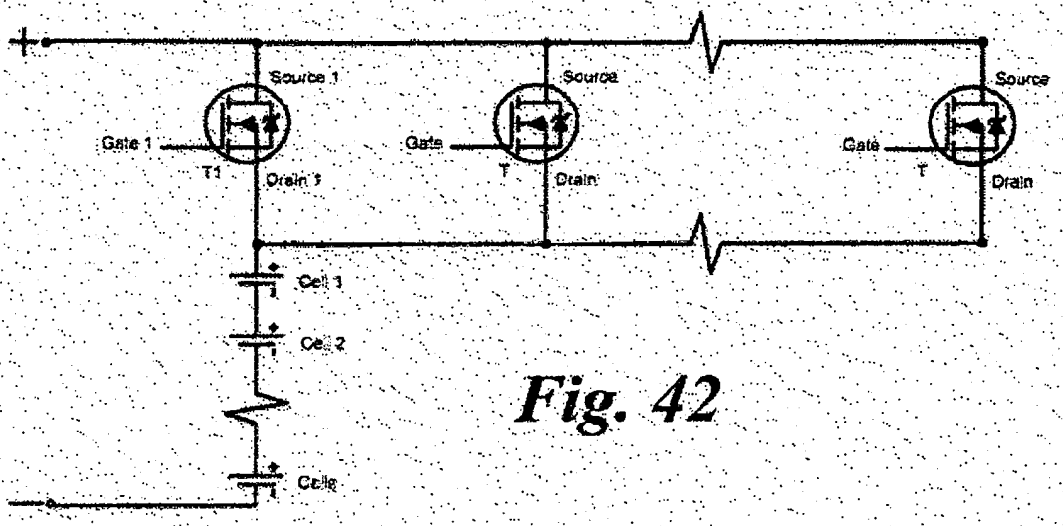


Fig. 42

Best Available Copy

REPLACEMENT SHEET

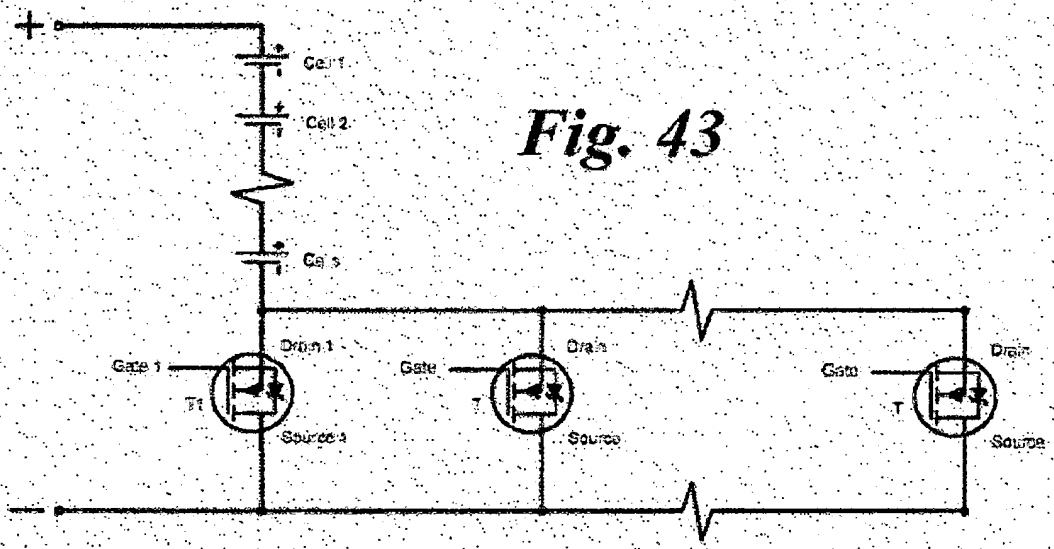


Fig. 43

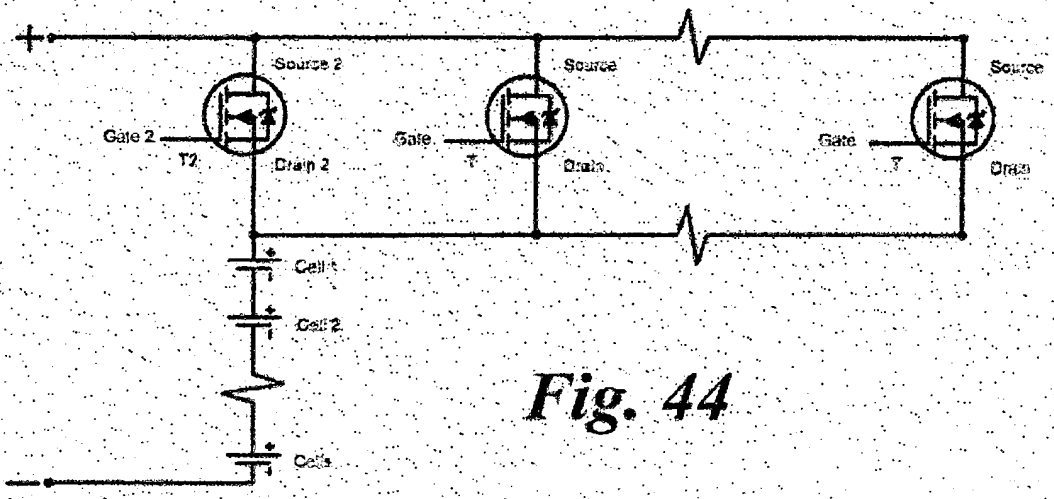


Fig. 44

Best Available Copy

REPLACEMENT SHEET

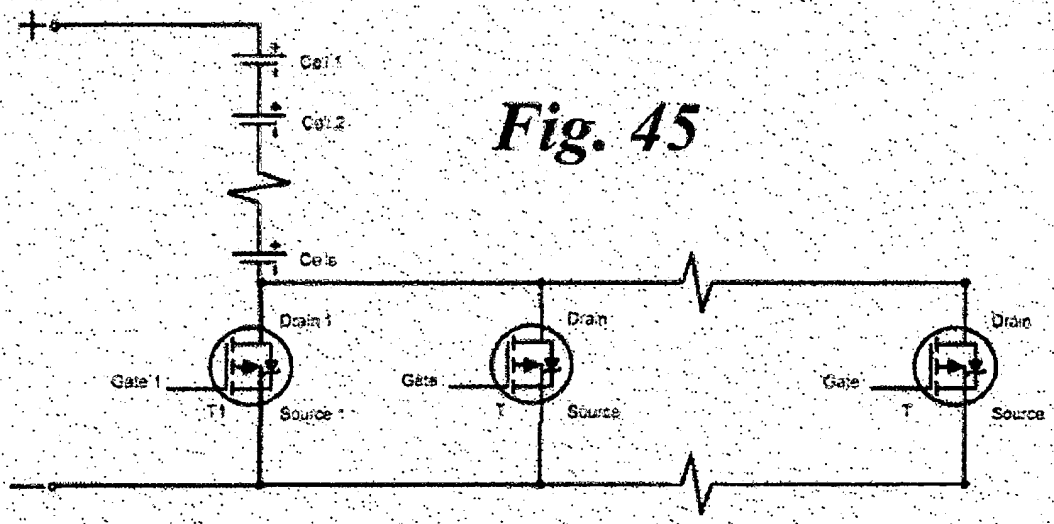


Fig. 45

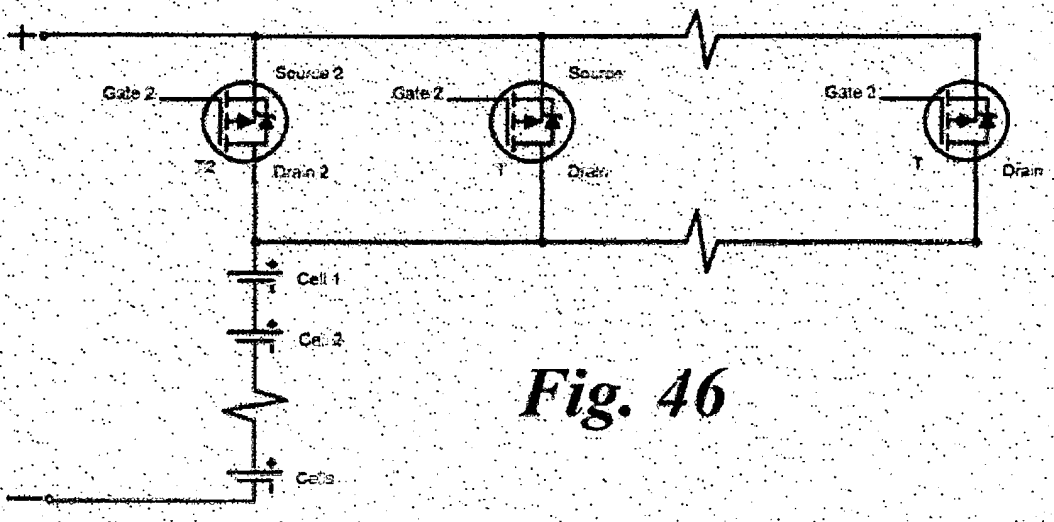


Fig. 46

Best Available Copy

REPLACEMENT SHEET

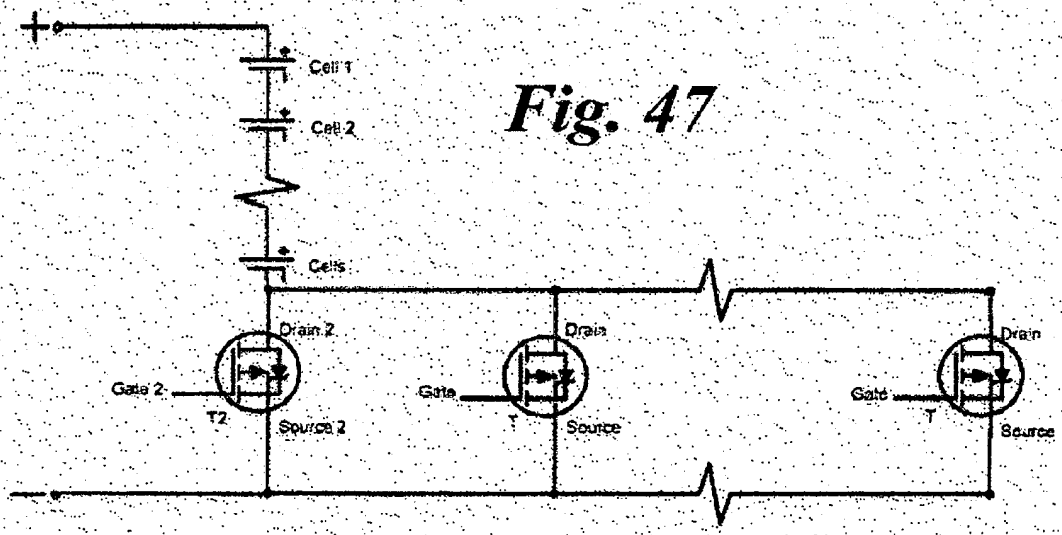


Fig. 47

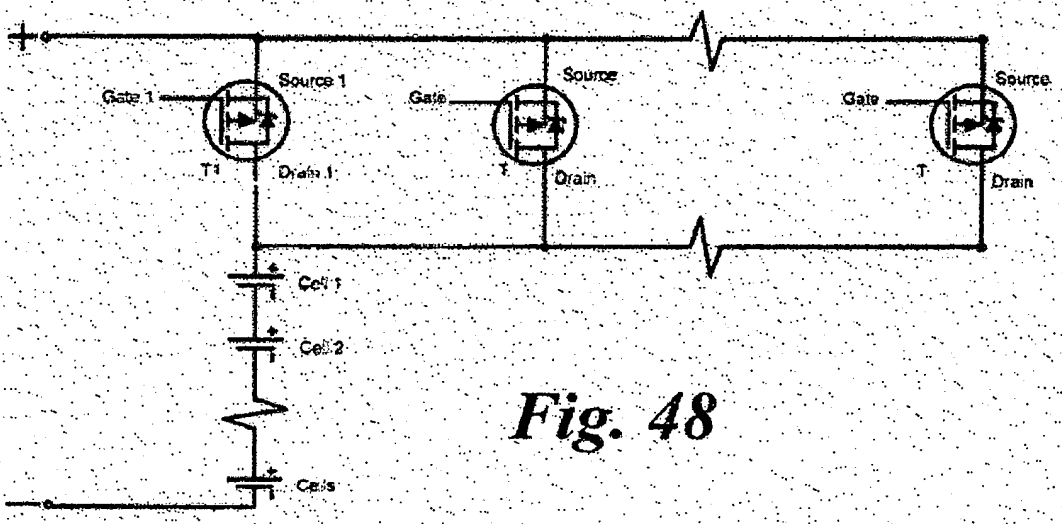


Fig. 48

Best Available Copy

REPLACEMENT SHEET

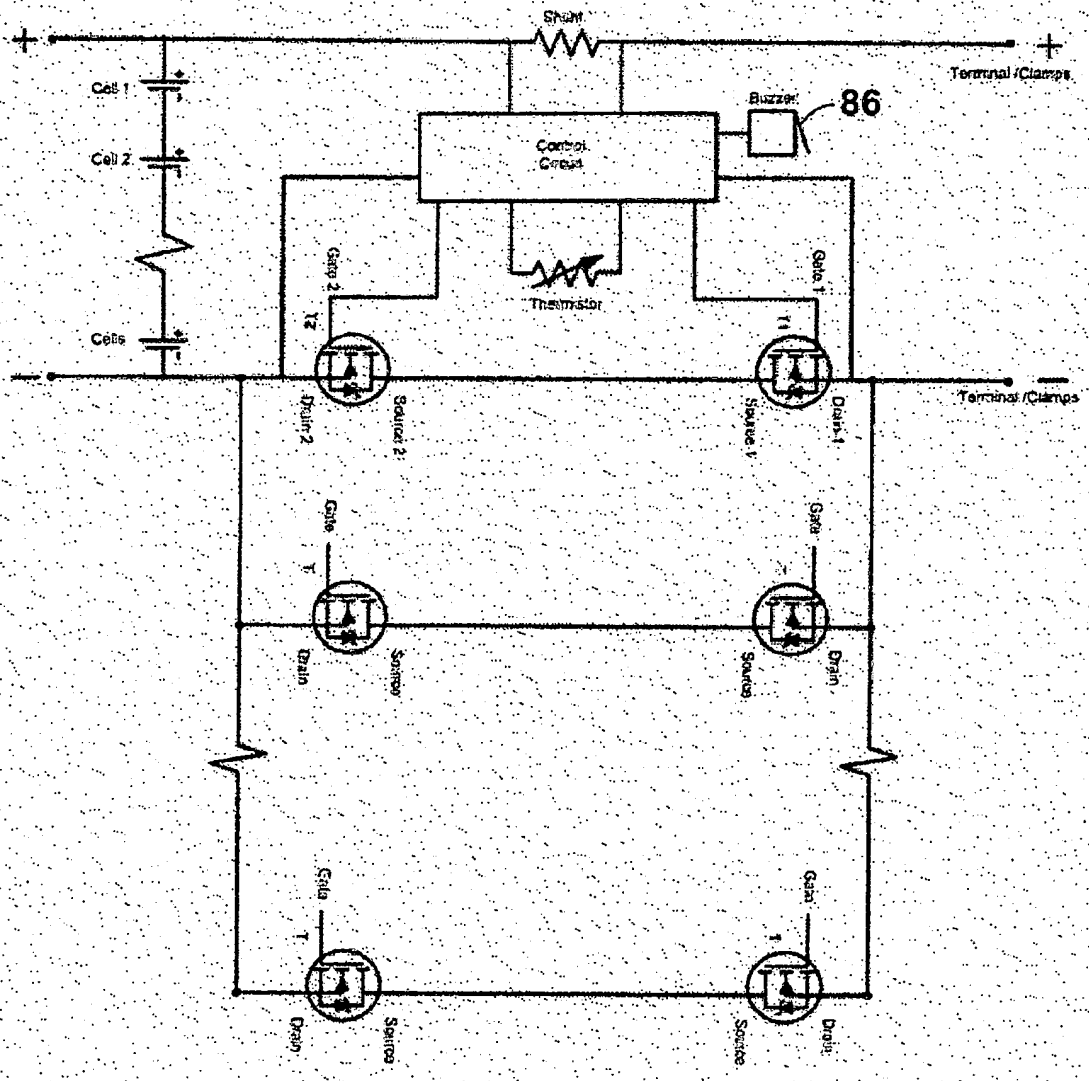


Fig. 49

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☒ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:**

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER

MAR 2 7 2017

PTO/SB/92 (07-16)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Certificate of Mailing or Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being:

1. ☐ Deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

on _____
Date

2. ☑ Facsimile transmitted to the United States Patent and Trademark Office, or

OR

3. ☐ EFS-Web transmitted to the USPTO.



Signature

27 March 2017
Date

Ralph H. Dougherty
Typed or printed name

704-940-3988
Telephone number

Note: Each paper must have its own certificate of mailing or transmission, or this certificate must identify each submitted paper.

This was originally transmitted on March 24, but there was a transmission error.

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/657,101	Filing Date 03/13/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **03/27/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
SHARON HARRIS

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER
MAR 24 2017

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT EXAMINING OPERATIONS

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)

Applicant: MARTIN KOEBLER

Serial No: 14/657,101

Filed: March 13, 2015

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Charlotte, North Carolina
March 24, 2017

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

AMENDMENT

Responsive to the Official Action dated January 4, 2017, kindly amend the above-identified application as follows:

Amendments to the Drawings begin on page 2.

Status of the Claims begin on page 3.

Remarks begin on page 8 of this paper.

Best Available Copy

In the drawings:

Please substitute the attached 22 Replacement Sheets containing Figures 1 through 49 for the drawing figures originally filed.

PAGE 5/34 * RCVD AT 3/24/2017 2:57:15 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/39 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):28-49

Best Available Copy

In the claims:

The claim status is now:

1. (Original) A battery pack for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system, said battery pack comprising:

a battery pack housing; and

at least one lithium-based rechargeable cell within said housing;

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

2. (Original) A battery pack according to claim 1 wherein the lithium-based cell is selected from the group consisting of $LiFePO$, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

3. (Original) A battery pack according to claim 1, wherein said battery pack comprises from three to sixteen lithium-based rechargeable cells in series in said housing.

4. (Original) A battery pack according to claim 1, further comprising a protection circuit board within said battery housing, said protection circuit board including at least one of a solid state switch, MOSFET, diode, or relay, which protects against temperature, reverse polarity, undervoltage or overvoltage.

5. (Original) A battery pack according to claim 1, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive

PETITIONERS Ex. 1004
167 of 304

Best Available Copy

pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

6. (Original) Apparatus according to claim 5, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

7. (Original) Apparatus according to claim 5, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

8. (Original) A battery pack according to claim 1, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

PAGE 7/34 * RCVD AT 3/24/2017 2:57:15 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/39 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):26-40
PET INVENTORS Ex. 1004
168 of 304

Best Available Copy

9. (Original) Apparatus according to claim 8, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

10. (Original) Apparatus according to claim 8, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

11. (Original) Apparatus according to claim 1, wherein the operating system of said internal combustion engine includes a battery, said apparatus further comprising a pair cables, each cable situated in a cable housing, one end of each cable connecting to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack, and at least one of a MOSFET, diode, or relay being situated within one of said cable housings.

12. (Original) A deep cycle battery in a 6 volt to 800 volt operating system, comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing;

a battery management system including a processor and a circuit board having a MOSFET arrangement which protects from one of overvoltage, undervoltage, reverse polarity, short circuit, and extremes of temperature;

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

13. (Original) A deep cycle battery according to claim 12 wherein the lithium-based cell is selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

LEXINGTON EX. 1004
169 of 304

Best Available Copy

14. (Original) A deep cycle battery according to claim 12, wherein said battery comprises from two to 250 lithium-based rechargeable cells in series in one or more of said housings.

15. (Original) A deep cycle battery according to claim 12, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

16. (Original) Apparatus according to claim 15, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

17. (Original) Apparatus according to claim 15, wherein said one or more cells are selected from the group consisting of $LiFePO_4$, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

18. (Original) A deep cycle battery according to claim 12, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

Ex. 1004
170 of 304

Best Available Copy

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

19. (Original) Apparatus according to claim 18, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

20. (Original) Apparatus according to claim 18, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

21. (Original) A battery pack for driving a battery device in a 12 volt to 120 volt internal combustion engine, said battery pack comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing, the total discharging amount of each lithium-based cell in the battery pack being from three (3) Ah to 5000 Ah, and charging voltage per one cell being 3.0 to 4.2 V;

a pair cables, each cable having a cable housing in which it is situated;

one end of each cable being provided with and connected to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack; and

at least one of a solid state switch, MOSFET, diode, or relay being situated within one of said cable housings.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER
MAR 24 2017

REMARKS

The drawings are objected to by the Examiner. Replacement Sheets containing Figures 1 through 49 have been prepared, and are submitted herewith correcting all informalities.

Claims 1-10 and 12 through 20 currently stand rejected under 35 USC 103 over Koebler Published US Patent Application 2013/0241498, which is the parent Application No. 13,989,273, from which the present application is a Continuation in part, as set forth in paragraph 0001 of the Specification. On August 6, 2015, long prior to examination of the present application, it was noted that the Application Data Sheet for this case had inadvertlently been omitted from the submissions at the time of filing the present application. Accordingly, the appropriate Application Data Sheet was filed that day, August 6, 2015. In a telephone conversation with Examiner Jelsma on March 23, 2017, he confirmed that the appropriate Application Data Sheet (ADS) had been filed.

In view of the prior submission of the ADS for the present case, which removes the Koebler US Published Patent Application 2013/0241498 (US Appln. No. 13/989,273) as a reference in this case, it is respectfully requested that the rejections of Claims 1 through 10 and 12 through 20 be withdrawn.

Claims 11 and 21 stand rejected under 35 USC 103 as unpatentable over Koebler in view of Grant USP 4,166,241. Claim 11 depends from claim 1, and upon withdrawal of the Koebler reference, claim 1 is clearly patentable. Therefore, claim 11 is equally patentable with claim 1.

Claim 21 is written independent form, and upon withdrawal of the Koebler reference there are insufficient teachings in Grant to render claim 21 obvious. Accordingly, it is submitted that both claims 11 and 21 are patentable within the meaning of 35 USC 103.

Best Available Copy

Since there is no amendment to the claims, no new matter is presented in the claims.

Since this amendment does not add more claims than previously paid for, no additional claim fee is required.

In view of the foregoing amendment and these remarks, this application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicant. The Examiner is invited to call Applicant's undersigned attorney if, in the opinion of the Examiner, a telephone conference will expedite prosecution of this application.

Respectfully submitted,

Ralph H. Dougherty
Attorney for Applicant
Registration No. 25,851
RALPH H. DOUGHERTY, P.A.
4219 Kronos Place
Charlotte, North Carolina 28210
Telephone: (704) 940-3988
Facsimile: (704) 631-4996

Enclosures - 22 Replacement Sheets of Drawings

Attorney's
Docket 5094

Best Available Copy

REPLACEMENT SHEET

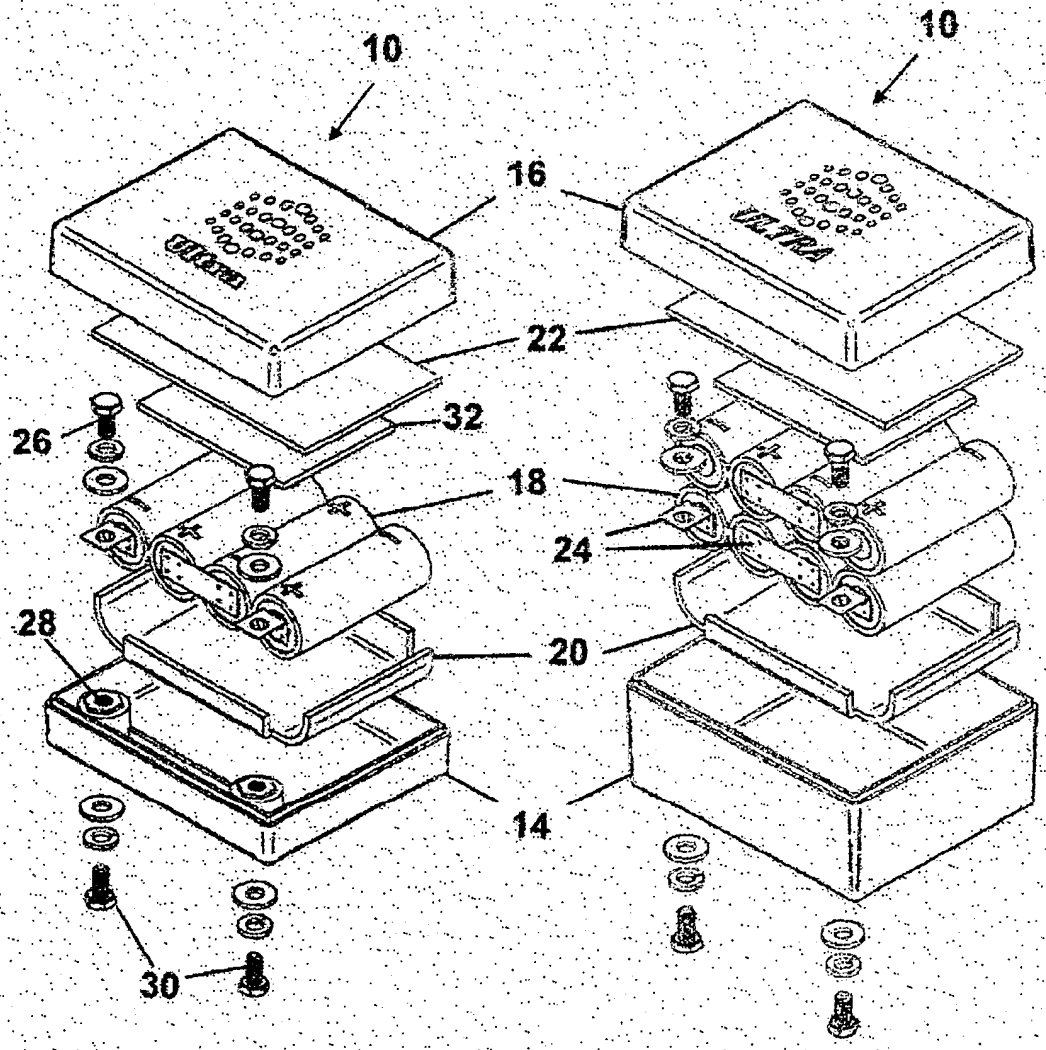


Fig. 1

Fig. 2

Best Available Copy

REPLACEMENT SHEET

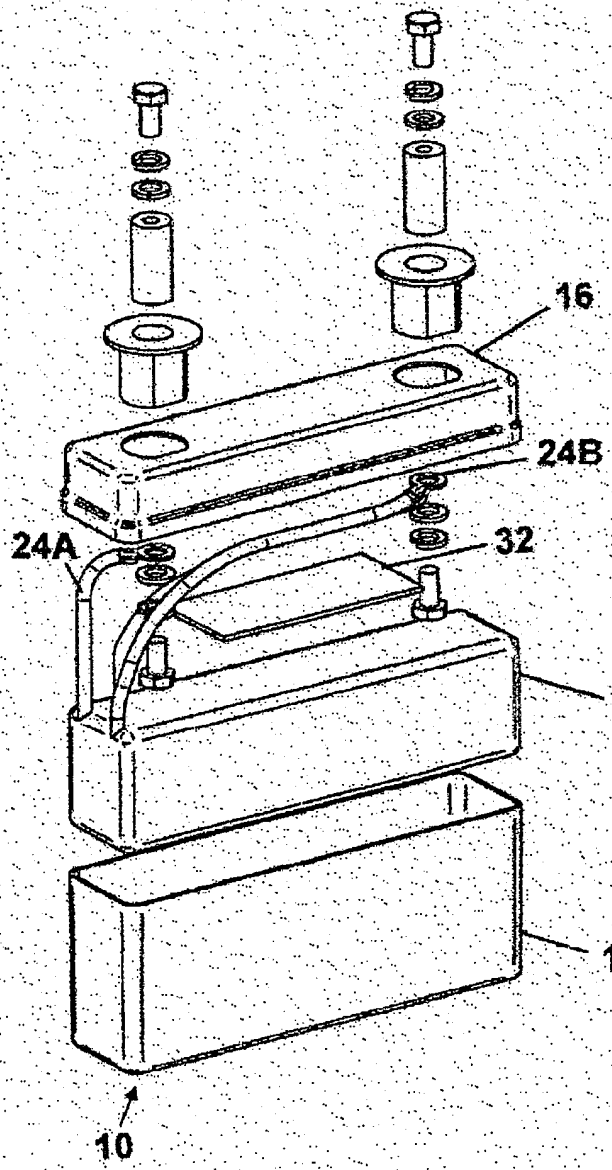


Fig. 3

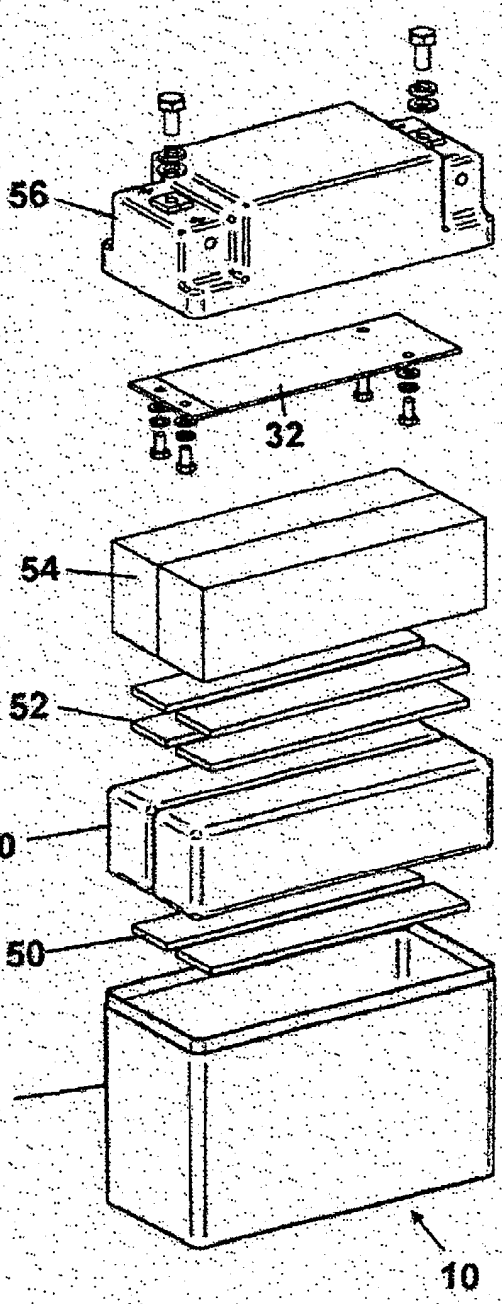


Fig. 13

Best Available Copy

REPLACEMENT SHEET

Fig. 5

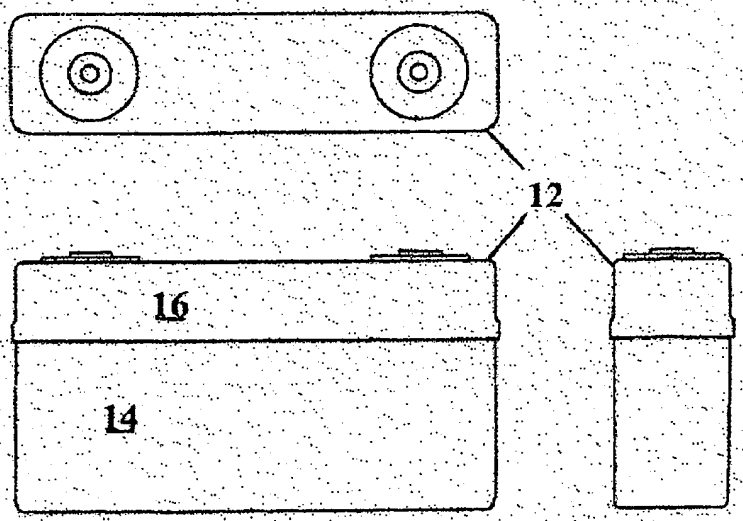


Fig. 4

Fig. 6

Fig. 7

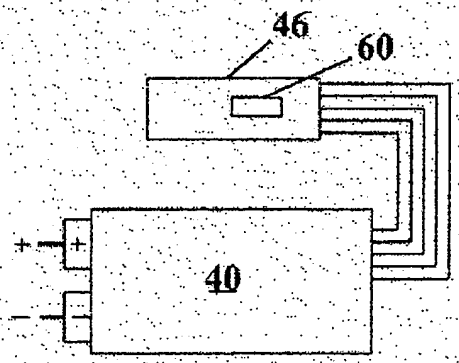
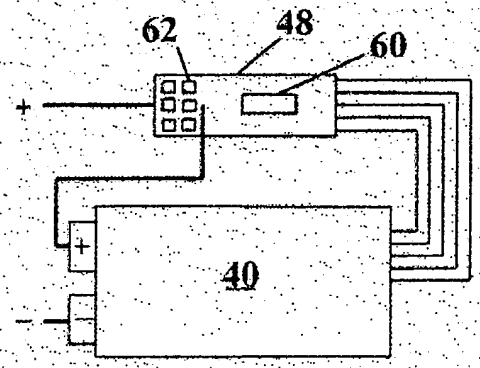


Fig. 8



Best Available Copy

REPLACEMENT SHEET

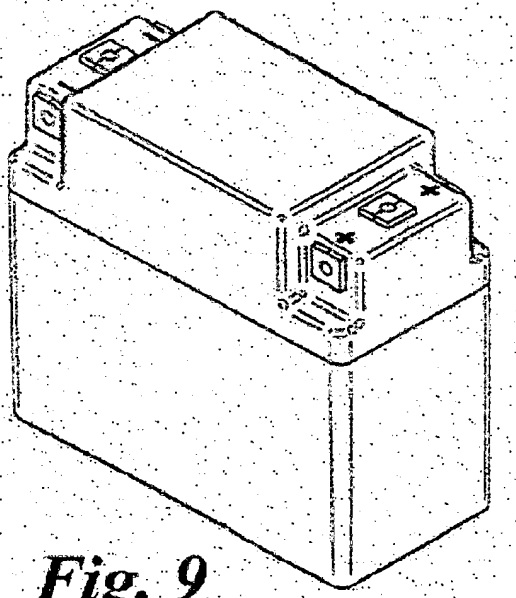


Fig. 9

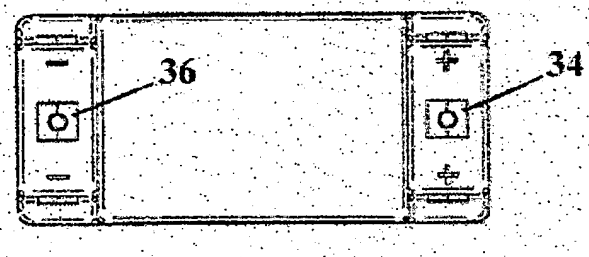


Fig. 10

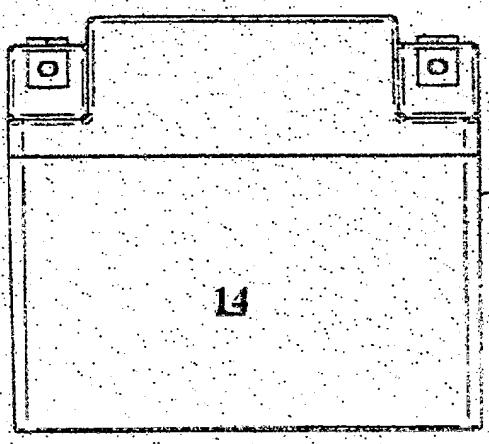


Fig. 11

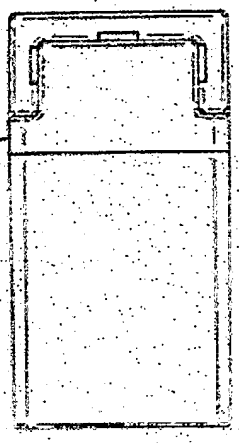


Fig. 12

Best Available Copy

REPLACEMENT SHEET

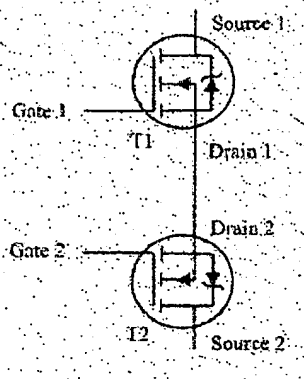


Fig. 14

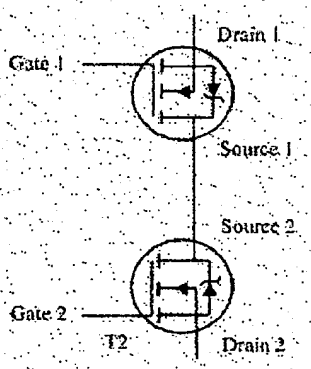


Fig. 15

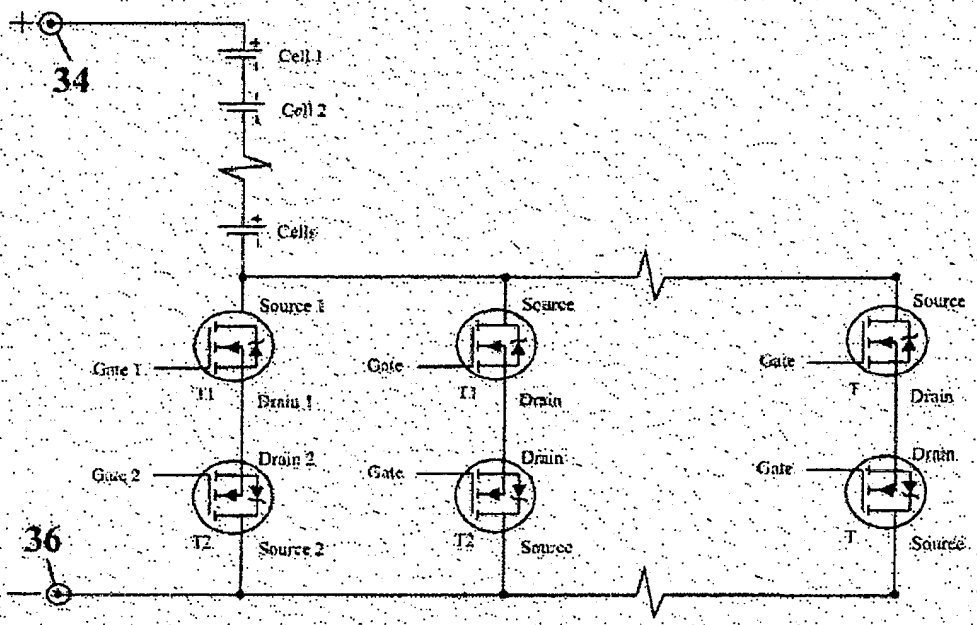


Fig. 16

Best Available Copy

REPLACEMENT SHEET

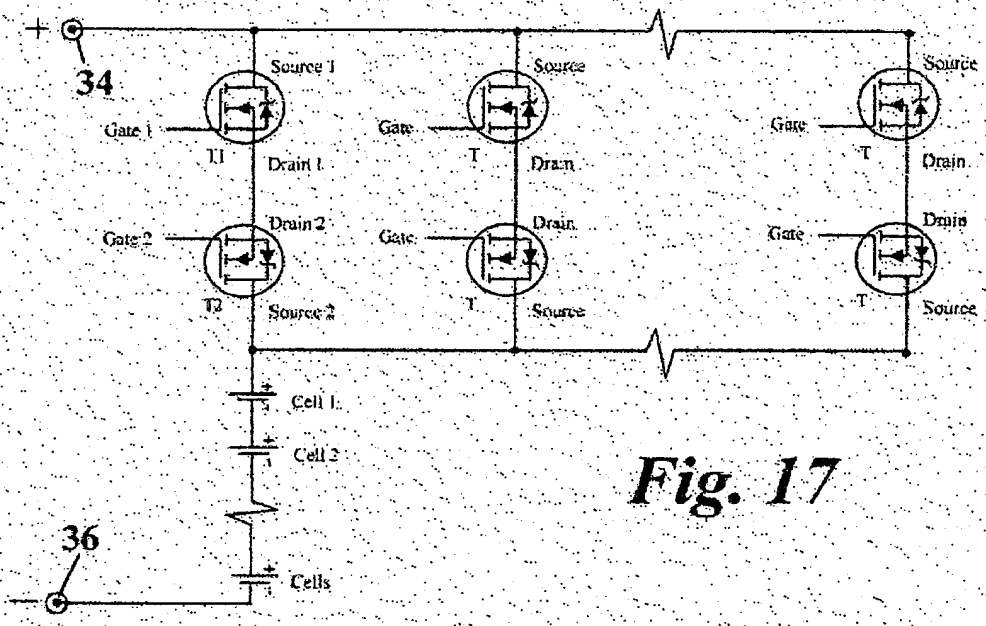


Fig. 17

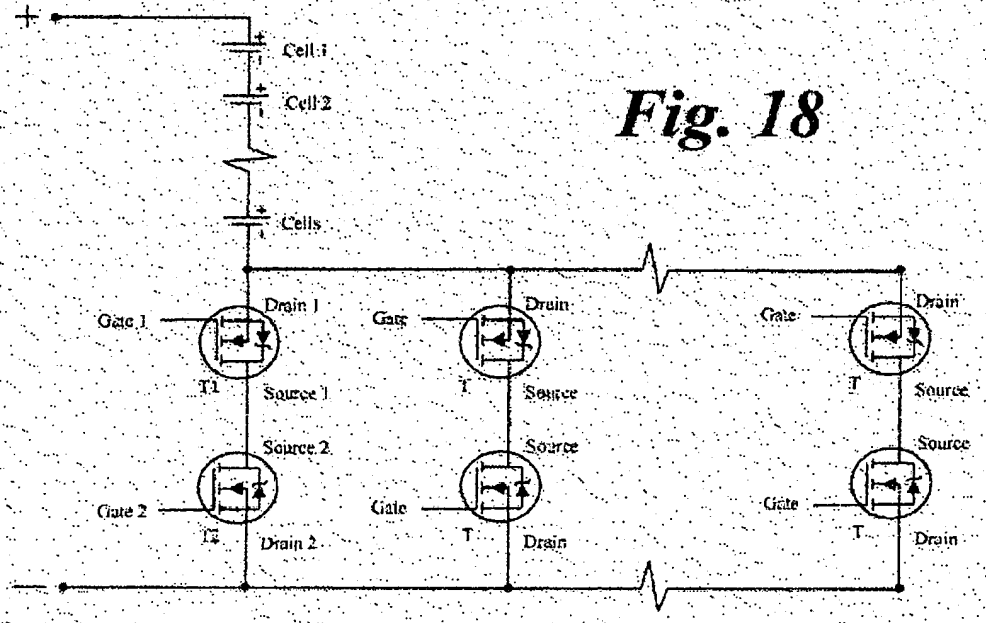


Fig. 18

Best Available Copy

REPLACEMENT SHEET

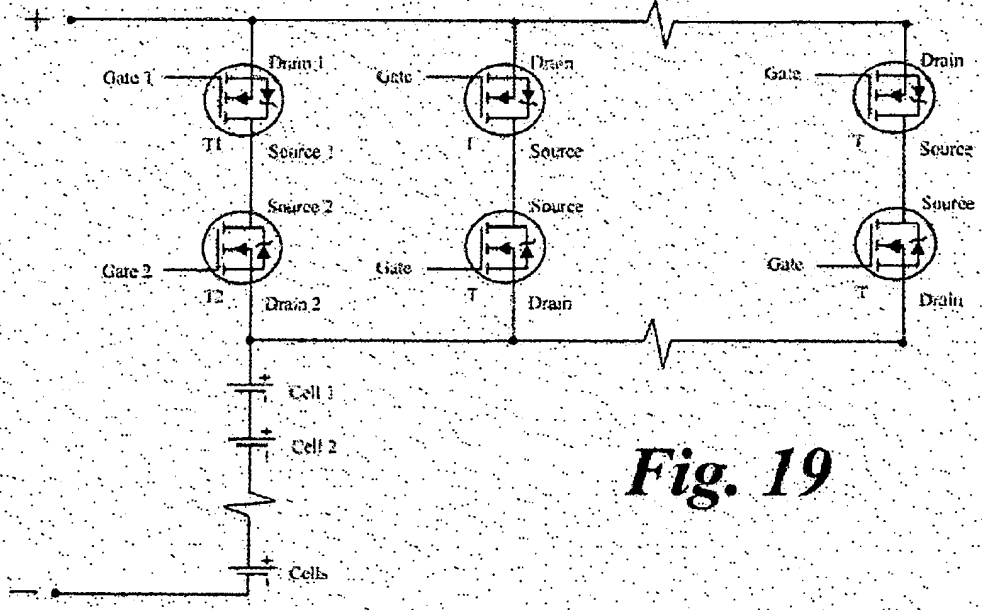


Fig. 19

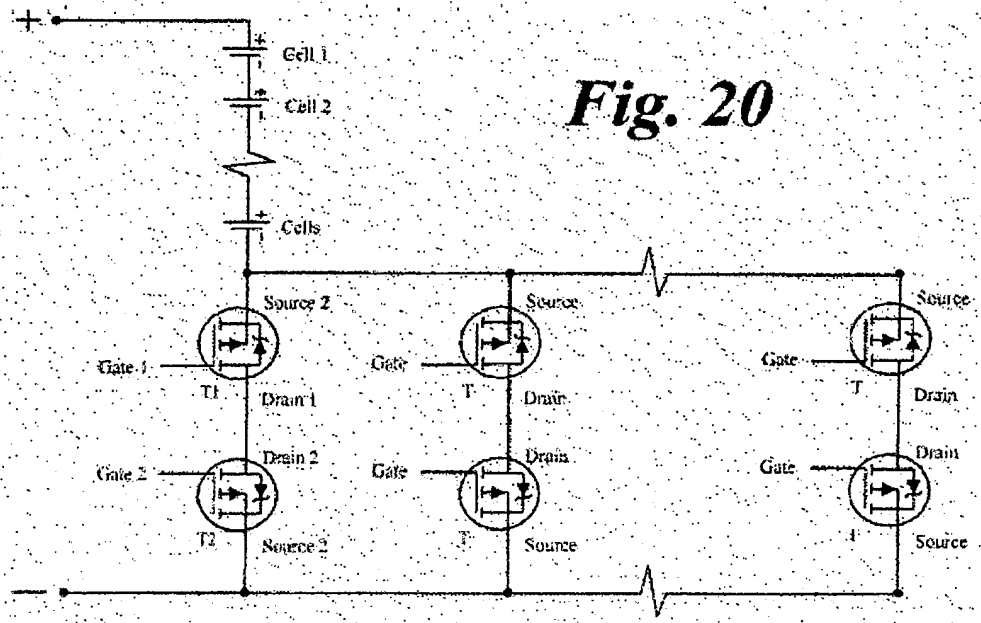


Fig. 20

Best Available Copy

REPLACEMENT SHEET

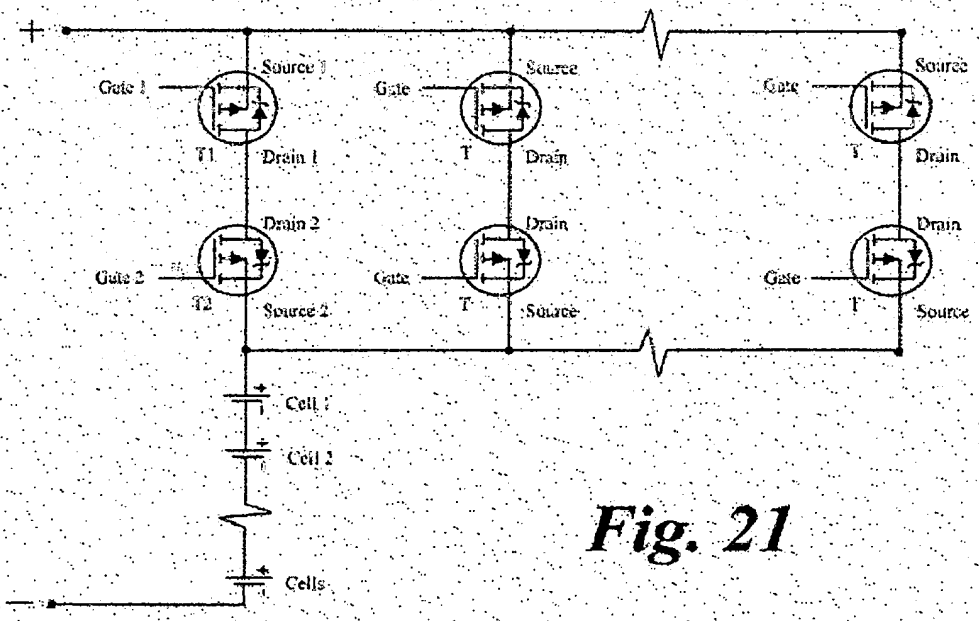


Fig. 21

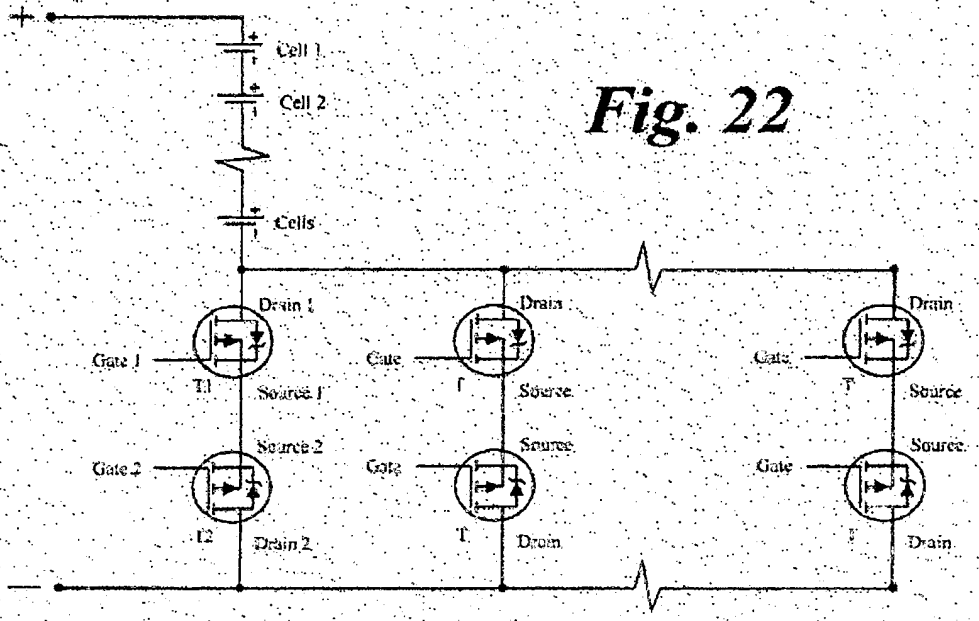


Fig. 22

PETITIONER'S EX. 1004

Best Available Copy

REPLACEMENT SHEET

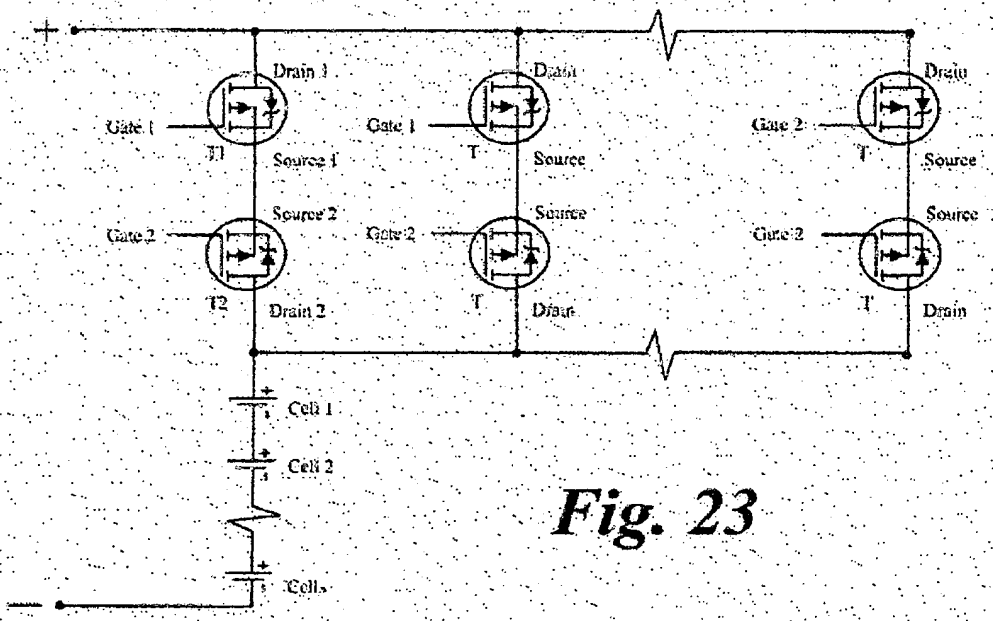


Fig. 23

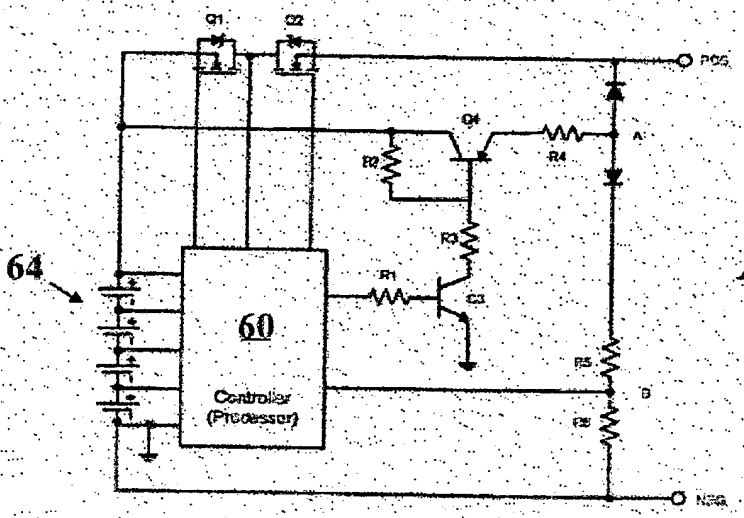


Fig. 24

Best Available Copy

REPLACEMENT SHEET

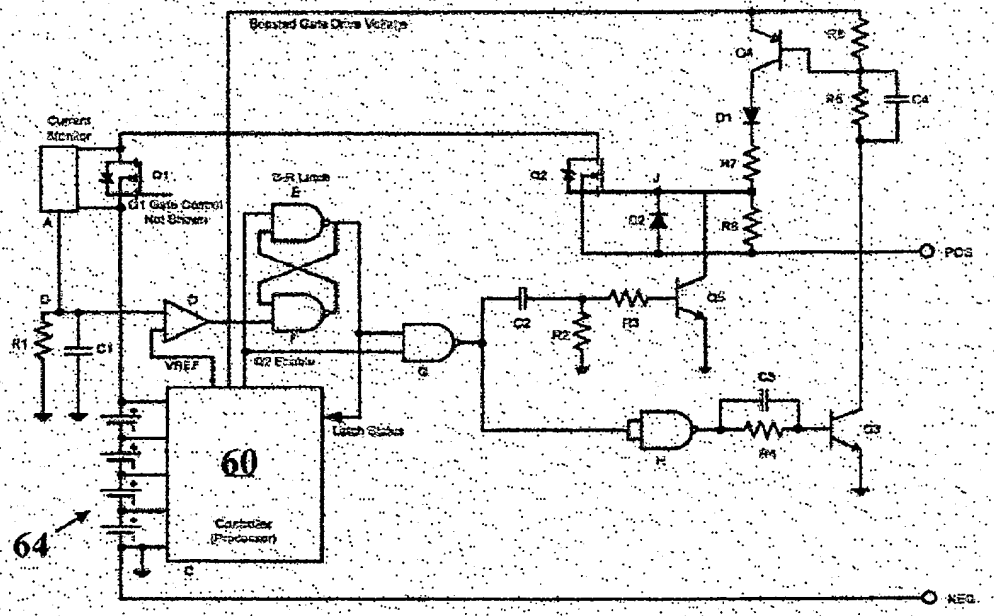


Fig. 25

Best Available Copy

REPLACEMENT SHEET

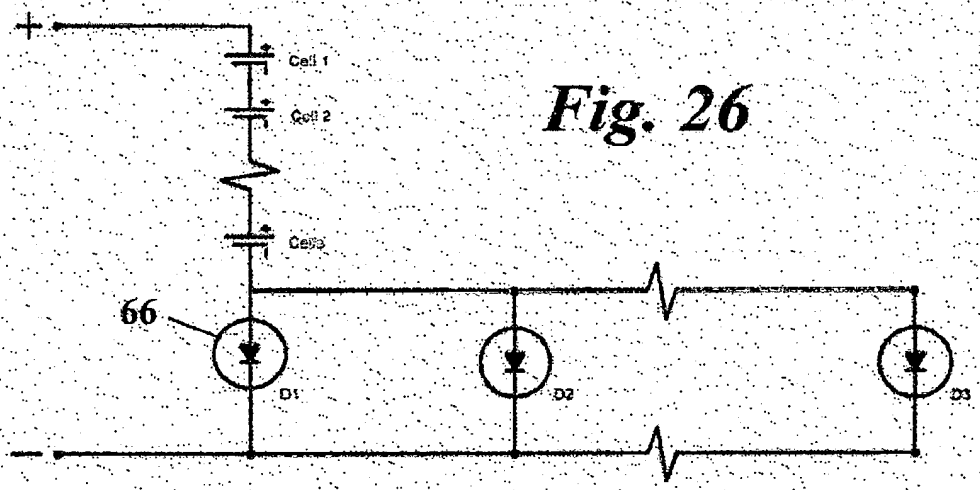


Fig. 26

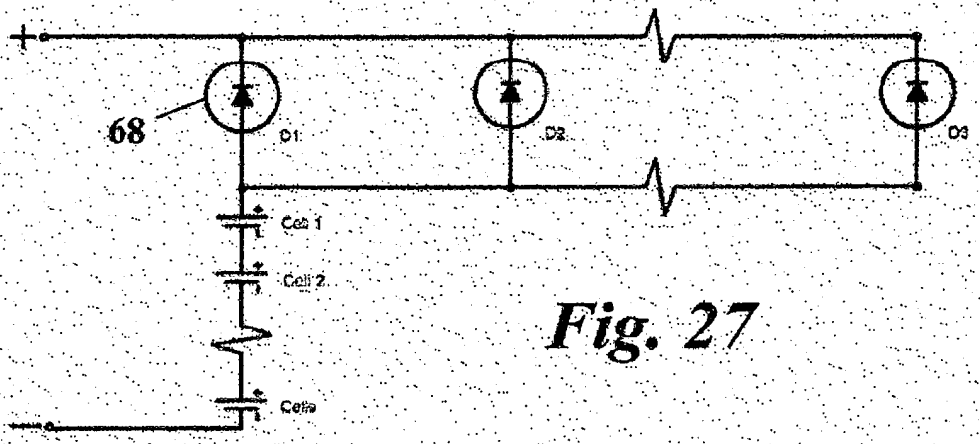


Fig. 27

Best Available Copy

REPLACEMENT SHEET

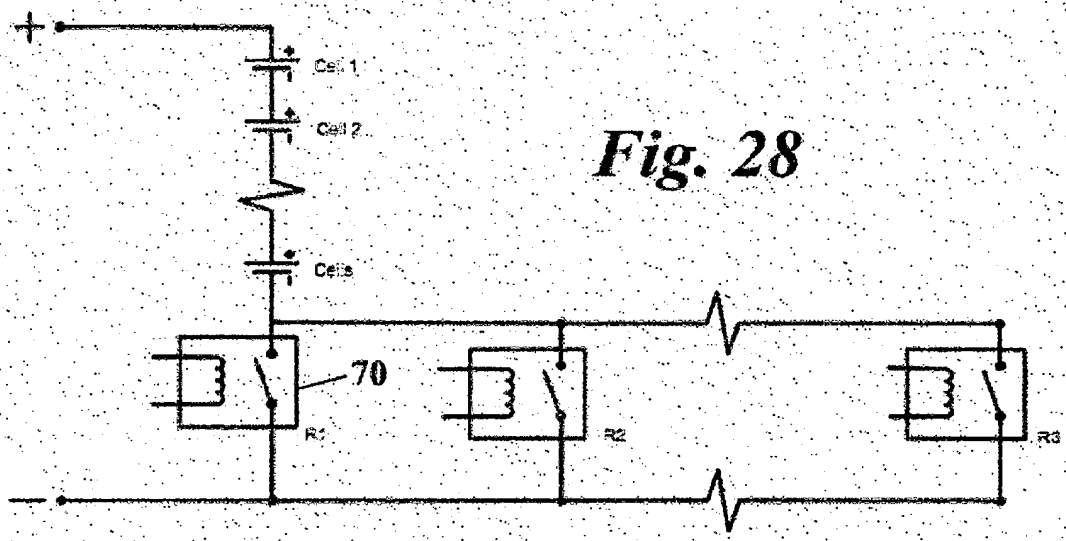


Fig. 28

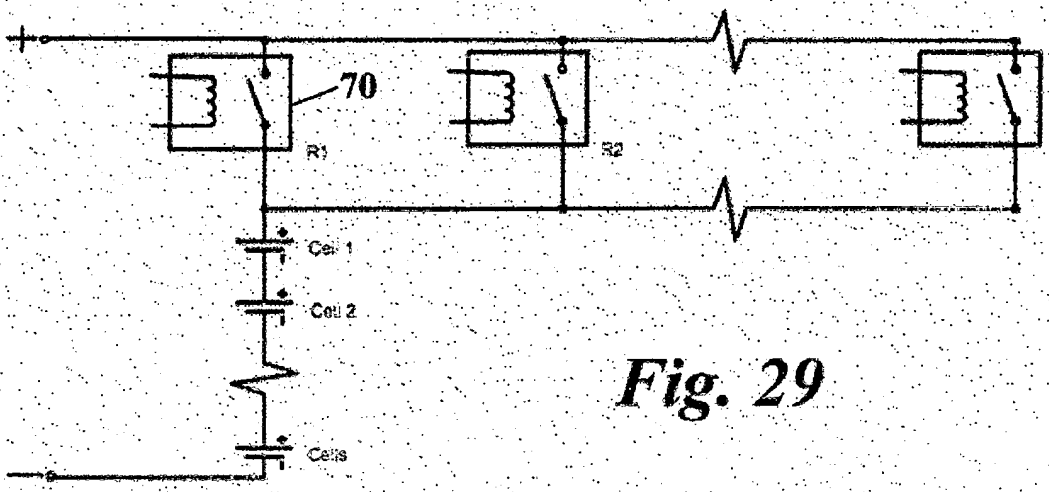


Fig. 29

Best Available Copy

REPLACEMENT SHEET

Fig. 30

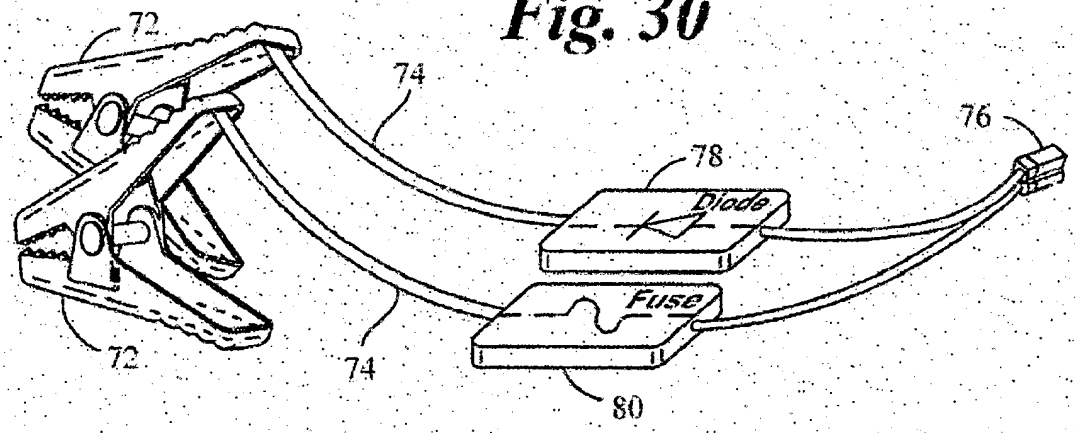


Fig. 31

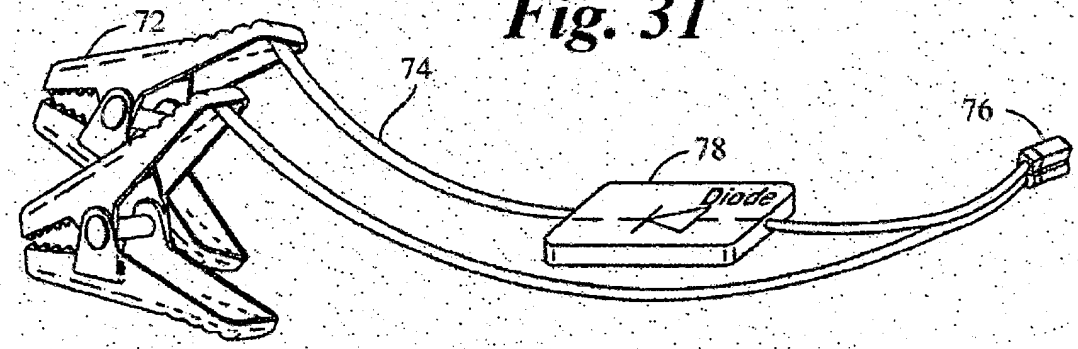
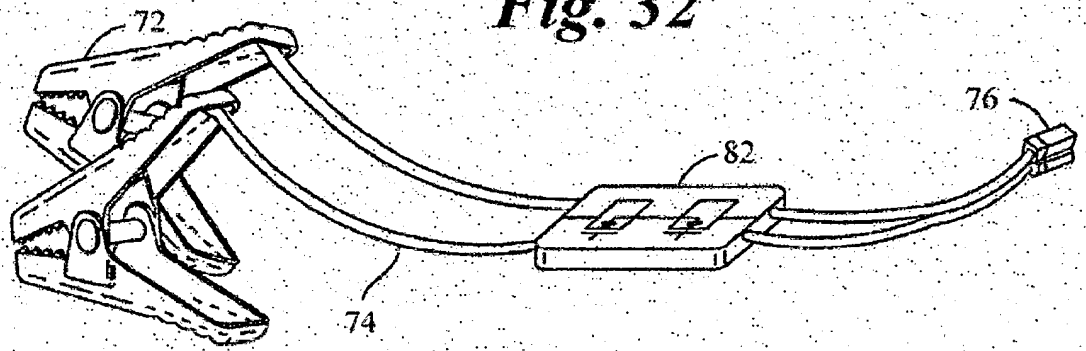


Fig. 32



Best Available Copy

REPLACEMENT SHEET

Fig. 30

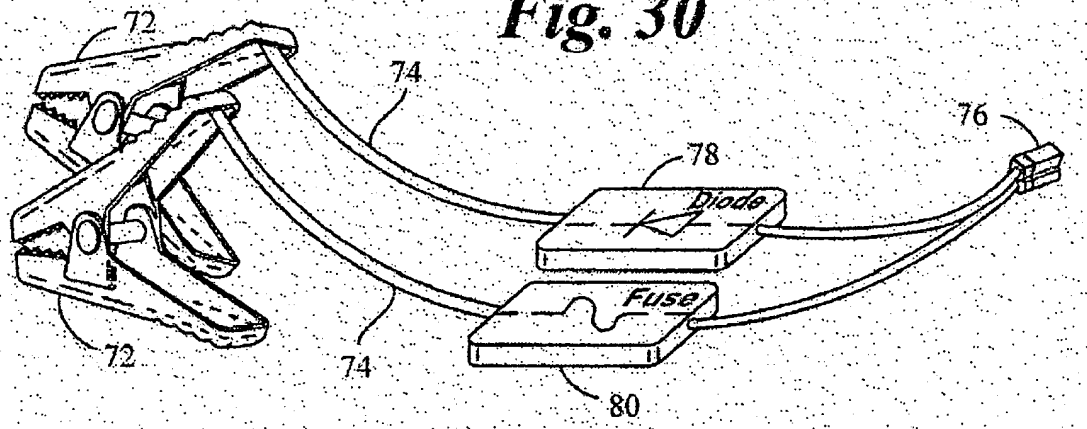


Fig. 31

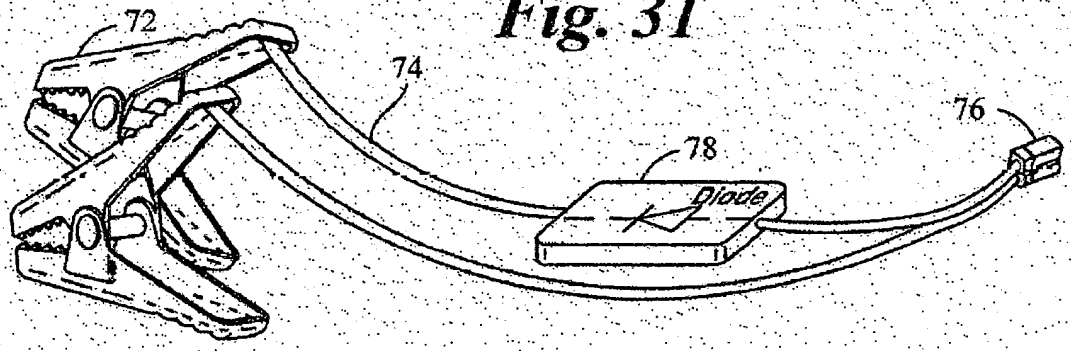
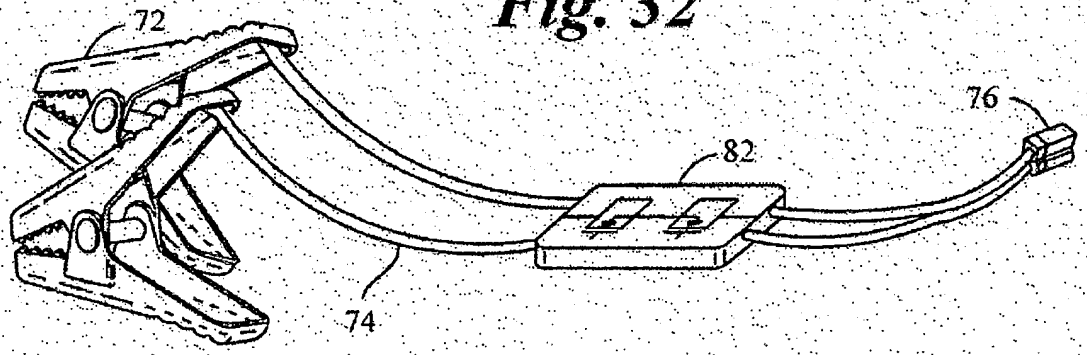


Fig. 32



Best Available Copy

REPLACEMENT SHEET

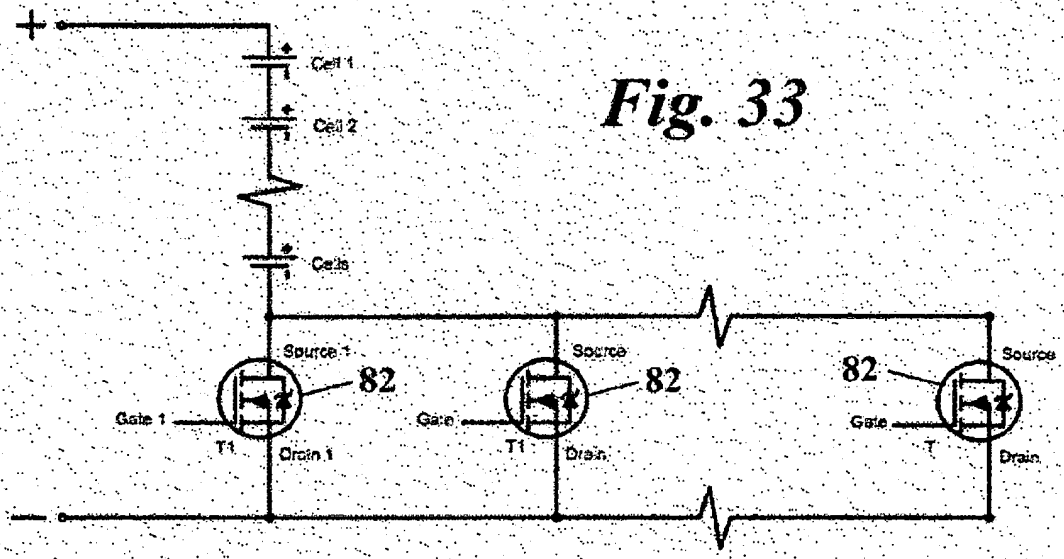


Fig. 33

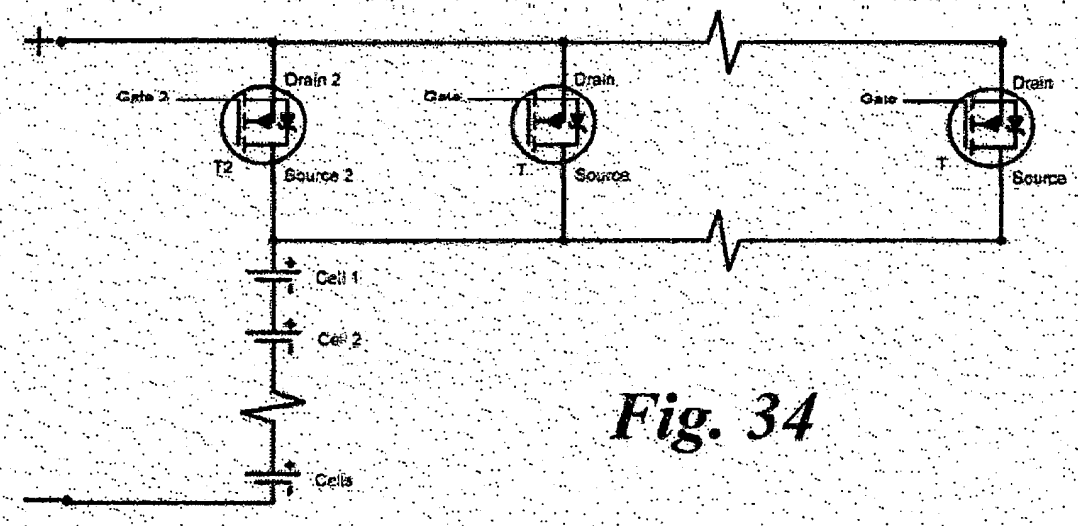


Fig. 34

Best Available Copy

REPLACEMENT SHEET

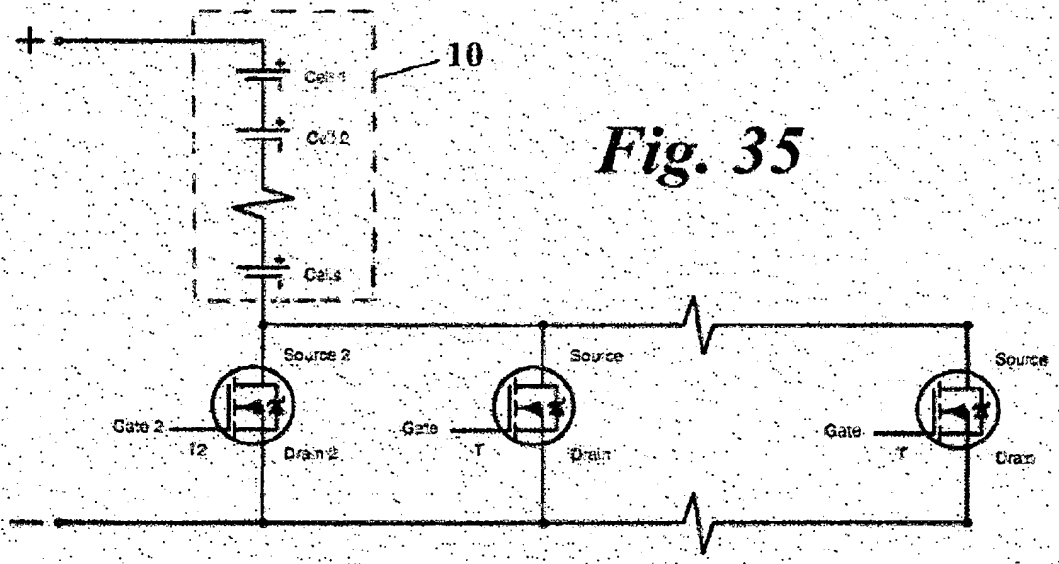


Fig. 35

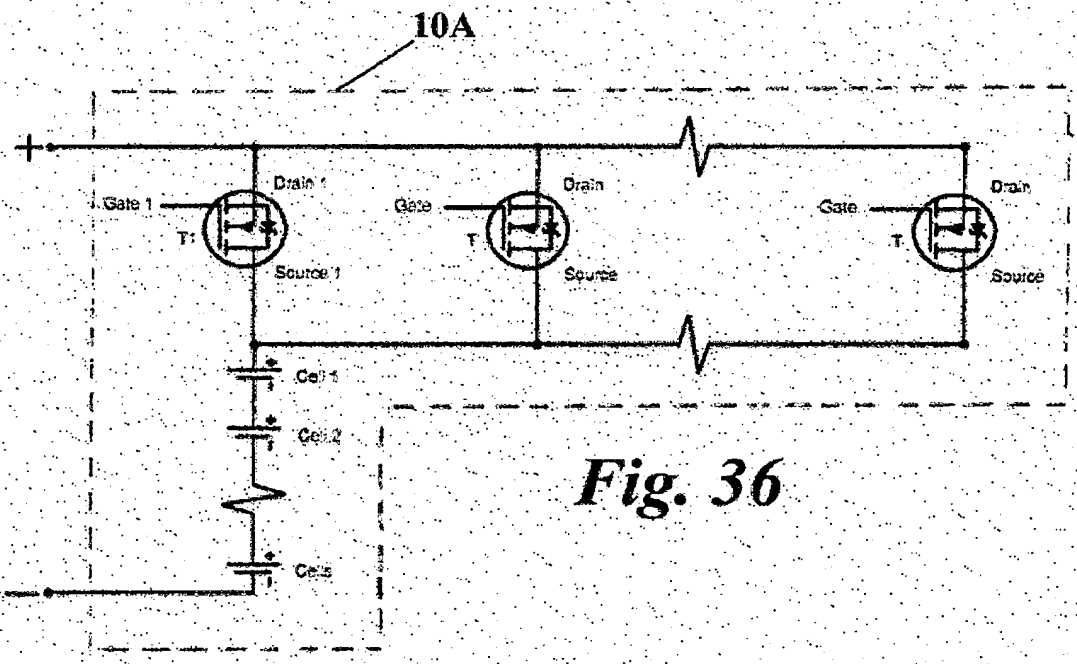


Fig. 36

PETITIONERS EX. 1004
189 of 304

Best Available Copy

REPLACEMENT SHEET

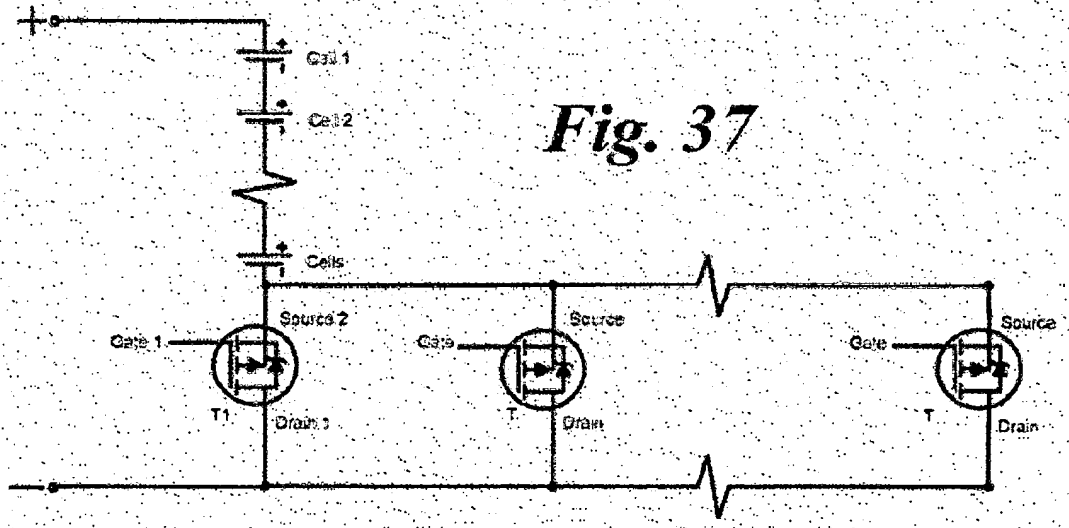


Fig. 37

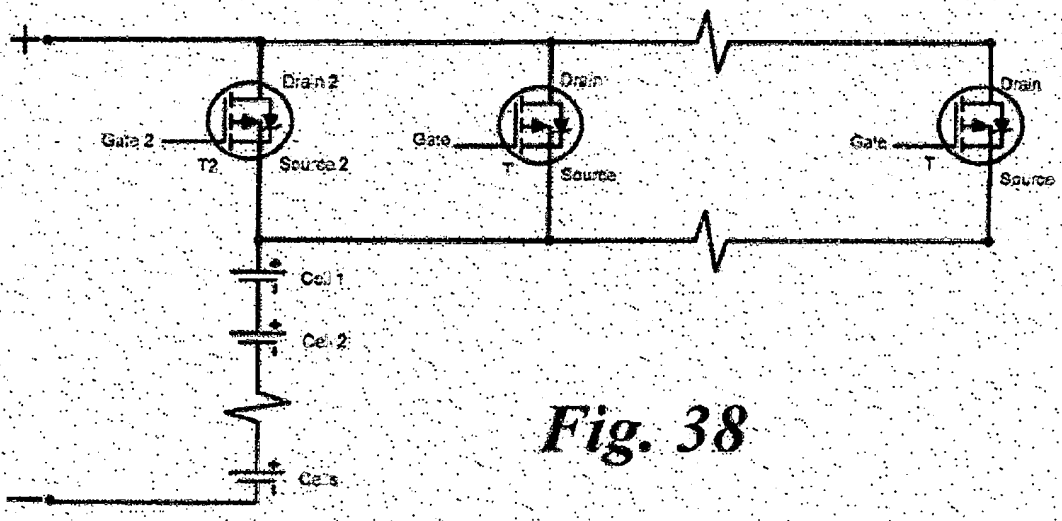


Fig. 38

Best Available Copy

REPLACEMENT SHEET

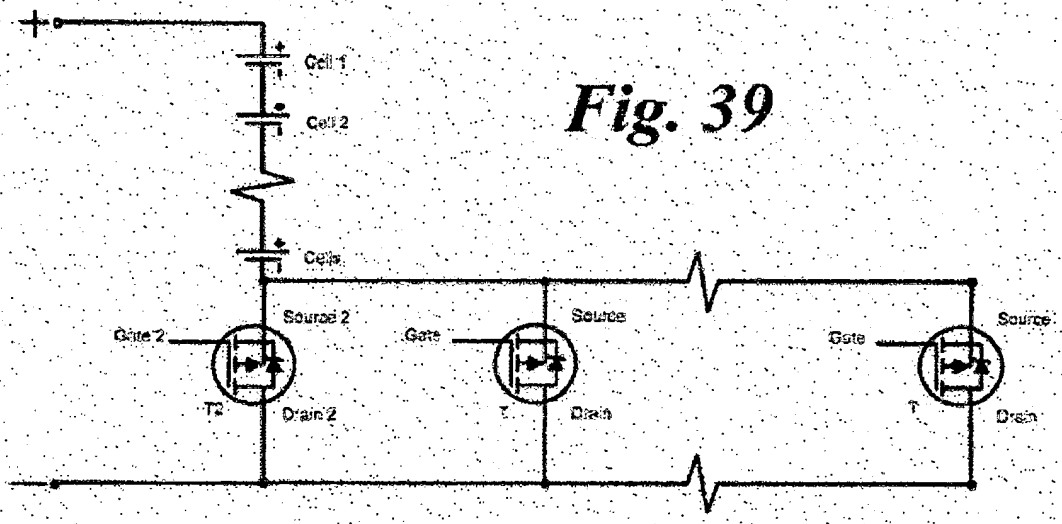


Fig. 39

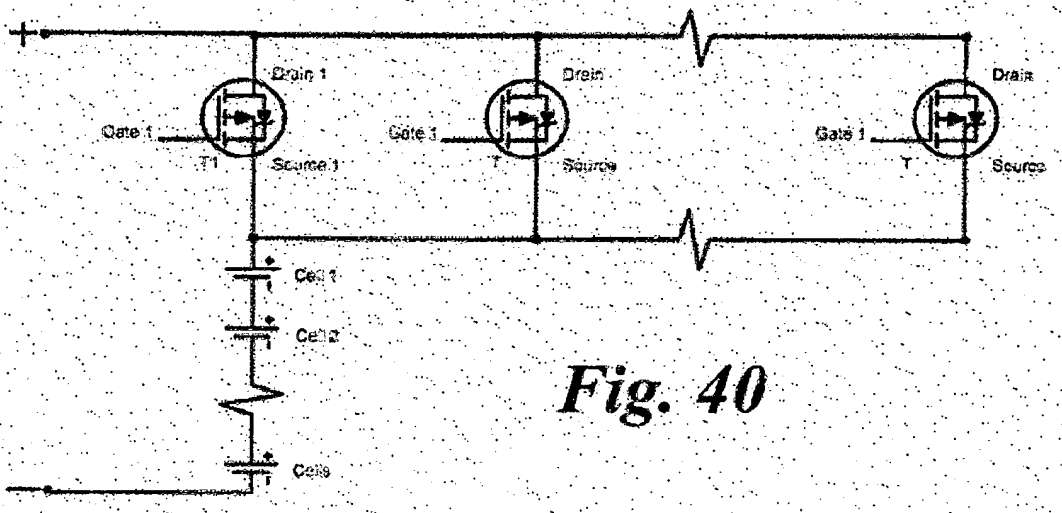


Fig. 40

Best Available Copy

REPLACEMENT SHEET

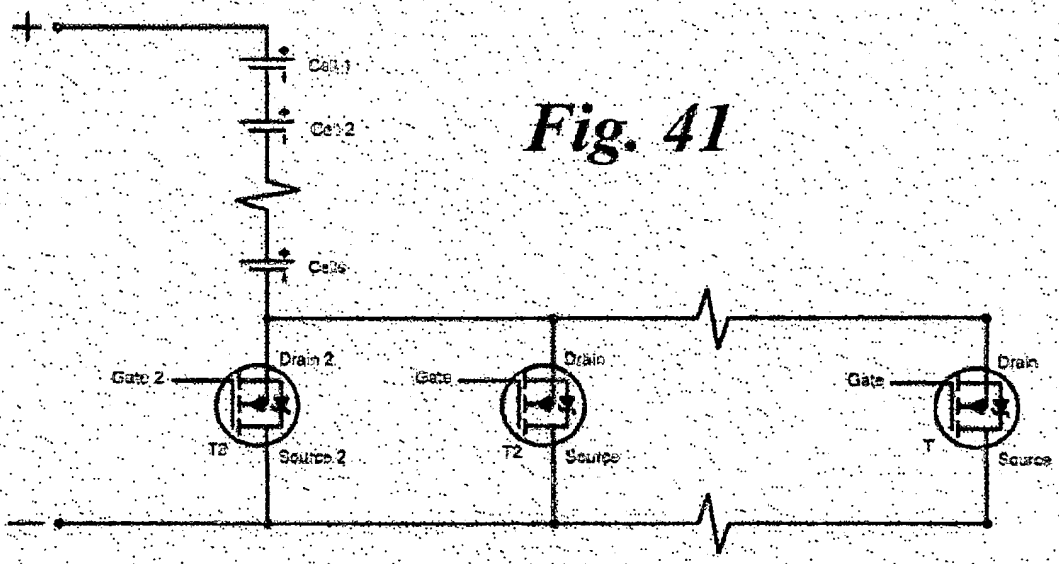


Fig. 41

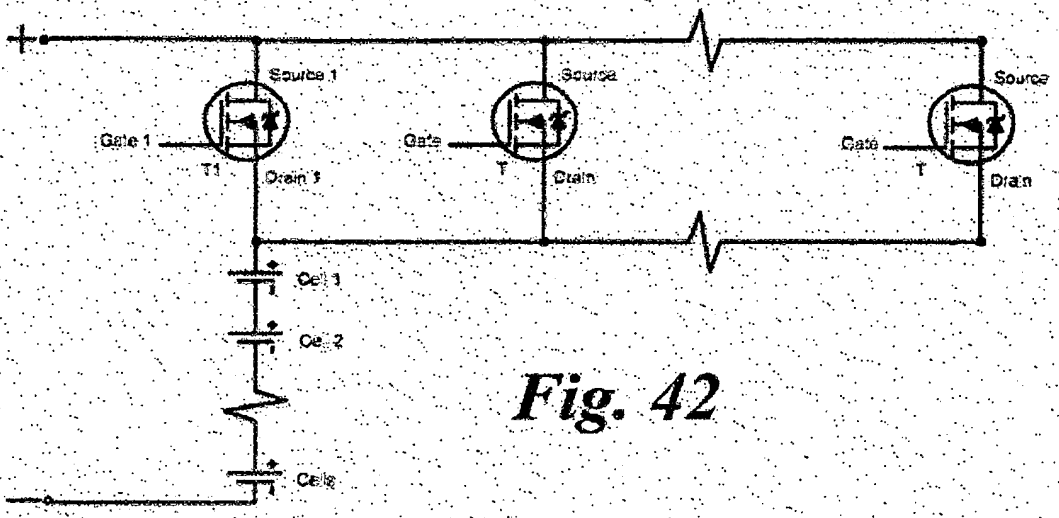


Fig. 42

Best Available Copy

REPLACEMENT SHEET

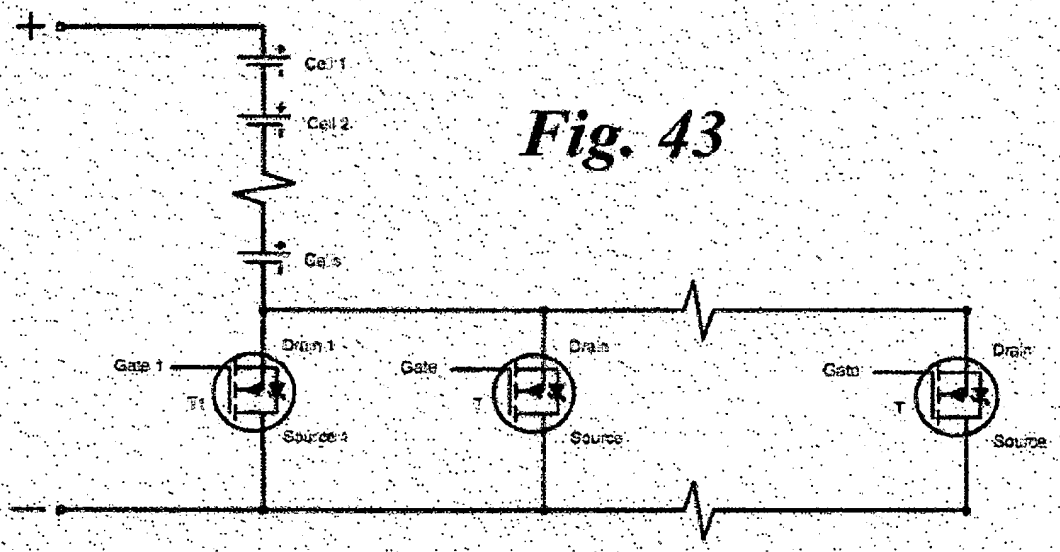


Fig. 43

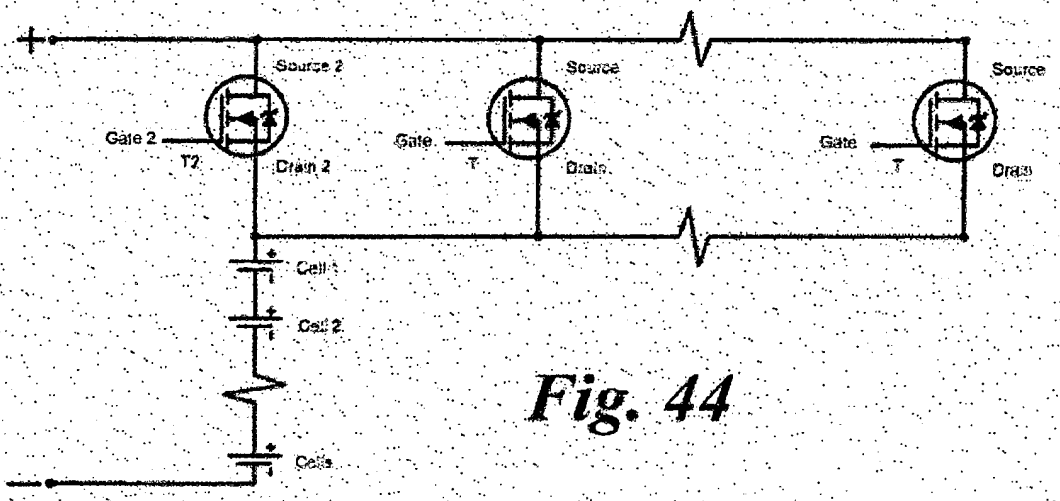


Fig. 44

PETITIONER'S EX. 1004

Best Available Copy

REPLACEMENT SHEET

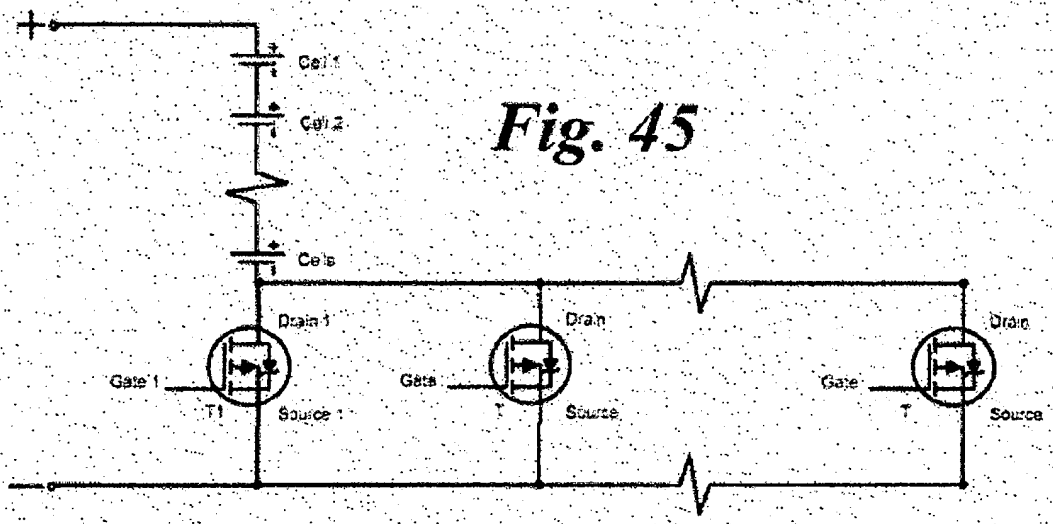


Fig. 45

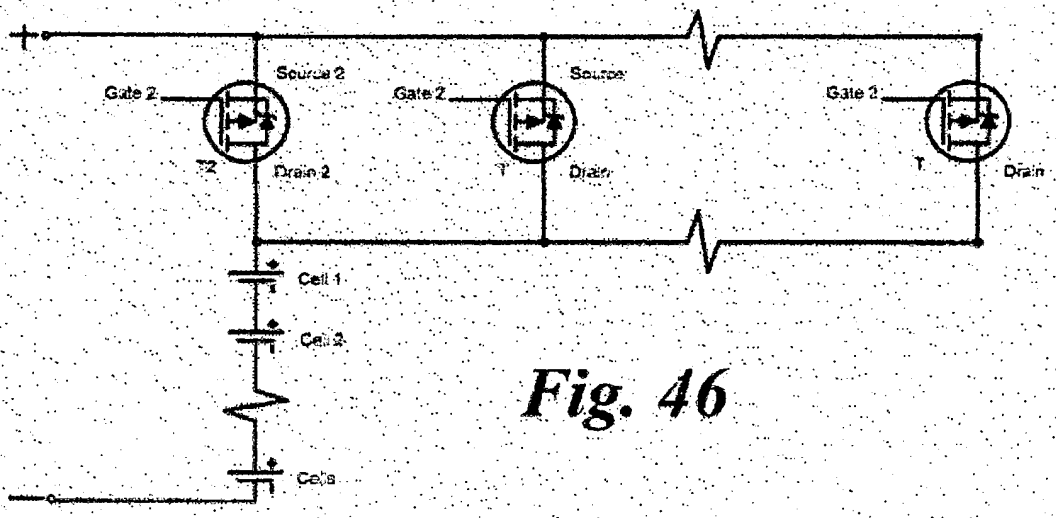


Fig. 46

ATL Pioneers Ex. 1004

Best Available Copy

REPLACEMENT SHEET

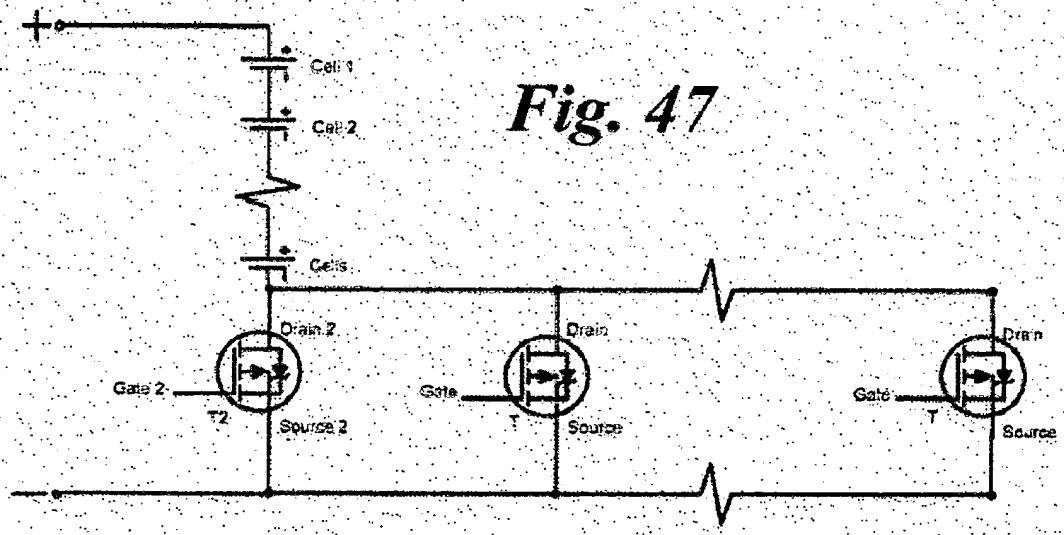


Fig. 47

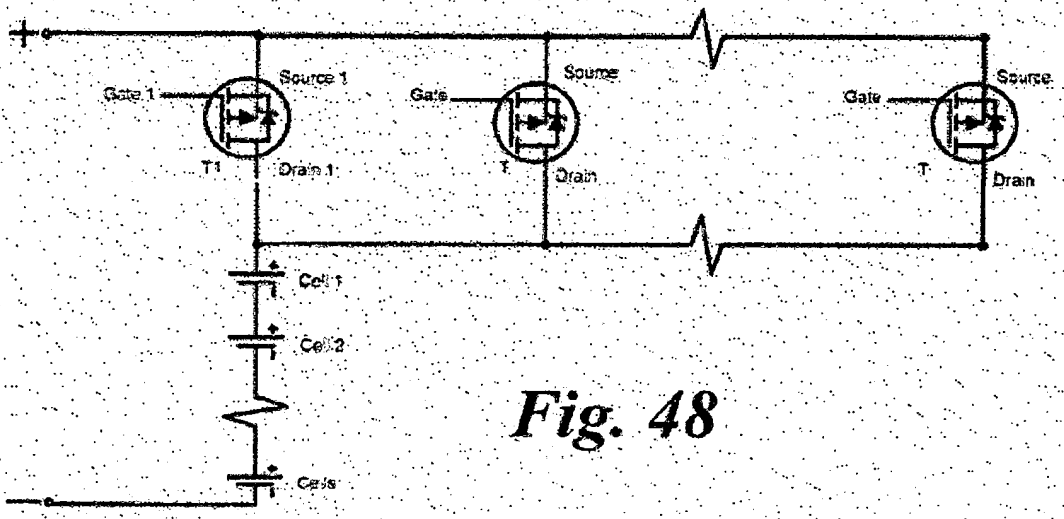


Fig. 48

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☒ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:**

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

RECEIVED
CENTRAL FAX CENTER
MAR 2 4 2017

FAX COVER SHEET

TO	
COMPANY	
FAXNUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2017-03-24 18:55:56 GMT
RE	Docket 5094: Examiner Jonathan G. SELSMA

COVER MESSAGE

FAX TO: US Patent and Trademark Office
FAX NO: 1-571-273-8300
FROM: Ralph H. Dougherty
No. of Pages: 33 (counting cover sheet)

Art Unit: 1721 (Examiner: Jonathan G. JELSMA)
Applicant: MARTIN KOEBLER
Serial No: 14/657,101
Filed: March 13, 2015
Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY,
WITH SOLID STATE SWITCH THEREFOR
Our File: Docket 5094

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

Dear Sirs::

Please forward the attached documents to Examiner Jonathan G. JELSMA, Art Unit 1321.
Thank you for your prompt attention to this matter.

Best regards,

Ralph H. Dougherty

Ralph H. Dougherty
Ralph H. Dougherty, P.A.
Patent, Trademark, Copyright Law
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988

PAGE 1/34 * RCVD AT 3/24/2017 2:57:15 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/39 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):26-49

Best Available Copy

Fax: 704-631-4996
E-Mail: ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 2/34 * RCVD AT 3/24/2017 2:57:15 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/39 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):26-40

Best Available Copy

RECEIVED
CENTRAL FAX CENTER

MAR 24 2017

PTO/SB/92 (07-16)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Certificate of Mailing or Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being:

1. ☐ Deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

on _____.
Date

2. ☑ Facsimile transmitted to the United States Patent and Trademark Office, or

OR

3. ☐ EFS-Web transmitted to the USPTO.

Signature — 24 March 2017 (Date)

Ralph H. Dougherty (Typed or printed name) — 704-940-3988 (Telephone number)

Note: Each paper must have its own certificate of mailing or transmission, or this certificate must identify each submitted paper.

_____

_____

_____

_____

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PETITIONERS Ex. 1004
199 of 304

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/657,101	03/13/2015	Martin Koebler	5094	6889

162 7590 01/04/2017

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

EXAMINER
JELSMA, JONATHAN G

ART UNIT	PAPER NUMBER
1721	

MAIL DATE	DELIVERY MODE
01/04/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/657,101	Applicant(s) KOEBLER, MARTIN	
	Examiner JONATHAN JELSMA	Art Unit 1721	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03/13/2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-21* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-21* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *03/13/2015* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1) The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Summary

1. This is the initial Office Action based on Application 14/657,101 filed 03/13/2015 by Martin Koebler.

2. Claims 1-21 are currently pending and have been fully considered.

Drawings

3. The drawings are objected to because the writing in the drawings is not clear, and in many cases cannot be clearly determined. See for example Figures 14-29 and 33-49, where details in the drawings cannot be clearly distinguished. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top

margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

5. Claim(s) 1-10 and 12-20 is/are rejected under 35 U.S.C. 102(a1) as being anticipated by KOEBLER (US 2013/0241498 A1).

6. KOEBLER teaches a starter battery for a starter motor of an internal combustion engine (paragraph 0017). The battery pack may include four cells of lithium iron phosphate cells as one example (paragraph 0017). Each of the cells may be larger cells from 1 Ah to 5000 Ah, and specific examples have 5 Ah, 10 Ah, 20 Ah, 50 Ah, 100 Ah, 400 Ah, and 500 Ah (paragraph 0017). The battery pack includes a housing for the lithium based cells, and a protection circuit board such as a balancing board (paragraph 0020). The pack may further include a solid state switch (paragraph 0021). Such as witch prevent overdischarging the battery pack (paragraph 0021). There may further be a separate cell balancing circuit, the solid state switch can be used on each individual cell (paragraph 0021). The battery may include lithium containing lithium iron

phosphate batteries having a nominal cell voltage of 3.2V-3.3V, and four cells may be connected in series to have a nominal voltage of 13.2 V (paragraph 0060). The protection circuit board may be included (paragraph 0070). Such a board may include a solid state switch such as an FET (paragraph 0080). The solid state switch is connected to the positive pole of the battery (Figure 8). Further such switches are connected to the positive terminal and controlled by the electronic circuit (paragraph 0022). The switches can be transistors, FET, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET (paragraph 0093). The cells may be lithium containing, LiFePO, LiFePO4, LiFeMgPO4, LiFeYPO4, LiCoO2, LiMn2O4, LiNiCoAlO2, LiNiMnCoO2, and Li4Ti5O12 as examples (paragraphs 0060-0061). The battery pack is encased in a housing, the battery pack having a positive terminal and a negative terminal, each cells having a positive pole and a negative pole, the solid state switches are in the housing, the switches being connected to the positive pole of the cell and to the positive terminal, the negative pole of the cells being connected to the negative terminal (claim 12). The solid state switch may include a MOSFET arrangement (paragraph 0086). The system includes at least a processor and a circuit board (paragraph 0078).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have

> been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 11 and 21 is/are rejected under 35 U.S.C. 103 as being unpatentable over KOEBLER (US 2013/0241498 A1) in view of GRANT (US 4,166,241).

10. Claim 11 is dependent upon claim 1, which is rejected above under 35 U.S.C. 102(a1) in view of KOEBLER. However, KOEBLER does not explicitly teach a battery pack further including a pair of cables, or a cable housing that includes a MOSFET, diode, or relay.

11. GRANT teaches an apparatus for jumpering a first battery to a second battery using jumper cables (column 2 lines 30-36). The jumpering cable includes first and second cables J1 and J2 connected to the batteries (column 2 lines 49-54). The jumper cables are connected into a case, and connected to at least a relay (column 3 lines 5-26). The case includes a cover, a switch in the case, as well as the relay (see Figures 1-3). The end of the cables include a first and second clamps (Figure 1). The other end of the cable is connected to the terminal of a battery B1 (Figure 1).

12. At the time of the invention one having ordinary skill in the art would have been motivated to include the cable and cable housing with the relay as taught by GRANT to connect to the battery of KOEBLER in order to have the beneficial result of charging a dead battery without harmful sparks being created at the terminals of the battery (column 2 lines 30-54).

13. With respect to claim 21. The rejection above in view of KOEBLER under 35 U.S.C. 102(a1) as applied to claims 1-10 and 12-20 above is repeated here. Further the combination of KOEBLER with GRANT as applied to claim 11 is also repeated here.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

15. BROCKMAN (US 2015/0318582 A1) – BROCKMAN teaches a battery 12 including a battery management system 50, the battery includes an array of battery cells, the battery cells may be lithium iron phosphate cells (paragraph 0023). The battery management system may include integrated circuits or circuit boards, the system being disposed in a battery housing (paragraph 0026). The system may monitor the operation of the battery, as well as perform cell balancing (paragraph 0027). The battery management system may include a solid state switch such as a FET or MOSFET (paragraph 0045).

16. MIYASHITA (US 2006/0087280 A1) – MIYASHITA teaches a battery pack for an electric motor of a compact engine starting device (paragraph 0022). The battery pack

is provided with lithium based secondary battery comprising at least two cells (paragraph 0022). The pack further includes an overcharge preventing circuit (paragraph 0022). The total discharging mount of the battery in the battery pack is 500-2000 mAh, and charging voltage per one cell is 3 to 4.2 V (paragraph 0024). There may further include an overcharge preventing circuit (paragraph 0027). A battery protection circuit is incorporated into the battery pack (paragraph 0079).

17. THOMASON (US 2005/0110467 A1) – THOMASON teaches a jump starter that includes jumper cables, and a controller (paragraph 0013). The jump starter includes a housing, a pair of cables, an internal battery, and appropriate circuitry (paragraph 0026). The housing includes at least a switch, and may include a microcontroller and a MOSFET (paragraph 0029).

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN JELSMA whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 8:00 a.m. - 5:00 p.m.

19. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

20. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JONATHAN JELSMA/
Primary Examiner, Art Unit 1721

JGJ

Notice of References Cited	Application/Control No. 14/657,101	Applicant(s)/Patent Under Reexamination KOEBLER, MARTIN	
	Examiner JONATHAN JELSMA	Art Unit 1721	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2015/0318582 A1	11-2015	Brockman; Daryl C.	G01R31/3606	320/137
*	B	US-2006/0087280 A1	04-2006	Miyashita; Satoshi	H01M2/1072	320/104
*	C	US-2005/0110467 A1	05-2005	Thomason, Lincoln	H02J7/0031	320/165
*	D	US-2013/0241498 A1	09-2013	Koebler; Martin	H02H7/18	320/135
*	E	US-4,166,241 A	08-1979	Grant; Thomas J.	H02J7/0034	320/105
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14657101	KOEBLER, MARTIN
	Examiner	Art Unit
	JONATHAN JELSMA	1721

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/29/2016								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								
	21	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14657101	KOEBLER, MARTIN
	Examiner	Art Unit
	JONATHAN JELSMA	1721

CPC- SEARCHED		
Symbol	Date	Examiner
H01M2/1077, 34, 425	12/29/2016	JGJ
H01M10/425	12/29/2016	JGJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name search (EAST)	12/29/2016	JGJ
EAST (see search history)	12/29/2016	JGJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 6889

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/657,101	03/13/2015	429	1721	5094

APPLICANTS

INVENTORS
Martin Koebler, Davidson, NC;

** **CONTINUING DATA** **********

** **FOREIGN APPLICATIONS** **********

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** ** ** SMALL ENTITY **
03/25/2015

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JONATHAN G JELSMA/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		NC	24	21	3

ADDRESS

RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210
UNITED STATES

TITLE

LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

FILING FEE RECEIVED		
770	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	13	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$ or US-20150318582-$ or US-20150318724-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$).did.	US-PGPUB; USPAT	OR	ON	2016/12/29 13:18
L2	5	L1 and Ah	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 13:18
L3	30170	(start$4) near2 (battery (power energy) near2 storage (electro adj chemical electro$1chemical) adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 14:30
L4	228	((terminal battery) near2 (clamp) jumper adj cabl$2) same L3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 14:30
L5	1557	((terminal battery) near2 (clamp) jumper adj cabl$2) same (mosfet diode relay)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 14:31
L6	53	4 and 5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 14:31
L7	3	"4166241".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 14:46
S1	28	(("KOEBLER") near3 ("Martin")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2016/12/29 08:22
S2	6	("20060087280" | "20070080662" | "20090123813" | "20100320961" |	US-PGPUB;	OR	ON	2016/12/29 08:26

		"20120139456" | "5635821").PN. OR ("9412994").URPN.	USPAT; USOCR			
S3	5928	h01m2/1077.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:46
S4	3554	h01m2/34.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:47
S5	5606	h01m10/425.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:47
S6	30170	(start$4) near2 (battery (power energy) near2 storage (electro adj chemical electro$1chemical) adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:49
S7	31006	(start$4 jump$4) near2 (battery (power energy) near2 storage (electro adj chemical electro$1chemical) adj cell)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:49
S8	598	S7 and (S3 S4 S5)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:49
S9	26283	solid adj state near2 switch$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:51
S10	13	S8 and S9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:51
S11	9	("20060087280" "20090123813" "5635821" "20070080662").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 08:53
S12	13	(US-20160268645-$ or US-20130241498-$ or US-20160181587-$ or US-20060087280-$ or US-20070080662-$ or US-20090123813-$ or US-20100320961-$	US-PGPUB; USPAT	OR	ON	2016/12/29 09:02

		or US-20150318582-$ or US-20150318724-$).did. or (US-5635821-$ or US-5488283-$ or US-5552642-$ or US-9412994-$).did.				
S13	10	(transistor FET MOSFET IGBT JFET BJT CMOS VMOS TMOS HEXFET DMOS) and S12	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/12/29 09:03

EAST Search History (Interference)

< This search history is empty>

12/ 29/ 2016 3:47:38 PM
C:\ Users\ jjelsma\ Documents\ EAST\ Workspaces\ 14657101.wsp

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/657,101	03/13/2015	Martin Koebler	5094

CONFIRMATION NO. 6889

162
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

PUBLICATION NOTICE

OC00000085821645

Title:LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Publication No.US-2016-0268645-A1
Publication Date:09/15/2016

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

RECEIVED
CENTRAL FAX CENTER

AUG 0 6 2015

FAX COVER SHEET

TO	
COMPANY	
FAX NUMBER	15712738300
FROM	Ralph H Dougherty PA
DATE	2015-08-06 20:34:36 GMT
RE	Art Unit 2859; - Docket 5094

COVER MESSAGE

FAX TO: US Patent and Trademark Office

FAX NO: 1-571-273-8300

FROM: Ralph H. Dougherty

No. of Pages: 11 (counting cover sheet)

Re: Art Unit: 2859 (Examiner
)

Applicant: MARTIN KOEBLER

Serial No. 14/657,101

Filed: March 15, 2015

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLEBATTERY,

WITH SOLID STATE SWITCH
THEREFOR

Our File: Docket 5094

==========
=

PLEASE CONFIRM RECEIPT OF THIS TRANSMISSION

RECEIVED
CENTRAL FAX CENTER
AUG 0 6 2015

Dear Sirs:

Please forward the attached documents to the Clerk of Art Unit 2859.

Thank you for your prompt attention to this matter.

Very truly yours,

Ralph H. Dougherty
Ralph H. Dougherty
Registration No. 25,851

Ralph H. Dougherty, P.A.
Patent, Trademark, Copyright Law
4219 Kronos Place
Charlotte, NC 28210 USA
Phone: 704-940-3988
Fax: 704-631-4996
E-Mail: <mailto:ralph@ralphdougherty.com> ralph@ralphdougherty.com

CONFIDENTIALITY NOTE: The information contained in this transmission is privileged and confidential information intended only for the use of the individual or entity named above. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this transmission in error, please immediately reply to the sender that you have received this communication in error and then delete it. Thank you.

PAGE 2/13 * RCVD AT 8/6/2015 4:35:24 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/38 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):09-10

THIS PAGE BLANK (USPTO)

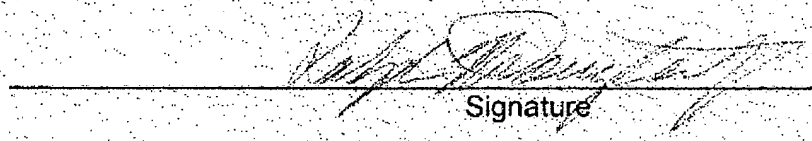
Best Available Copy

PTO/SB/97 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Certificate of Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office

on August 6, 2015
Date



Signature

RALPH H. DOUGHERTY

Typed or printed name of person signing Certificate

25,851 — Registration Number, if applicable

704-940-3988 — Telephone Number

Note: Each paper must have its own certificate of transmission, or this certificate must identify each submitted paper.

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Best Available Copy

RECEIVED
CENTRAL FAX CENTER

AUG 0 6 2015

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT EXAMINING OPERATIONS

Art Unit: 2859 (Examiner:)

Applicant: MARTIN KOEBLER

Serial No: 14/657,101

Filed: March 13, 2015

Title: LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Charlotte, North Carolina
August 6, 2015

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

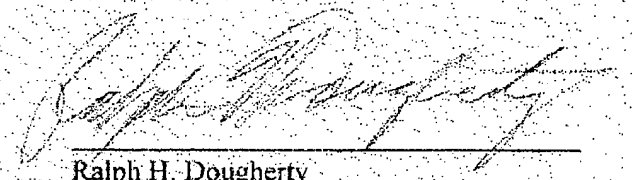
SUBMISSION OF APPLICATION DATA SHEET

Although the subject application is a Continuation-in-Part Application of US Patent Application NO. 13/989,273, dated May 23, 2013, no Application Data Sheet accompanied the present application, thus the priority of the prior application was not granted. Attached is the

Best Available Copy

required Application Data Sheet for the subject application, and entry of this document into the file of the subject application is respectfully requested.

Respectfully submitted,



Ralph H. Dougherty
Attorney for Applicant
Registration No. 25,851
RALPH H. DOUGHERTY, P.A.
4219 Kronos Place
Charlotte, North Carolina 28210
Telephone: (704) 940-3988
Facsimile: (704) 631-4996

Attorney's
Docket 5094

Enclosure

AUG 0 6 2015

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	MARTIN		KOEBLER	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	DAVIDSON	State/Province	NC	Country of Residence	US

City		Country of Residence	

Mailing Address of Inventor:

Address 1	530 Portside Drive		
Address 2			
City	Davidson	State/Province	NC
Postal Code	28036	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ An Address is being provided for the correspondence Information of this application.

Customer Number	00162		
Name 1		Name 2	
Address 1			
Address 2			
City		State/Province	
Country		Postal Code	
Phone Number		Fax Number	
Email Address	ralph@ralphdougherty.com	Add Email	Remove Email

AUG 0 6 2015

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Application Information:

Title of the Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR		
Attorney Docket Number	5094	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	24	**Suggested Figure for Publication (if any)**	
Plant Submissions Only:			
Latin Name		**Variety Denomination Name**	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	00162		

RECEIVED
CENTRAL FAX CENTER
2015-08-06 20:35:35 (GMT)
AUG 0 6 2015

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Prefix	Given Name	Middle Name	Family Name	Suffix	Remove
Registration Number					
Prefix	Given Name	Middle Name	Family Name	Suffix	Remove
Registration Number					

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14657101	Continuation in part of	13989273	2013-05-23

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

RECEIVED
CENTRAL FAX CENTER
AUG 06 2015

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PAGE 10/13 * RCVD AT 8/6/2015 4:35:24 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/38 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):09-10

RECEIVED
CENTRAL FAX CENTER 2015-08-06 20:35:35 (GMT)
AUG 0 6 2015

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

○ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☐

Organization Name

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Applicant:

Address 1	530 Portside Drive		
Address 2			
City	Davidson	**State/Province**	NC
Country	US	Postal Code	28036
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PAGE 11/13 * RCVD AT 8/6/2015 4:35:24 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/38 * DNIS:2738300 * CSID:17046314996 * DURATION (mm-ss):09-10

AUG 0 6 2015

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	5094
	Application Number	
Title of Invention	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Organization Name	WILLIAM GOODYEAR COMPANY

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country[i]		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature	/RALPH H. DOUGHERTY/			Date (YYYY-MM-DD)	2015-08-06
First Name	RALPH	Last Name	DOUGHERTY	Registration Number	25851

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent C o o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/657,101

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	21 minus 20 =	* 1	x 40 =	40	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	770		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/657,101	03/13/2015	2859	770	5094	21	3

CONFIRMATION NO. 6889

162
RALPH H. DOUGHERTY
4219 Kronos Place
CHARLOTTE, NC 28210

FILING RECEIPT

OC000000074220701

Date Mailed: 03/25/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Martin Koebler, Davidson, NC;

Applicant(s)

Martin Koebler, Davidson, NC;

Power of Attorney: The patent practitioners associated with Customer Number 00162

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 03/25/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/657,101**

Projected Publication Date: 09/15/2016

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **

Title

LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

Preliminary Class

320

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PTO/AIA/15 (05-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	5094
First Named Inventor	KOEBLER, Martin
Title	Linear inverter, pump inverter, and deep cycle battery, with anode
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [✓] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [✓] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✓] **Specification** [*Total Pages* 38] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✓] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 24]
6. **Inventor's Oath or Declaration** [*Total Pages* 80] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [✓] Newly executed (original or copy)
   b. [ ] A copy from a prior application (37 CFR 1.63(d))
7. [ ] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (Appendix)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** *(if applicable, items a. – c. are required)*
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ADDRESS TO:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ACCOMPANYING APPLICATION PAPERS

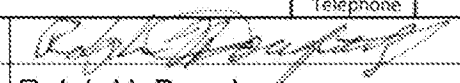
10. [ ] **Assignment Papers** (cover sheet & document(s))
    Name of Assignee _____
11. [ ] **37 CFR 3.73(c) Statement** *(when there is an assignee)* [✓] **Power of Attorney**
12. [ ] **English Translation Document** *(if applicable)*
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** *(MPEP § 503)* *(Should be specifically itemized)*
16. [ ] **Certified Copy of Priority Document(s)** *(if foreign priority is claimed)*
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [ ] **Other:** _____

Note:* (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[✓] The address associated with Customer Number: 00162 **OR** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature		Date	13 March, 2015
Name (Print/Type)	Ralph H. Dougherty	Registration No. (Attorney/Agent)	25,851

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

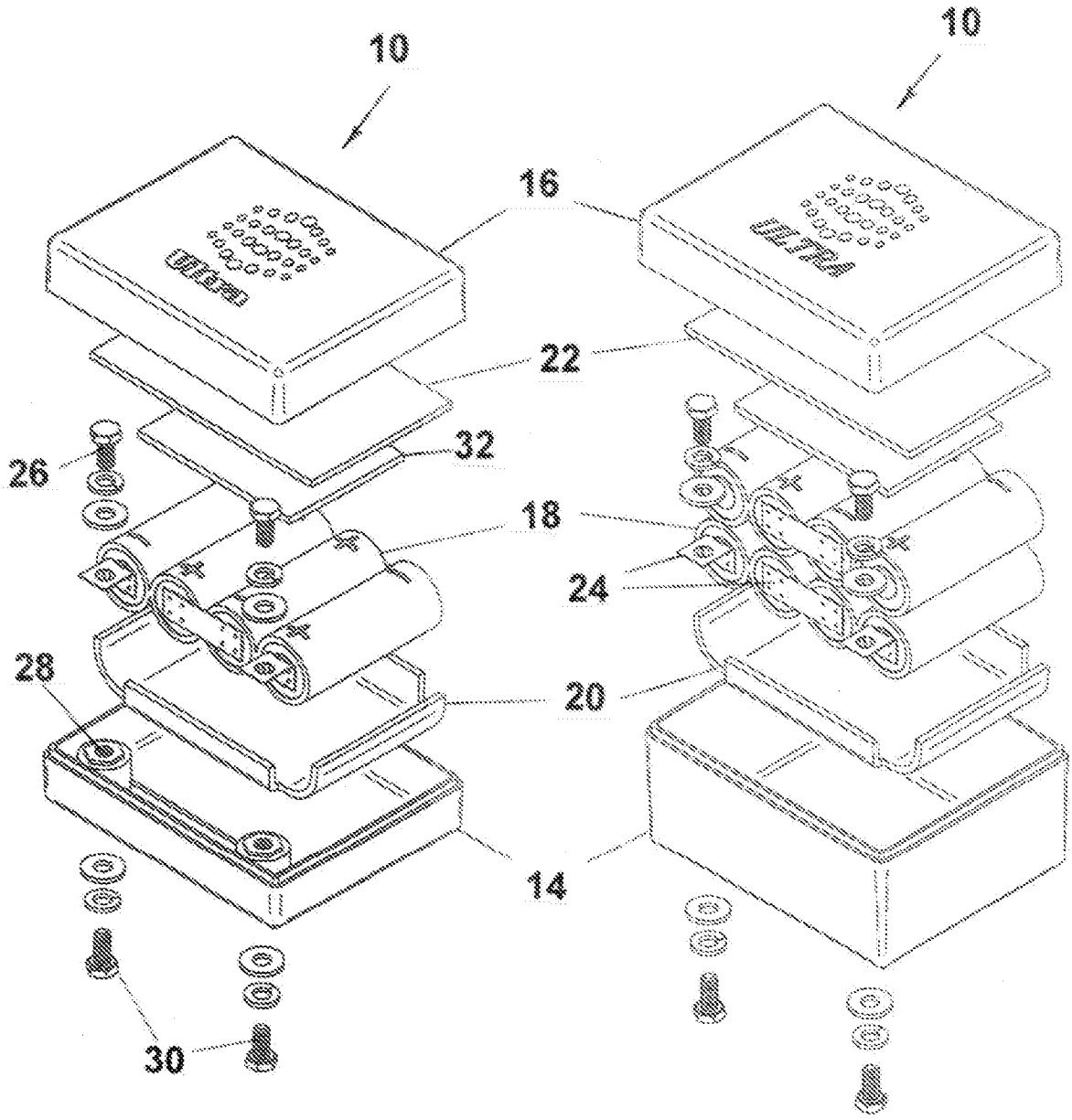


Fig. 1

Fig. 2

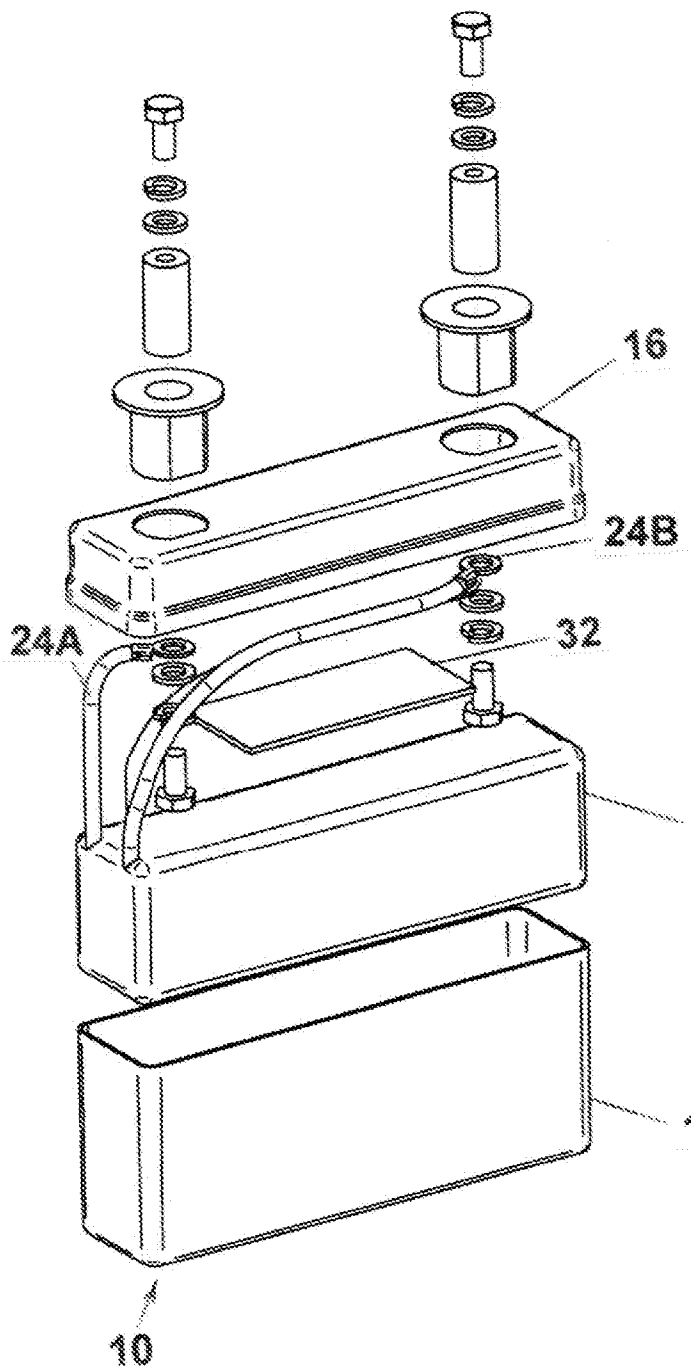


Fig. 3

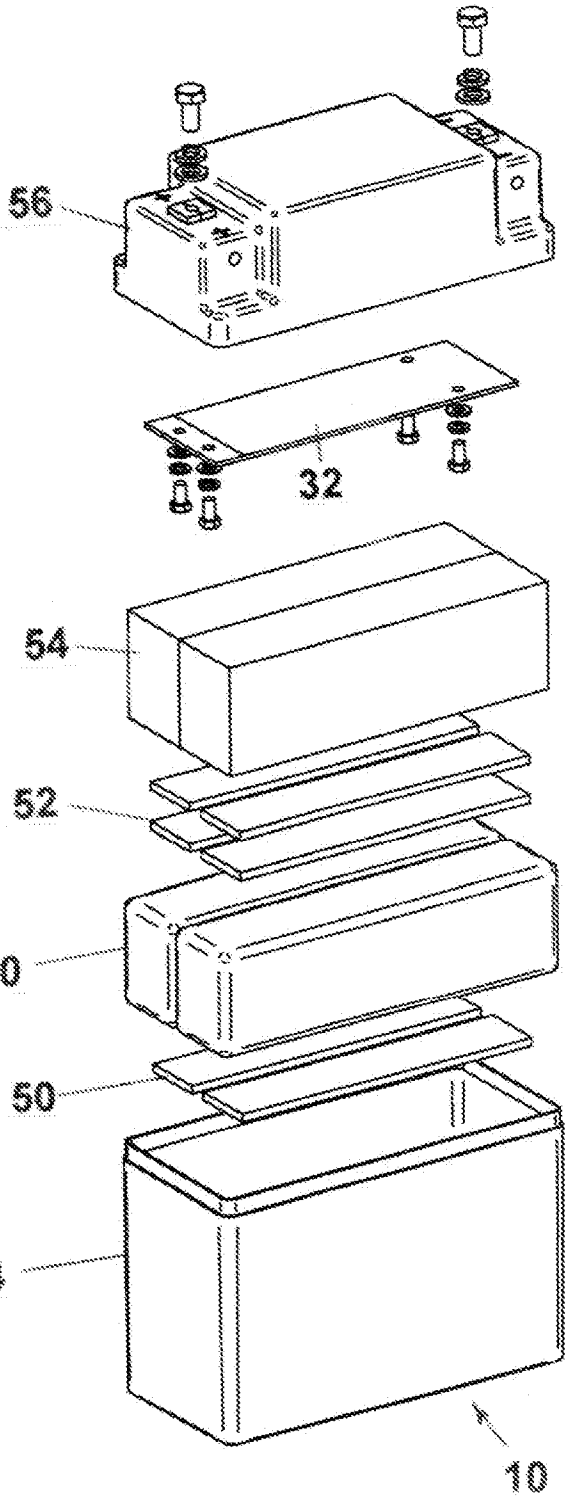


Fig. 13

Fig. 5

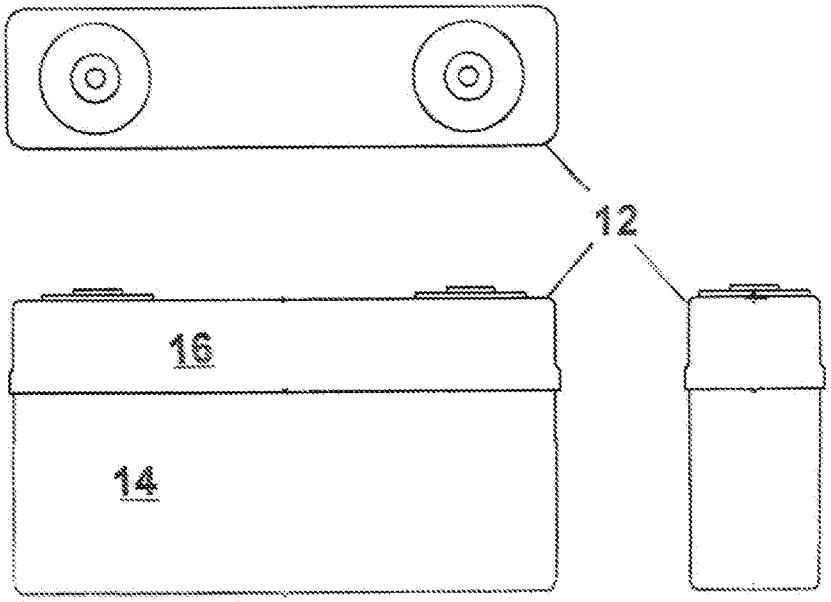


Fig. 4

Fig. 6

Fig. 7

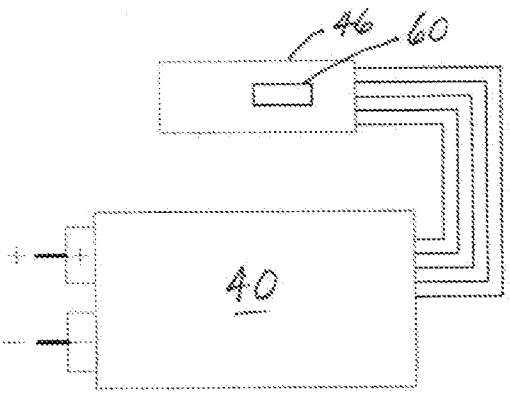
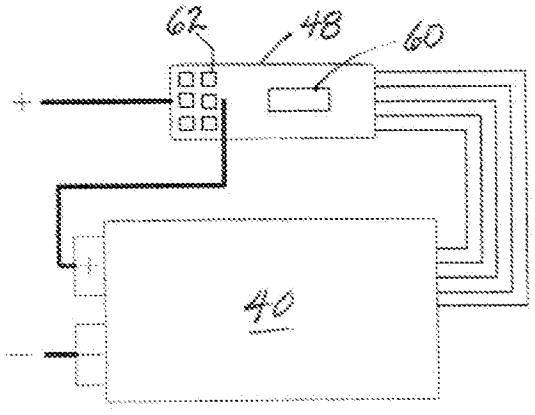


Fig. 8



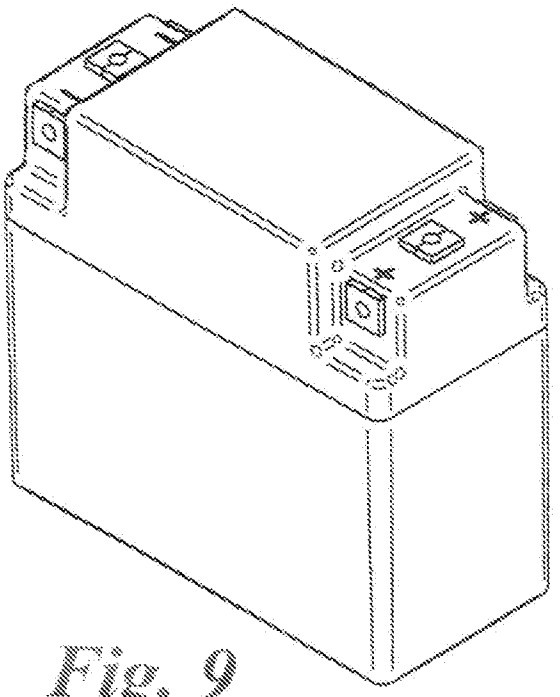


Fig. 9

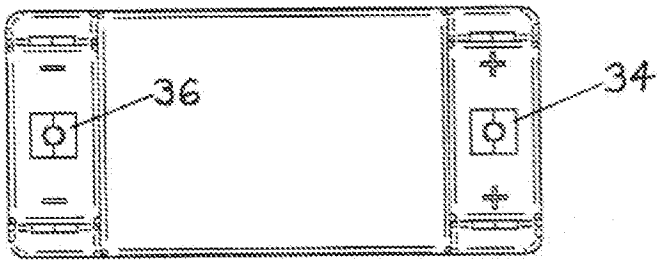


Fig. 10

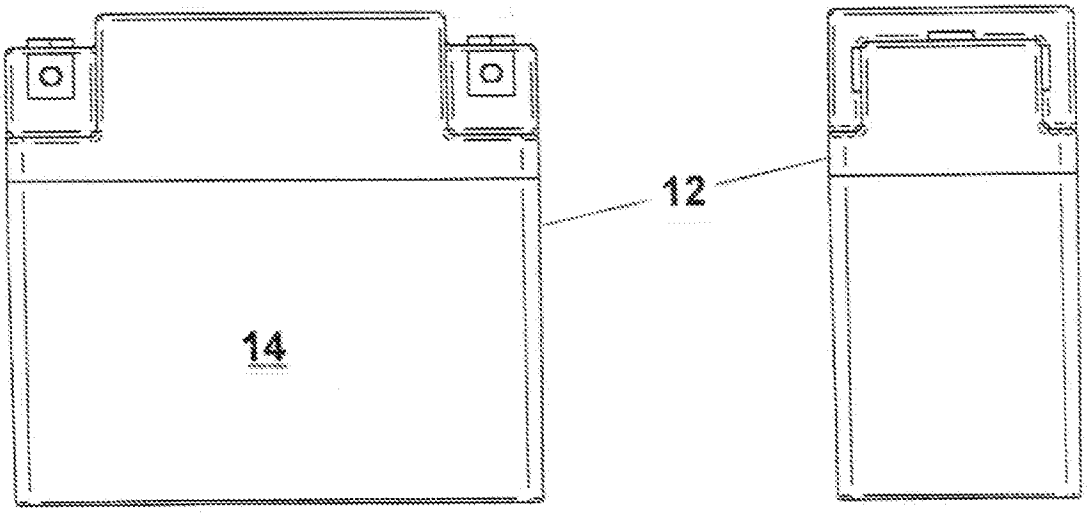


Fig. 11

Fig. 12

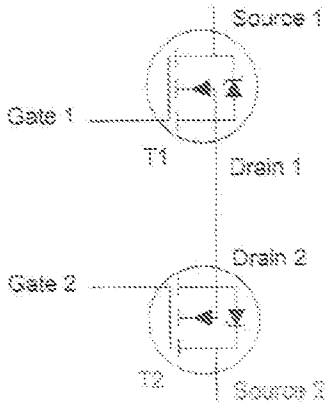


Fig. 14

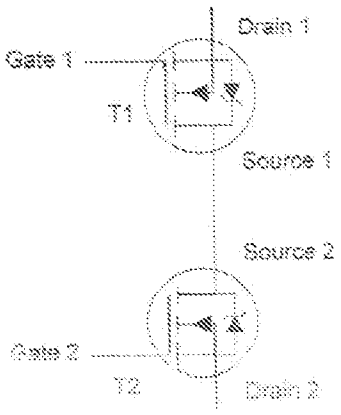


Fig. 15

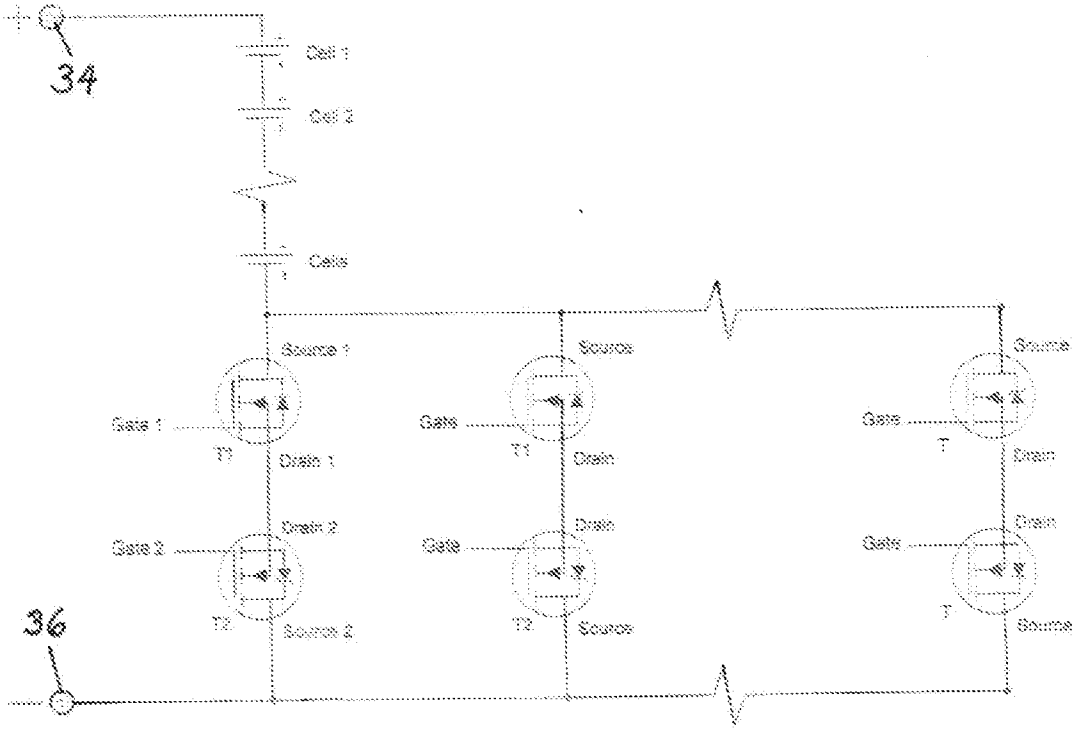


Fig. 16

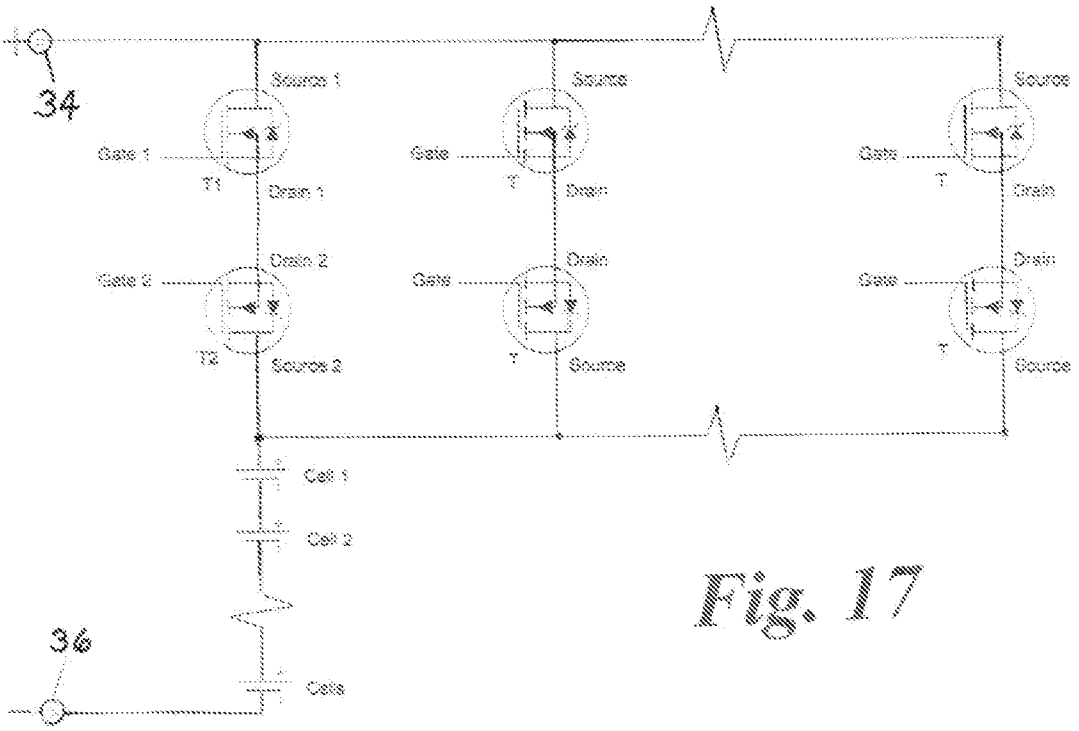

34
Source 1
Gate 1
T1
Drain 1
Drain 2
Gate 2
T2
Source 2
Source
Gate
T
Drain
Source
Gate
T
Drain
Drain
Gate
T
Source
Cell 1
Cell 2
Cell 3
36

Fig. 17

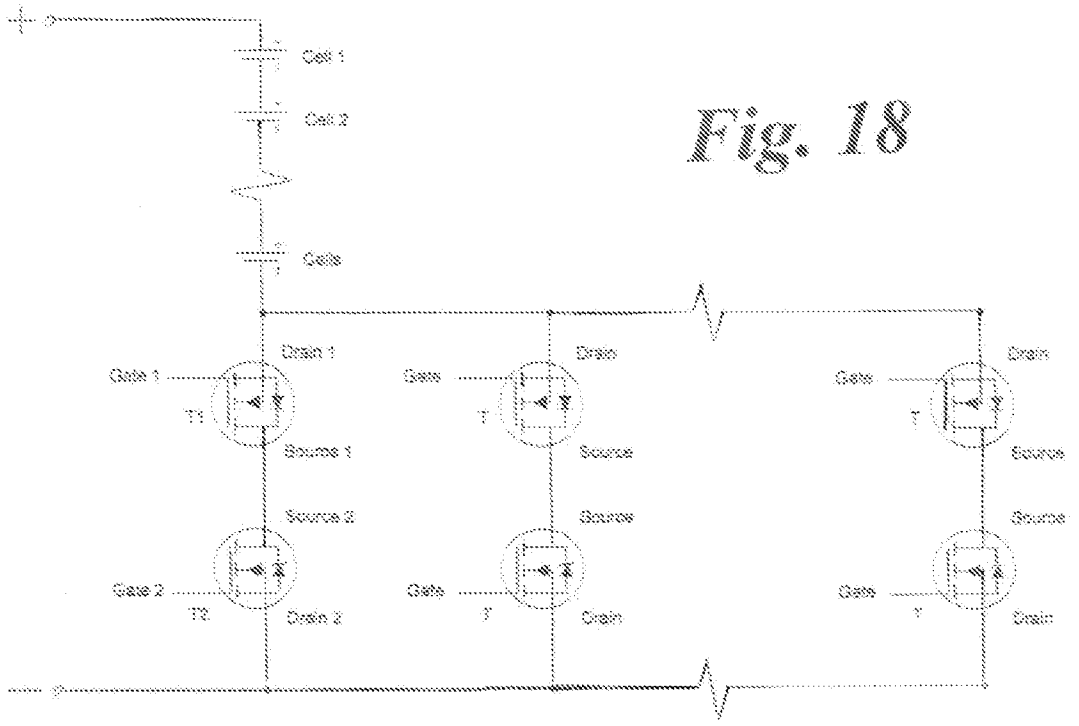

Cell 1
Cell 2
Cell 3
Drain 1
Gate 1
T1
Source 1
Source 2
Gate 2
T2
Drain 2
Drain
Gate
T
Source
Source
Gate
T
Drain
Drain
Gate
T
Source

Fig. 18

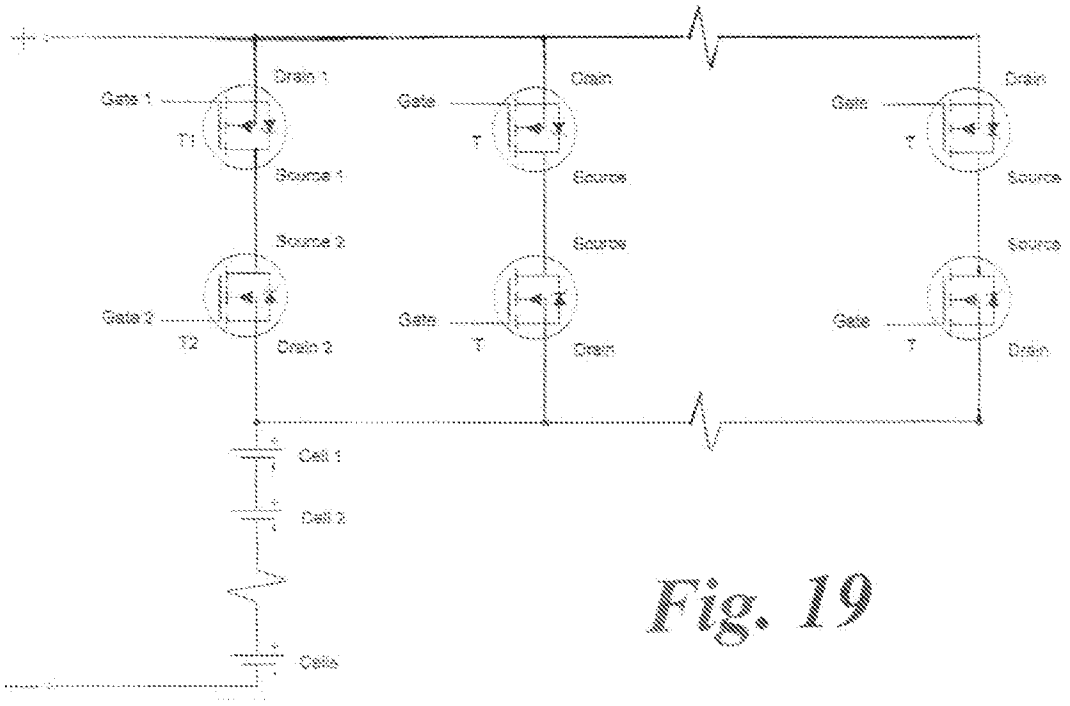

Drain 1
Gate 1
T1
Source 1
Source 2
Gate 2
T2
Drain 2
Gate
T
Drain
Source
Cell 1
Cell 2
Cells

Fig. 19

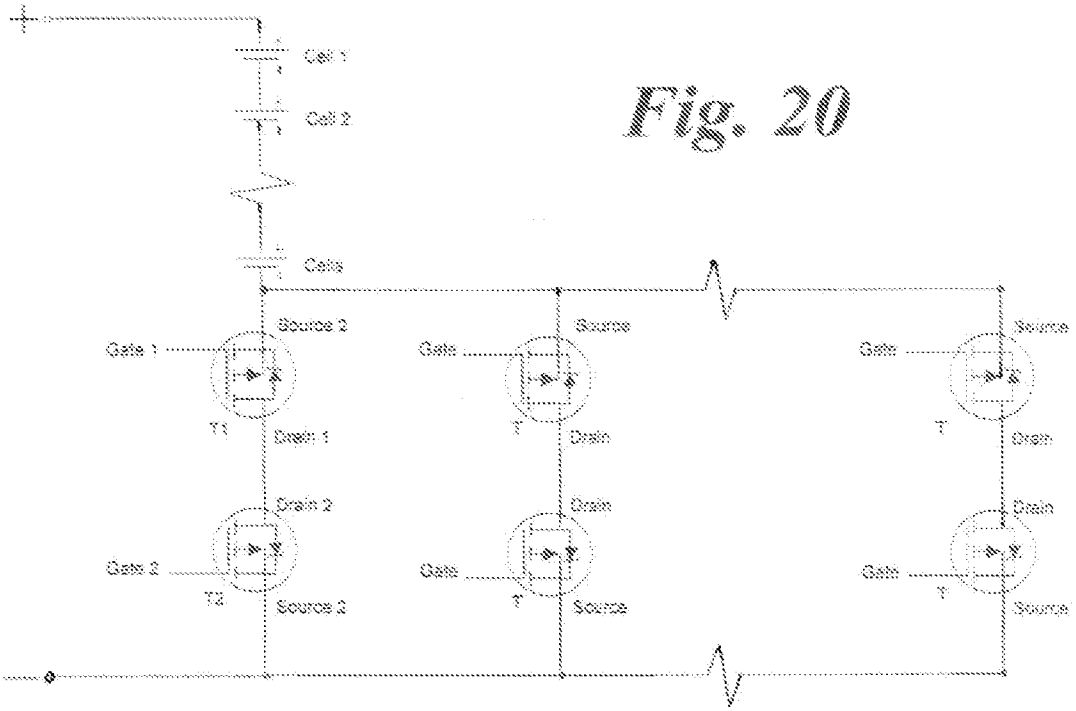

Cell 1
Cell 2
Cells
Source 2
Gate 1
T1
Drain 1
Drain 2
Gate 2
T2
Source 2
Gate
T
Drain
Source

Fig. 20

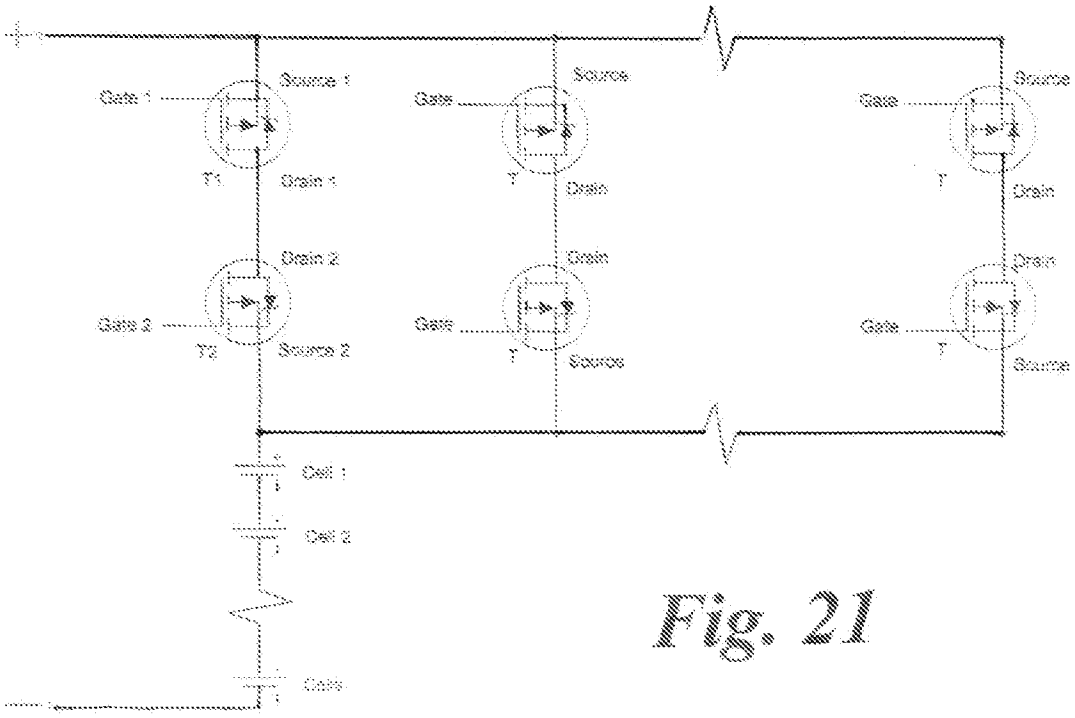

Source 1
Gate 1
T1
Drain 1
Drain 2
Gate 2
T2
Source 2
Source
Gate
T
Drain
Drain
Gate
T
Source
Source
Gate
T
Drain
Drain
Gate
T
Source
Cell 1
Cell 2
Cell n

Fig. 21

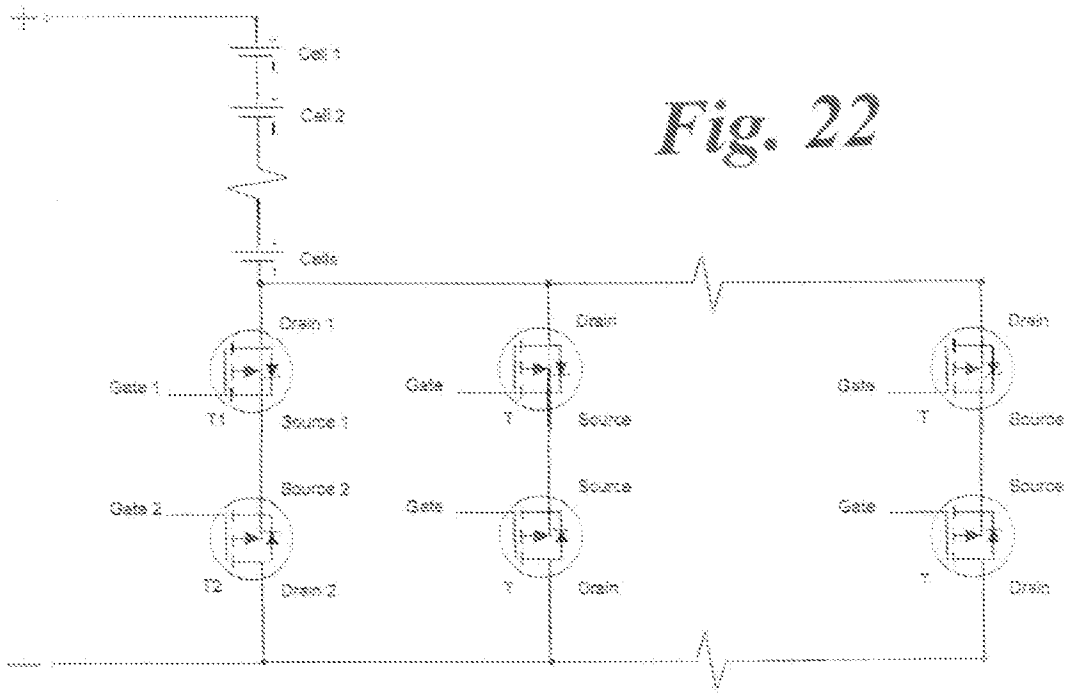

Cell 1
Cell 2
Cell n
Drain 1
Gate 1
T1
Source 1
Source 2
Gate 2
T2
Drain 2
Drain
Gate
T
Source
Source
Gate
T
Drain
Drain
Gate
T
Source
Source
Gate
T
Drain

Fig. 22

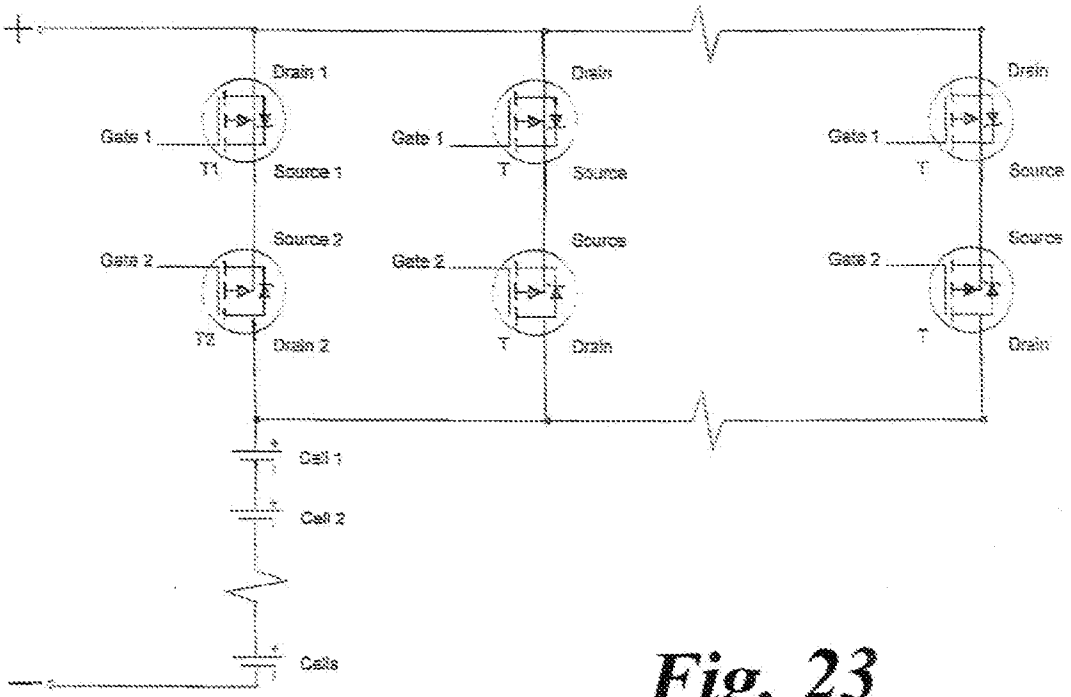

+
Drain 1
Gate 1
T1
Source 1
Source 2
Gate 2
T2
Drain 2
Drain
Gate 1
T
Source
Source
Gate 2
T
Drain
Drain
Gate 1
T
Source
Source
Gate 2
T
Drain
Cell 1
Cell 2
Cells
—

Fig. 23

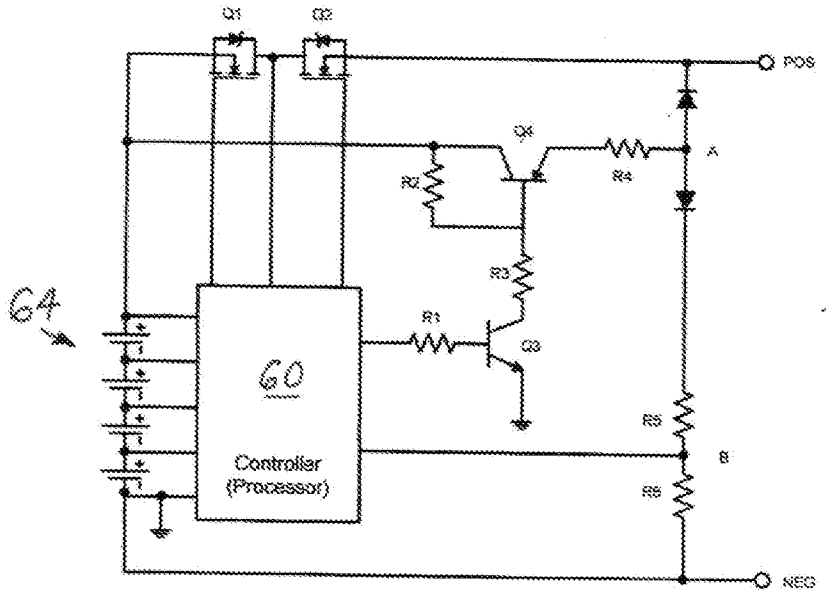

Q1
Q2
POS
Q4
R2
R4
A
R3
R1
Q3
64
60
Controller
(Processor)
R5
B
R6
NEG

Fig. 24

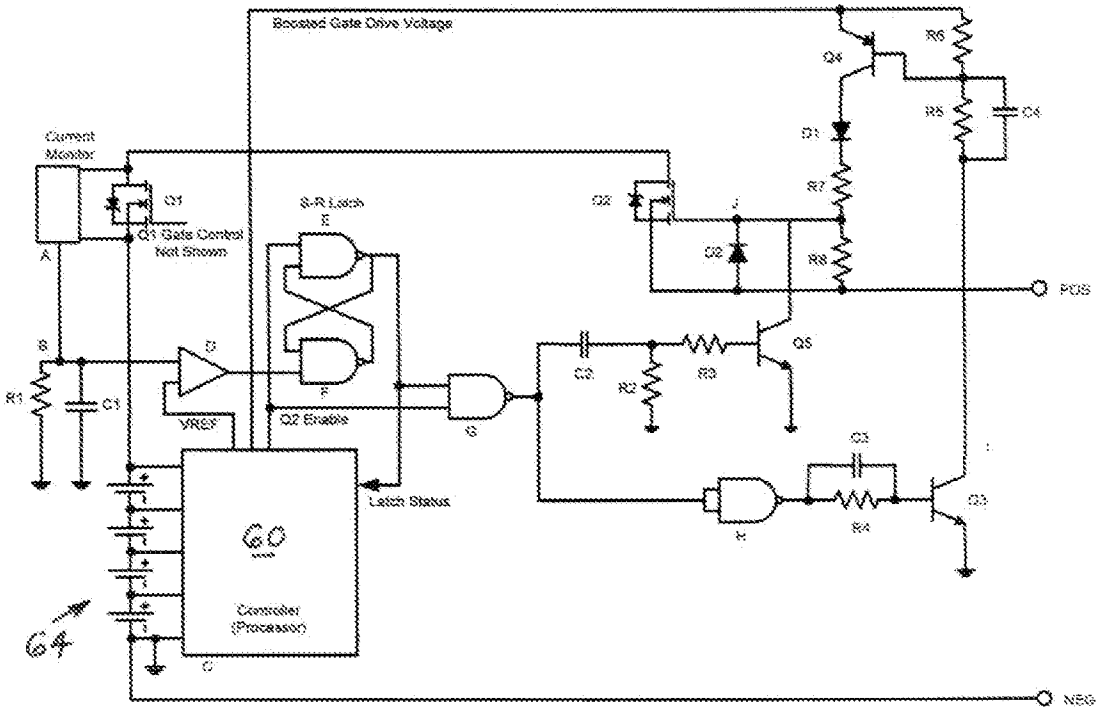

Boosted Gate Drive Voltage
Current Monitor
Q1
Q1 Gate Control Not Shown
A
B
R1
C1
D
VREF
S-R Latch
S
R
Q2 Enable
Latch Status
60
Controller (Processor)
64
Q2
J
Q4
R6
R5
C4
D1
R7
D2
R8
POS
NEG
C2
R2
R3
Q5
K
C3
R4
Q3

Fig. 25

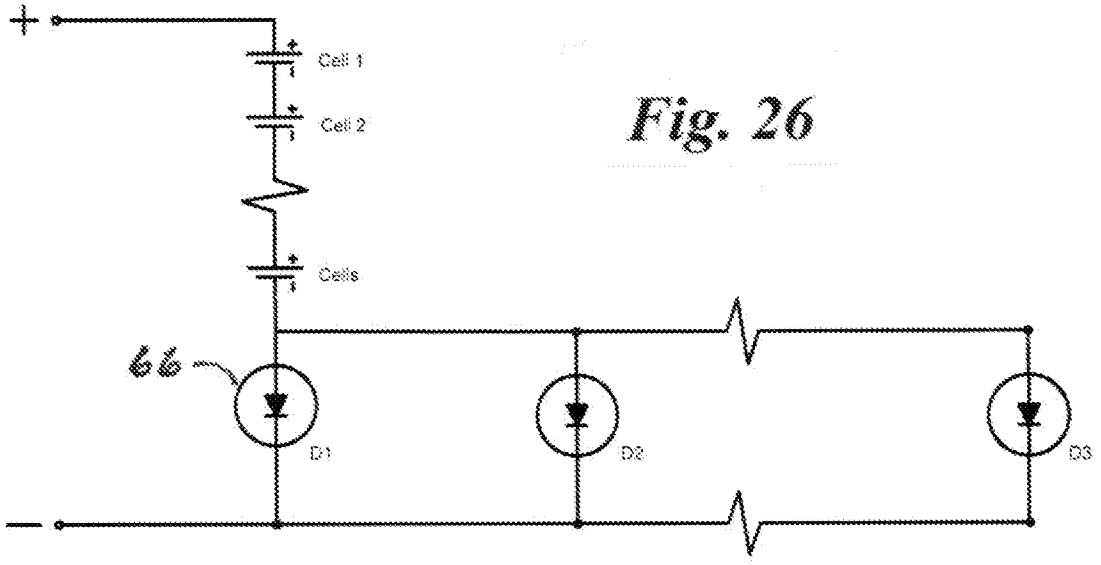


Fig. 26

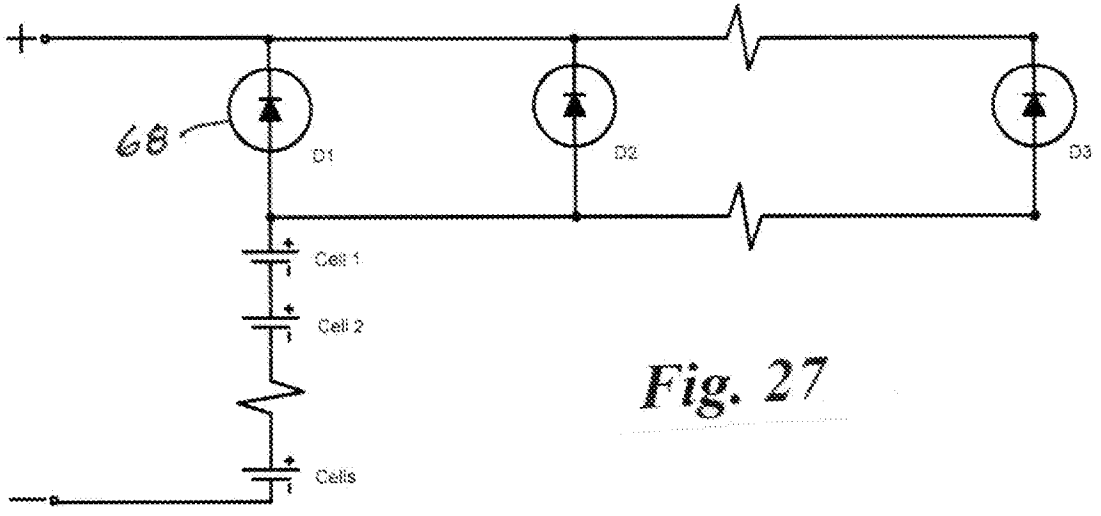


Fig. 27

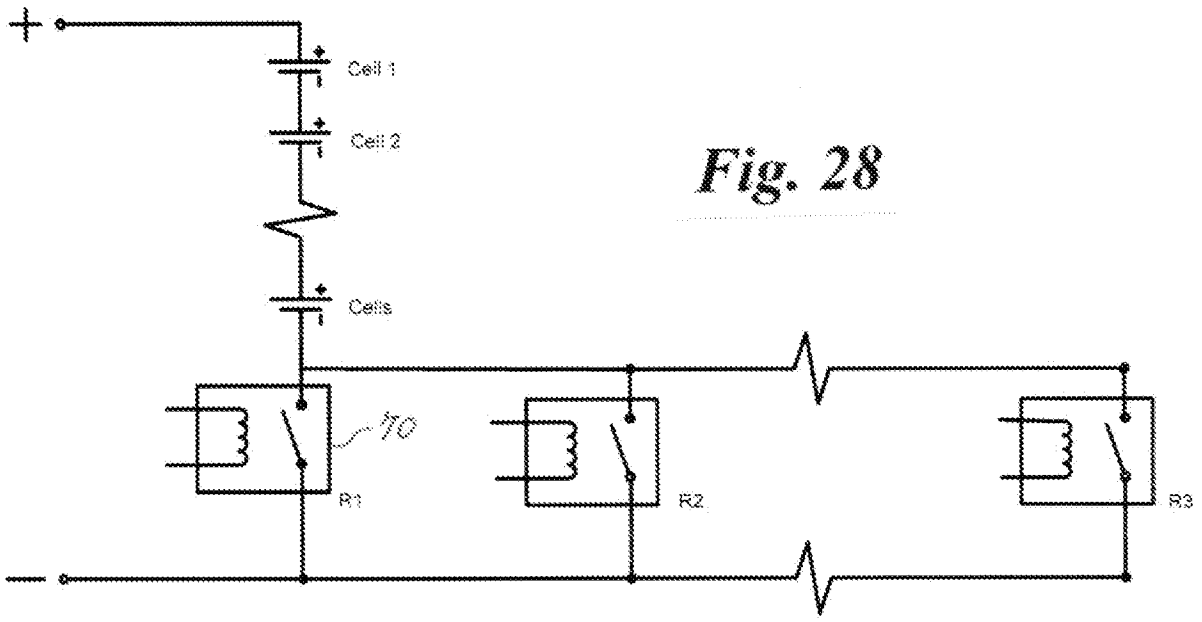


Fig. 28

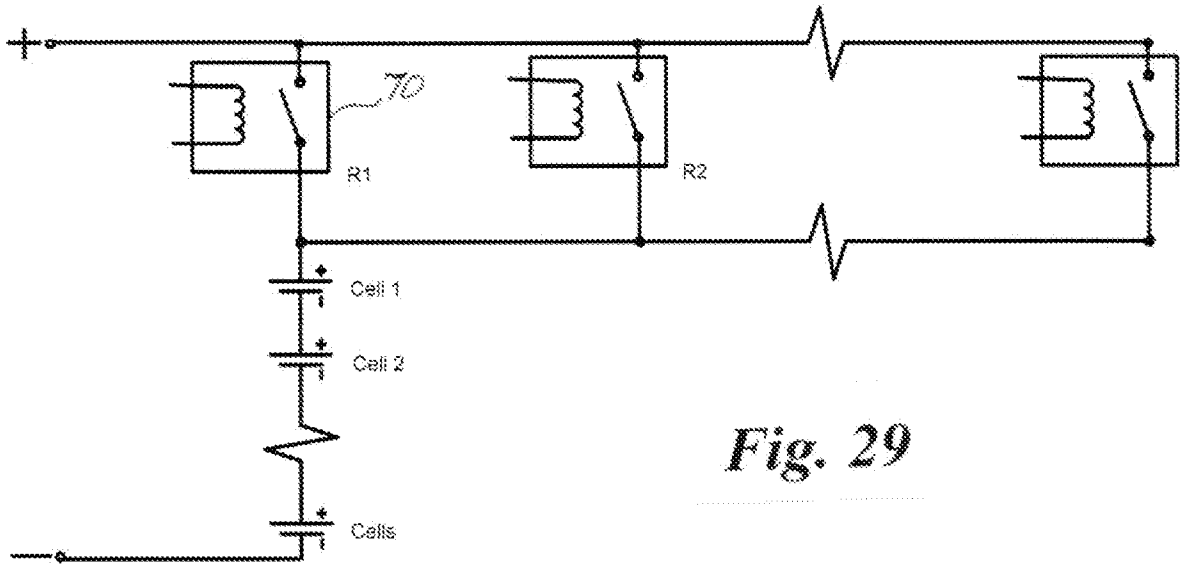


Fig. 29

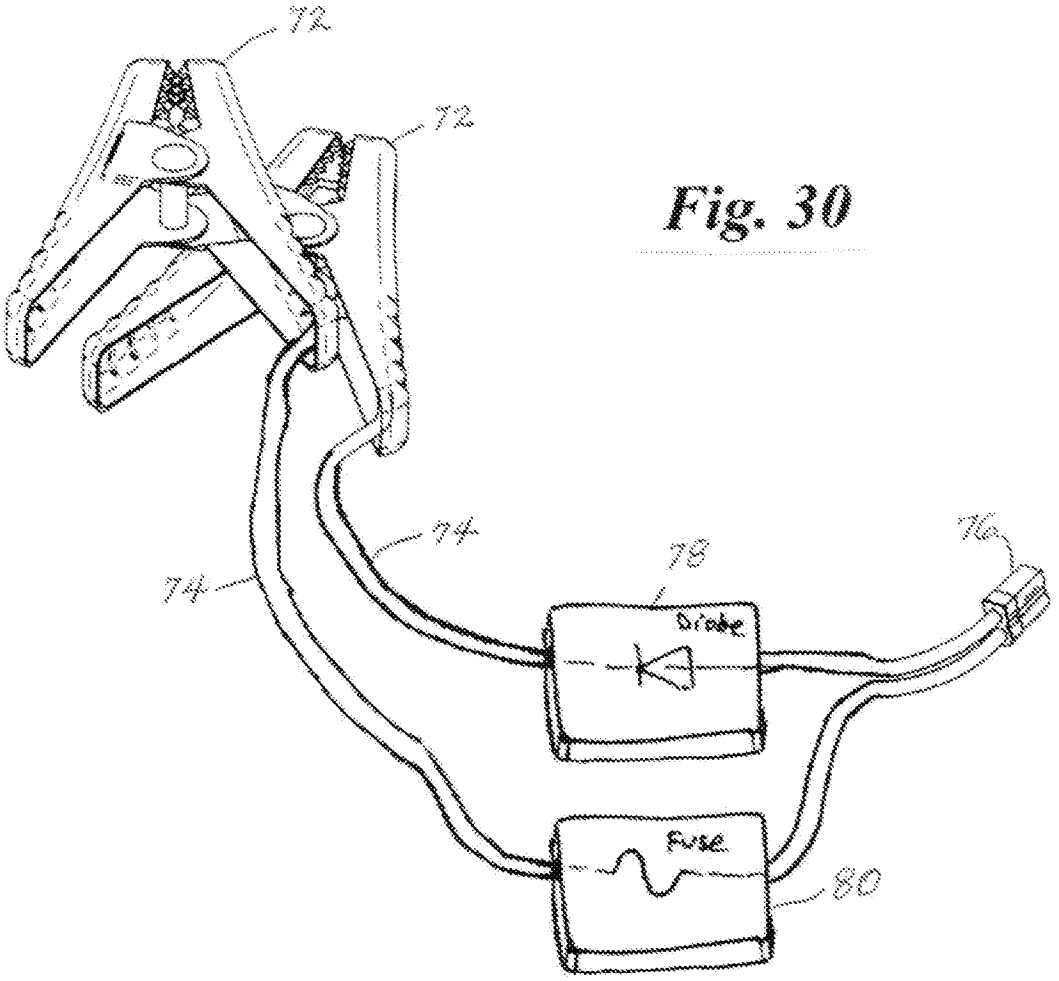


Fig. 30

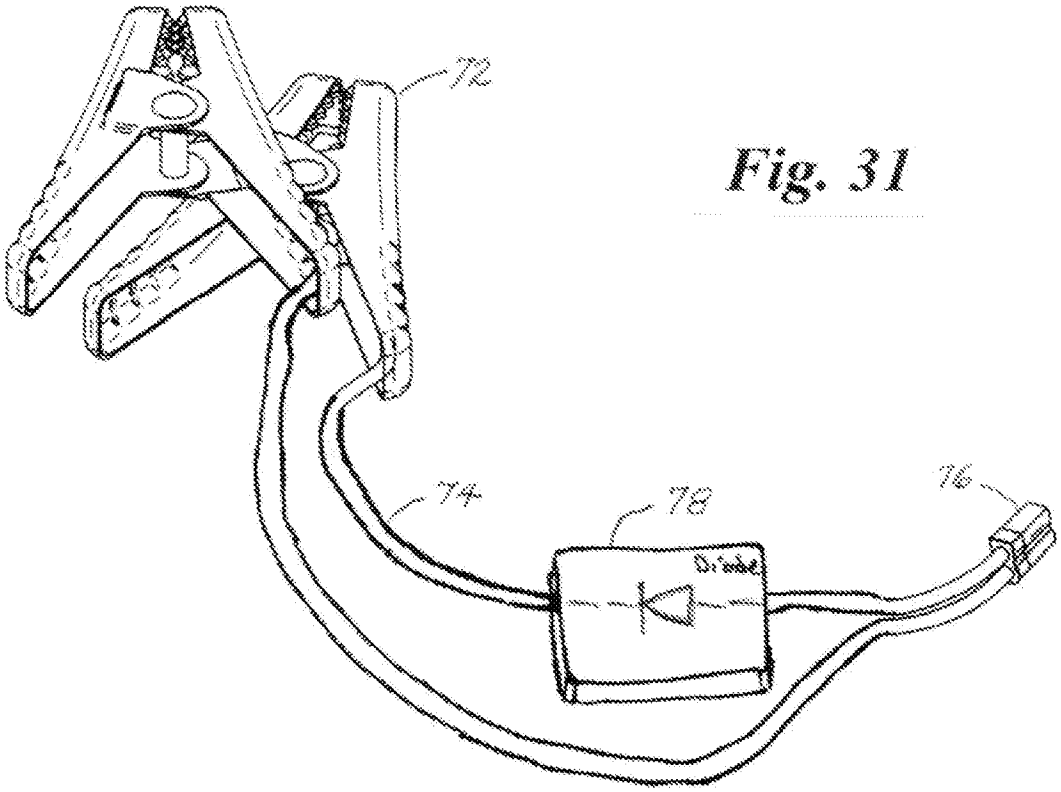


Fig. 31

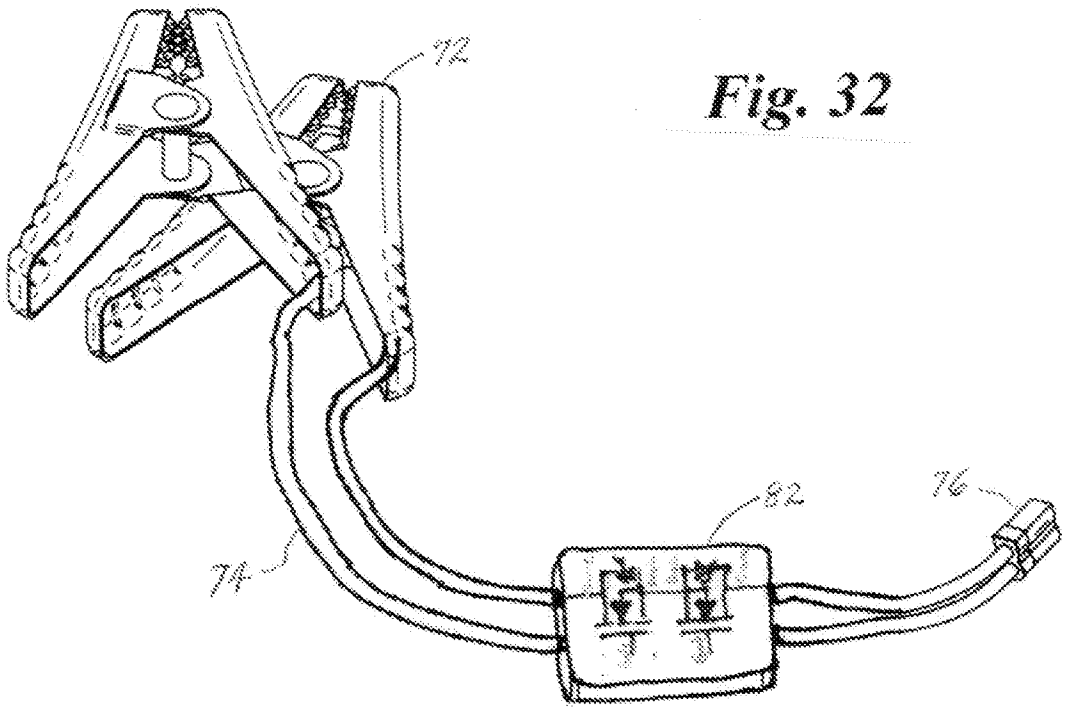


Fig. 32

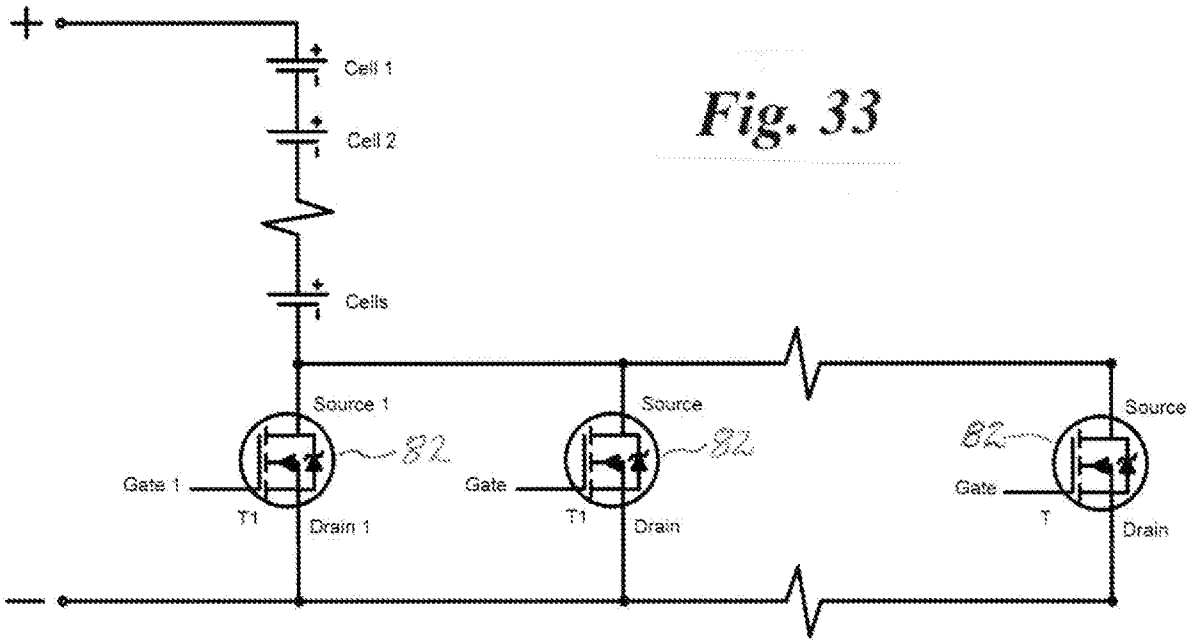

Cell 1
Cell 2
Cells
Source 1
Gate 1
T1
Drain 1
82
Source
Gate
T1
Drain
82
82
Source
Gate
T
Drain

Fig. 33

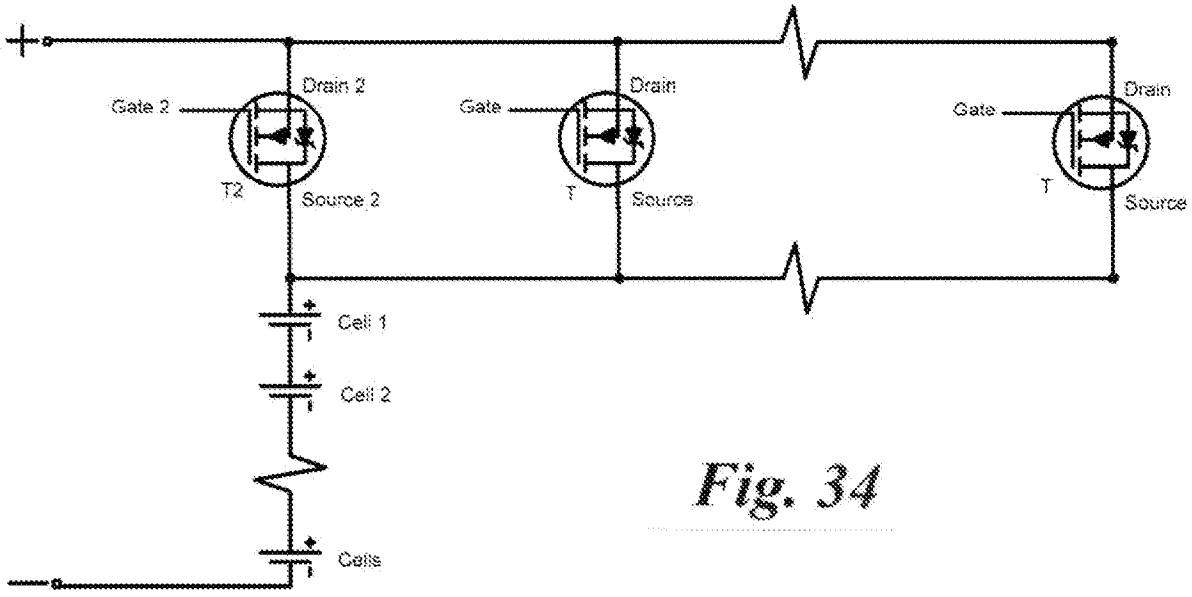

Drain 2
Gate 2
T2
Source 2
Drain
Gate
T
Source
Drain
Gate
T
Source
Cell 1
Cell 2
Cells

Fig. 34

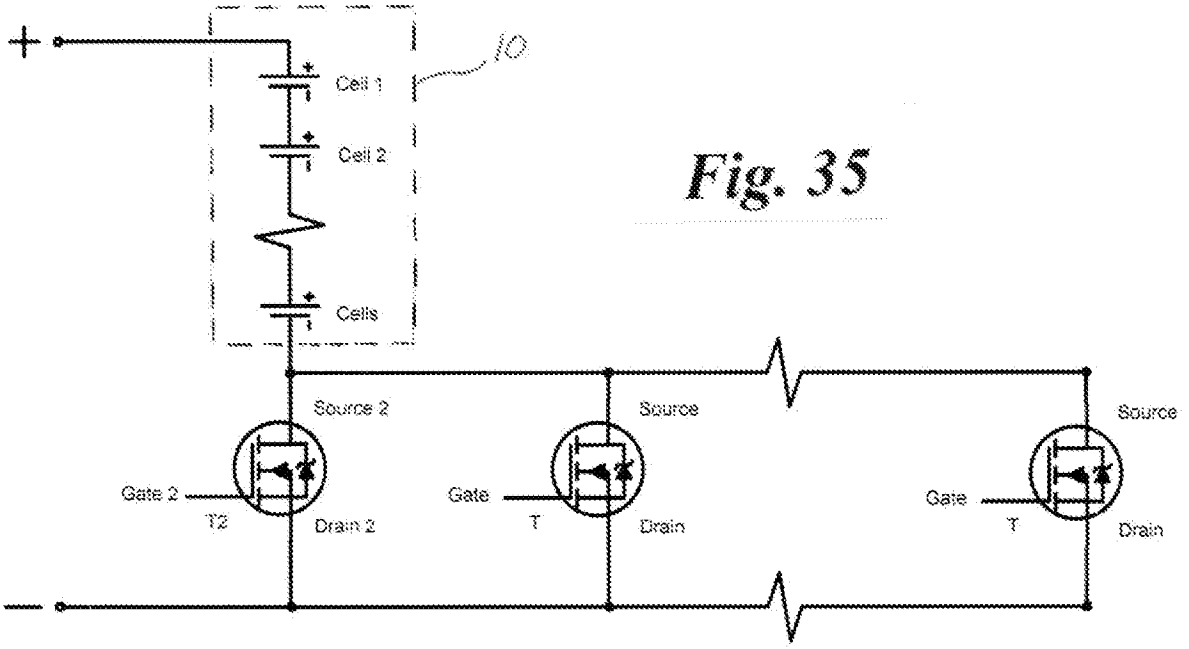

10
Cell 1
Cell 2
Cells
Source 2
Gate 2
T2
Drain 2
Source
Gate
T
Drain
Source
Gate
T
Drain

Fig. 35

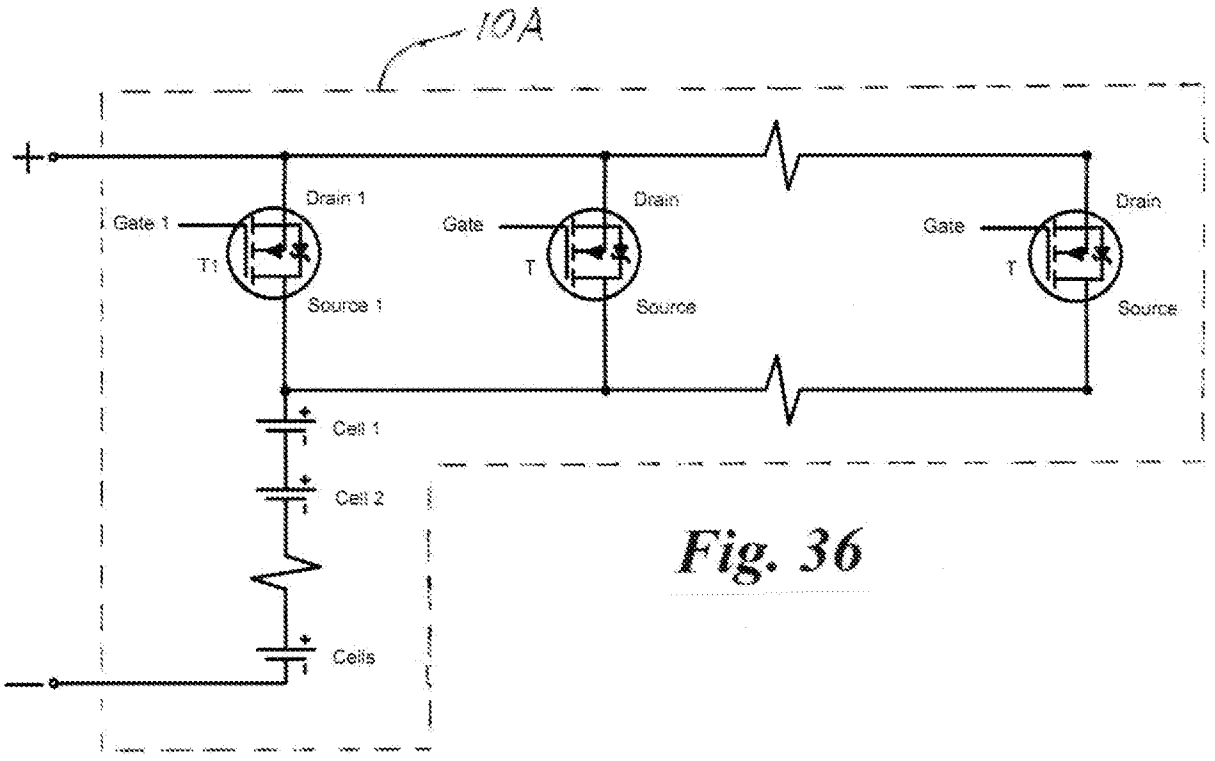

10A
Drain 1
Gate 1
T1
Source 1
Drain
Gate
T
Source
Drain
Gate
T
Source
Cell 1
Cell 2
Cells

Fig. 36

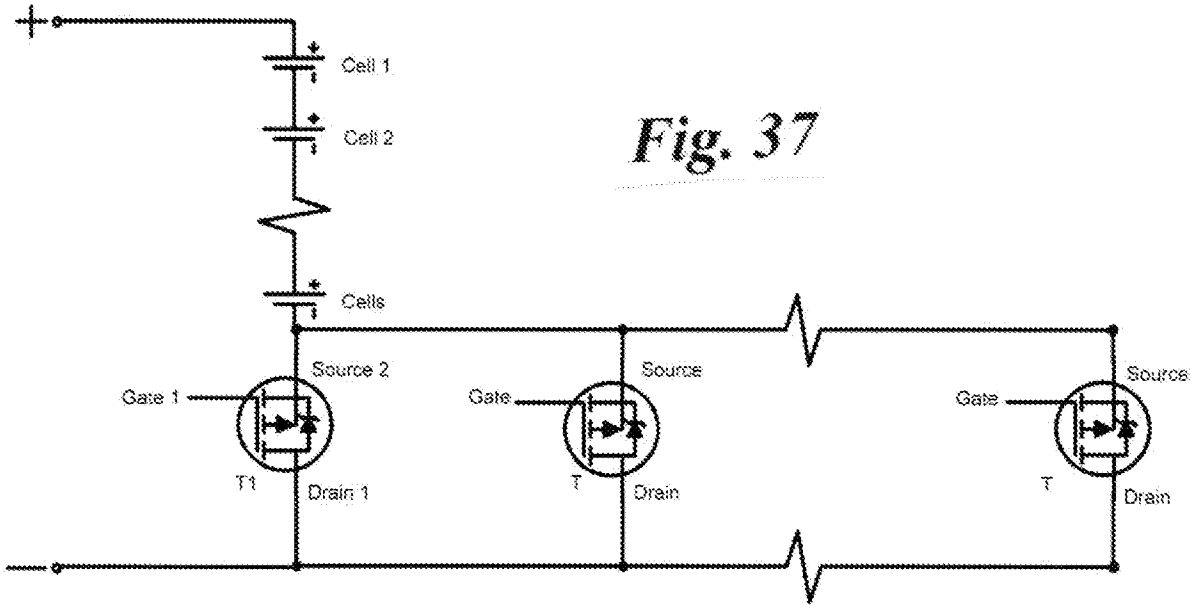

Cell 1
Cell 2
Cells
Source 2
Gate 1
T1
Drain 1
Source
Gate
T
Drain
Source
Gate
T
Drain

Fig. 37

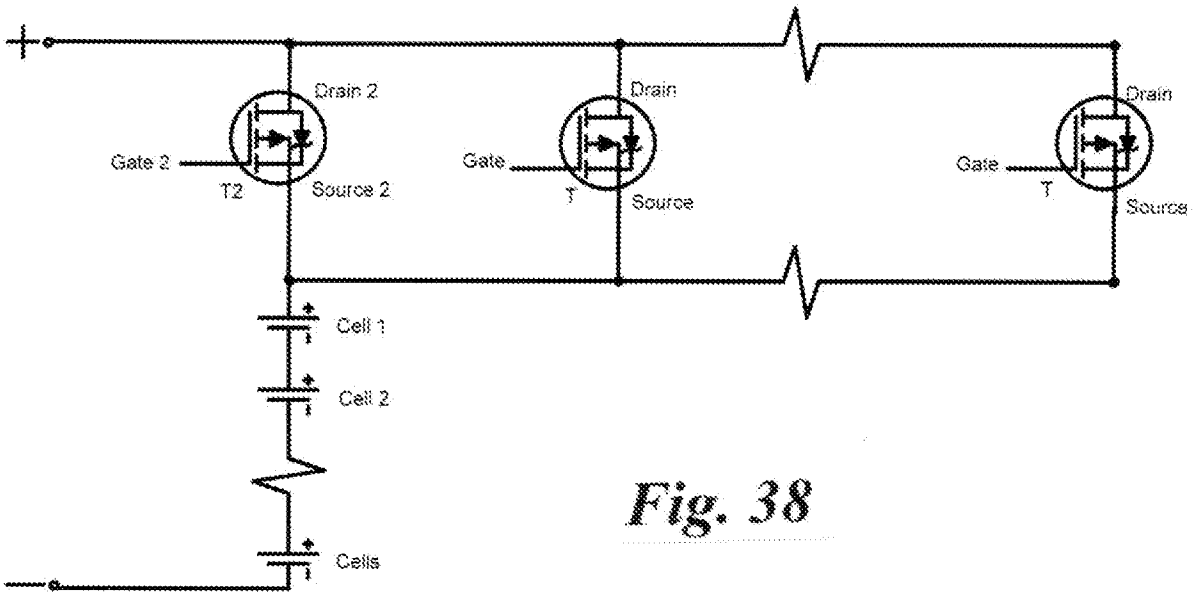

Drain 2
Gate 2
T2
Source 2
Drain
Gate
T
Source
Drain
Gate
T
Source
Cell 1
Cell 2
Cells

Fig. 38

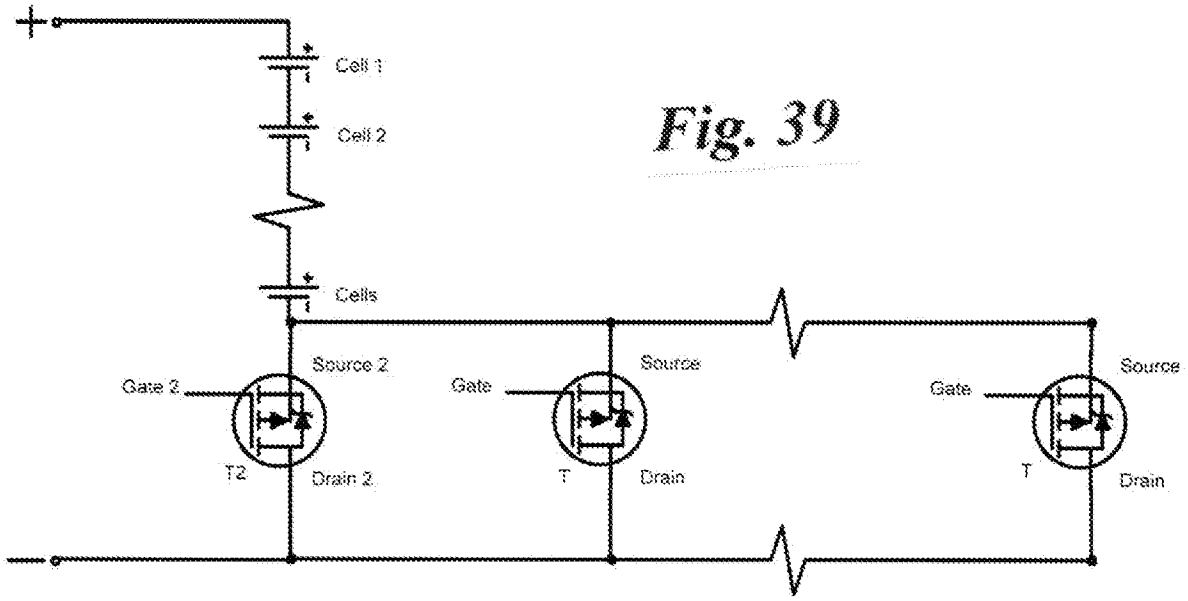

Cell 1
Cell 2
Cells
Gate 2
Source 2
T2
Drain 2
Gate
Source
T
Drain
Gate
Source
T
Drain

Fig. 39

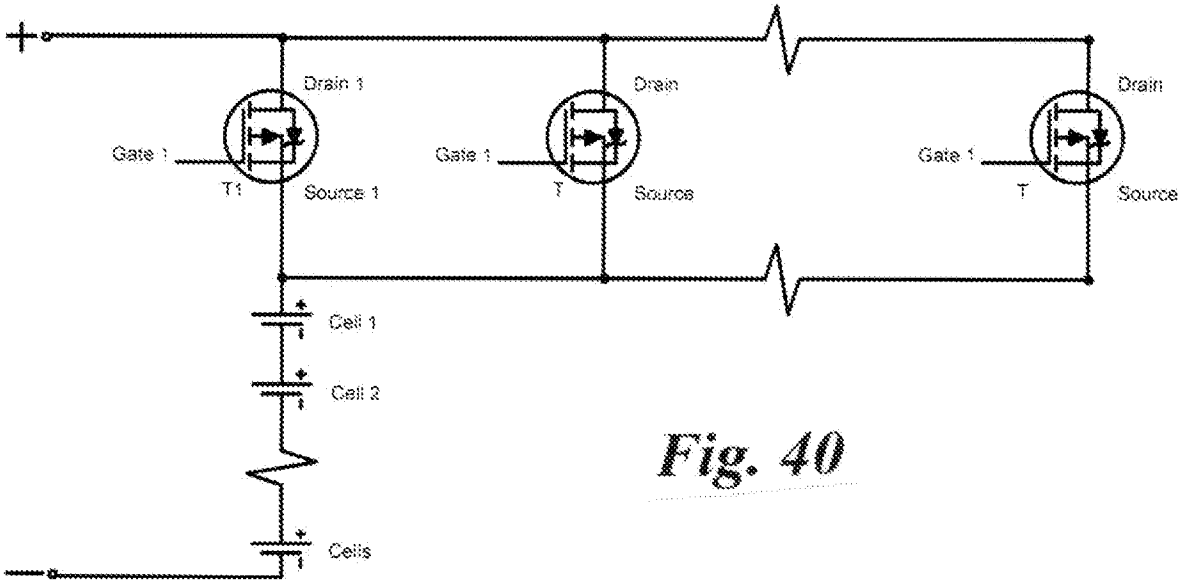

Drain 1
Gate 1
T1
Source 1
Gate 1
Drain
T
Source
Gate 1
Drain
T
Source
Cell 1
Cell 2
Cells

Fig. 40

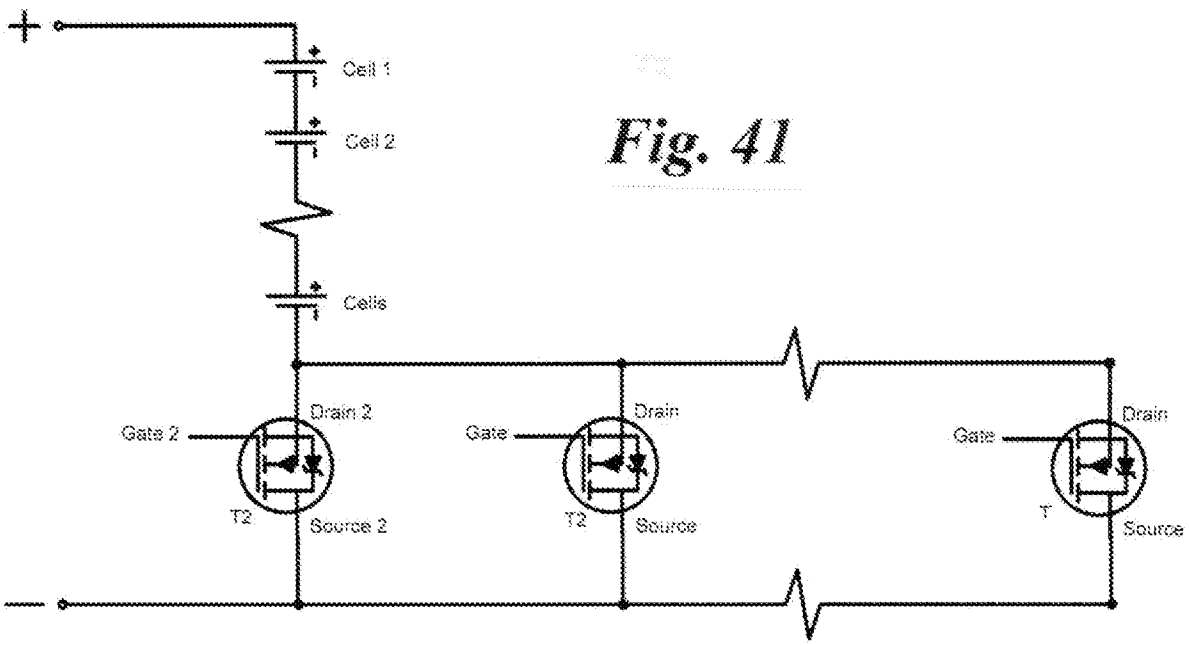

Cell 1
Cell 2
Cells
Gate 2
Drain 2
T2
Source 2
Gate
Drain
T2
Source
Gate
Drain
T
Source

Fig. 41

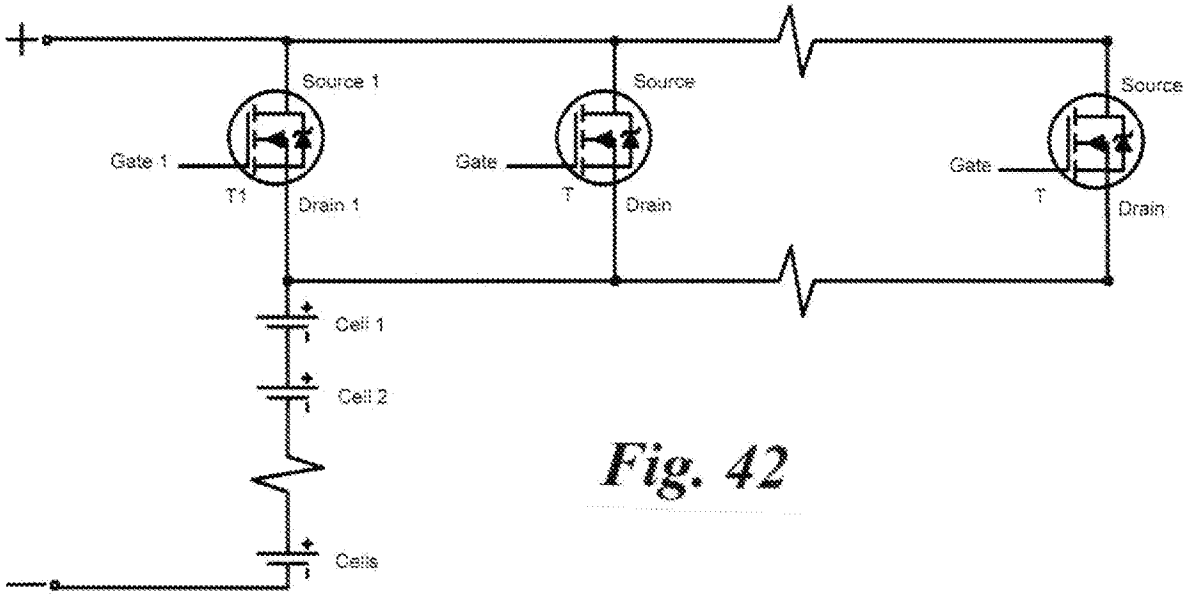

Source 1
Gate 1
T1
Drain 1
Source
Gate
T
Drain
Source
Gate
T
Drain
Cell 1
Cell 2
Cells

Fig. 42

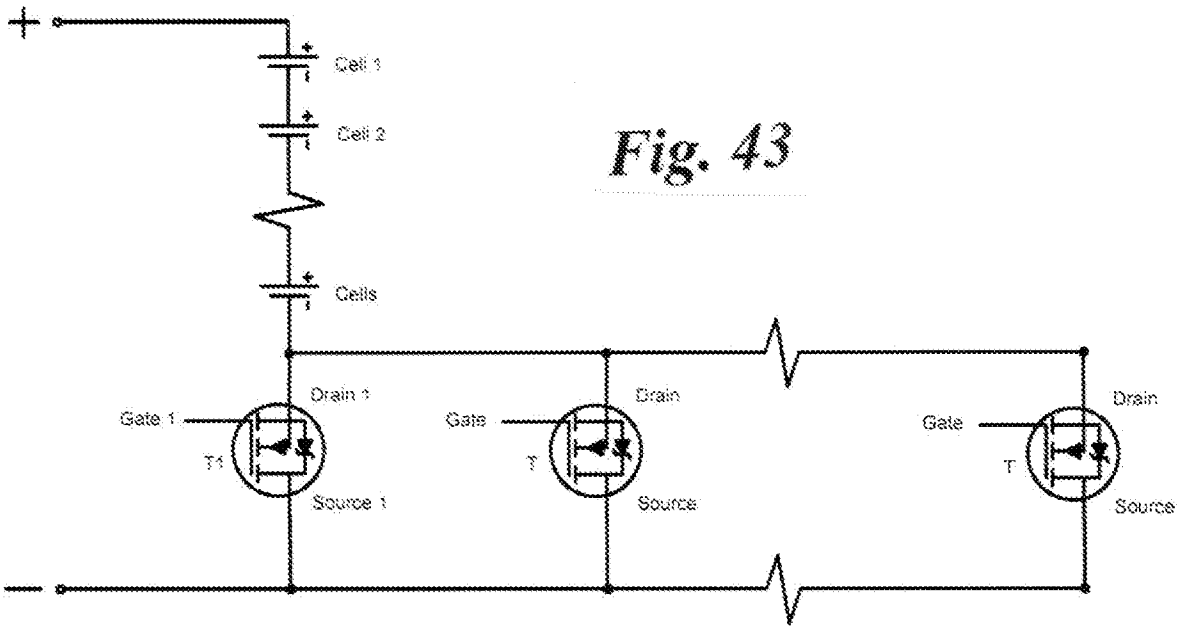

Cell 1
Cell 2
Cells
Drain 1
Gate 1
T1
Source 1
Gate
T
Drain
Source
Gate
T
Drain
Source

Fig. 43

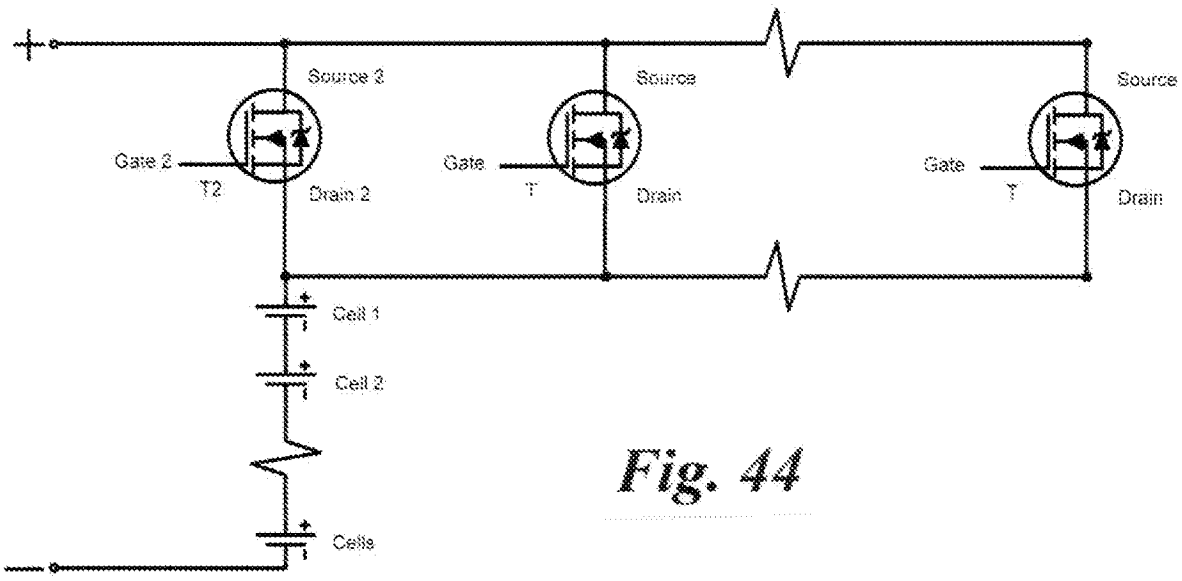

Source 2
Gate 2
T2
Drain 2
Gate
T
Source
Drain
Gate
T
Source
Drain
Cell 1
Cell 2
Cells

Fig. 44

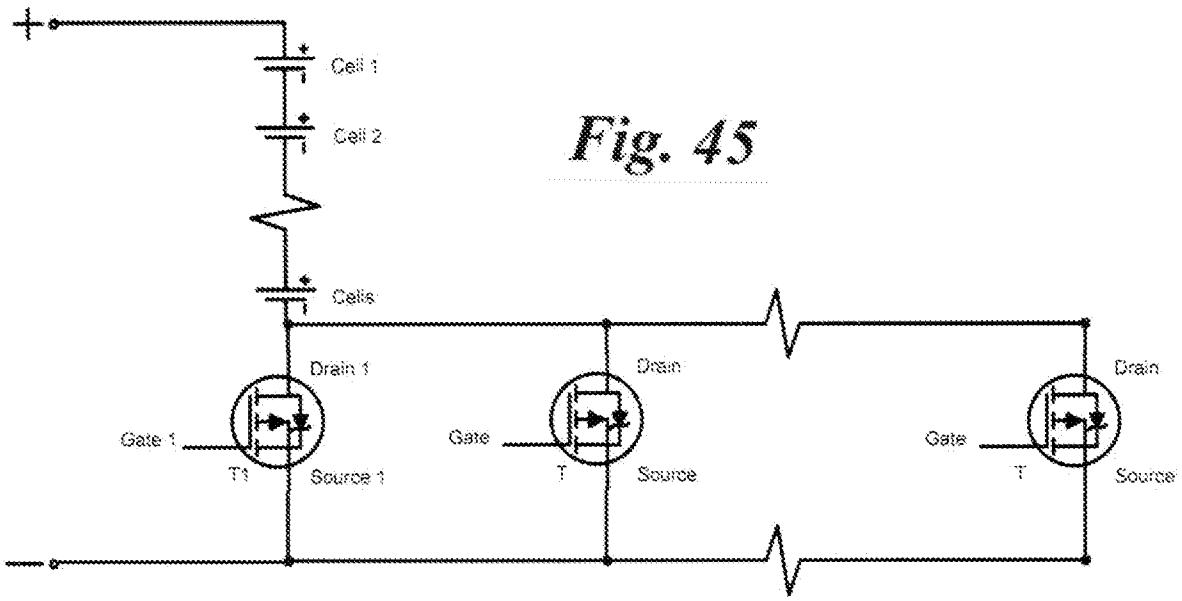

Cell 1
Cell 2
Cells
Drain 1
Gate 1
T1
Source 1
Drain
Gate
T
Source
Drain
Gate
T
Source

Fig. 45

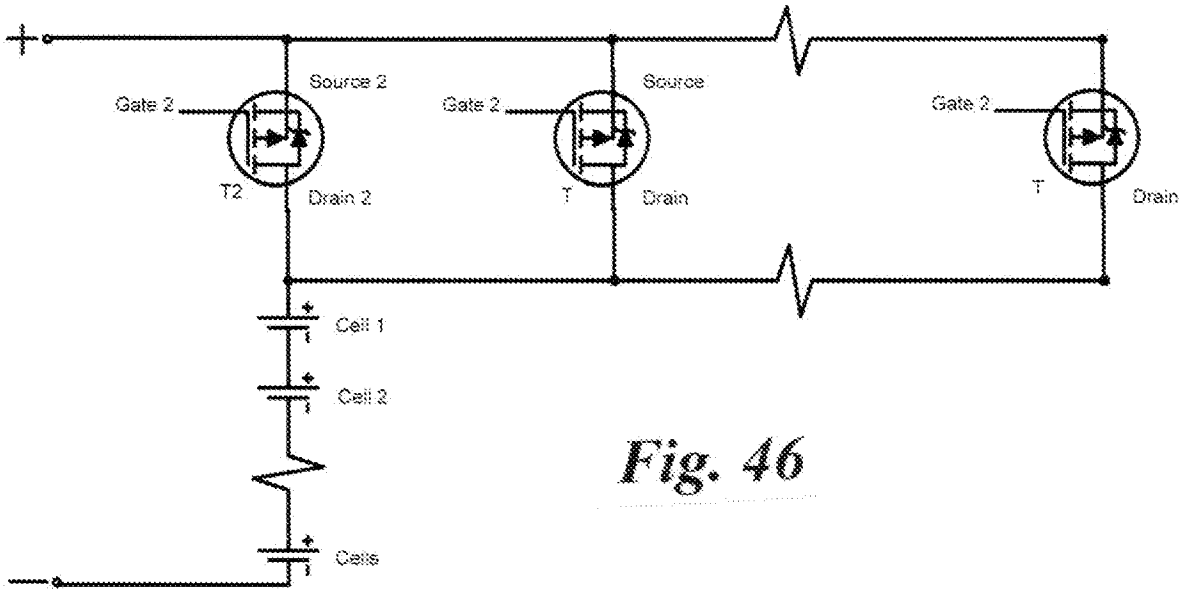

Source 2
Gate 2
T2
Drain 2
Source
Gate 2
T
Drain
Gate 2
T
Drain
Cell 1
Cell 2
Cells

Fig. 46

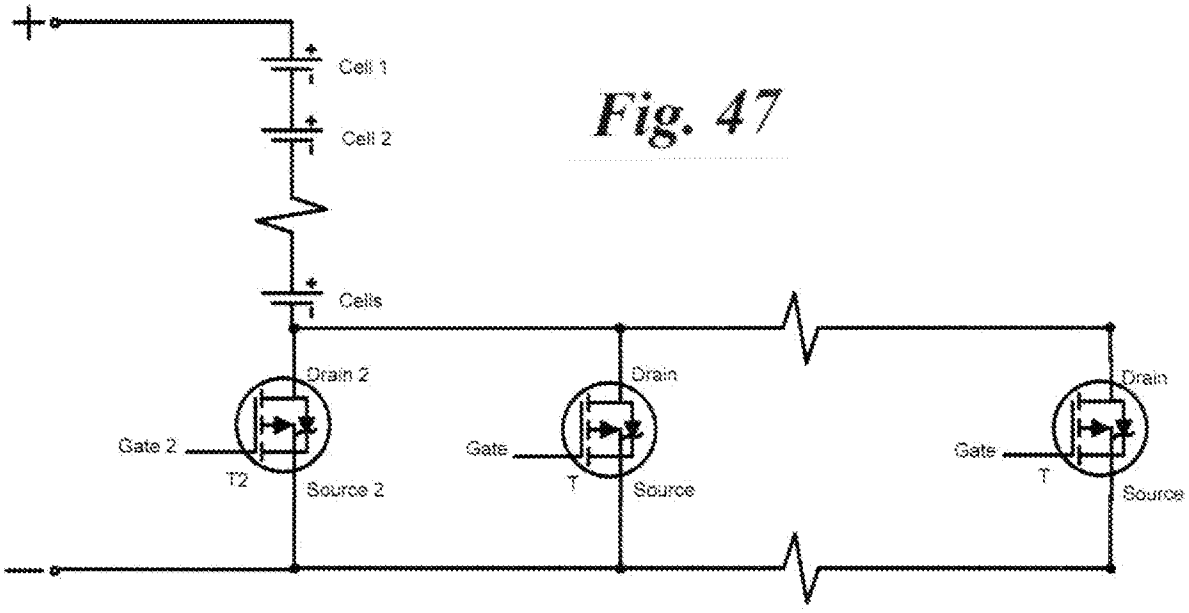

Cell 1
Cell 2
Cells
Drain 2
Gate 2
T2
Source 2
Drain
Gate
T
Source
Drain
Gate
T
Source

Fig. 47

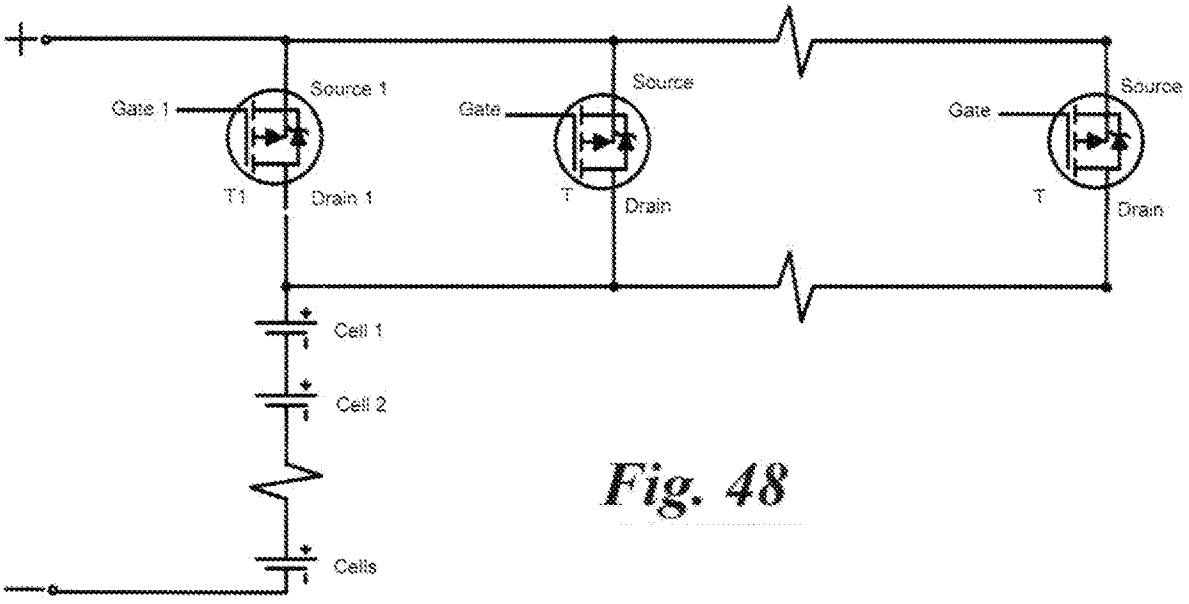

Source 1
Gate 1
T1
Drain 1
Source
Gate
T
Drain
Source
Gate
T
Drain
Cell 1
Cell 2
Cells

Fig. 48

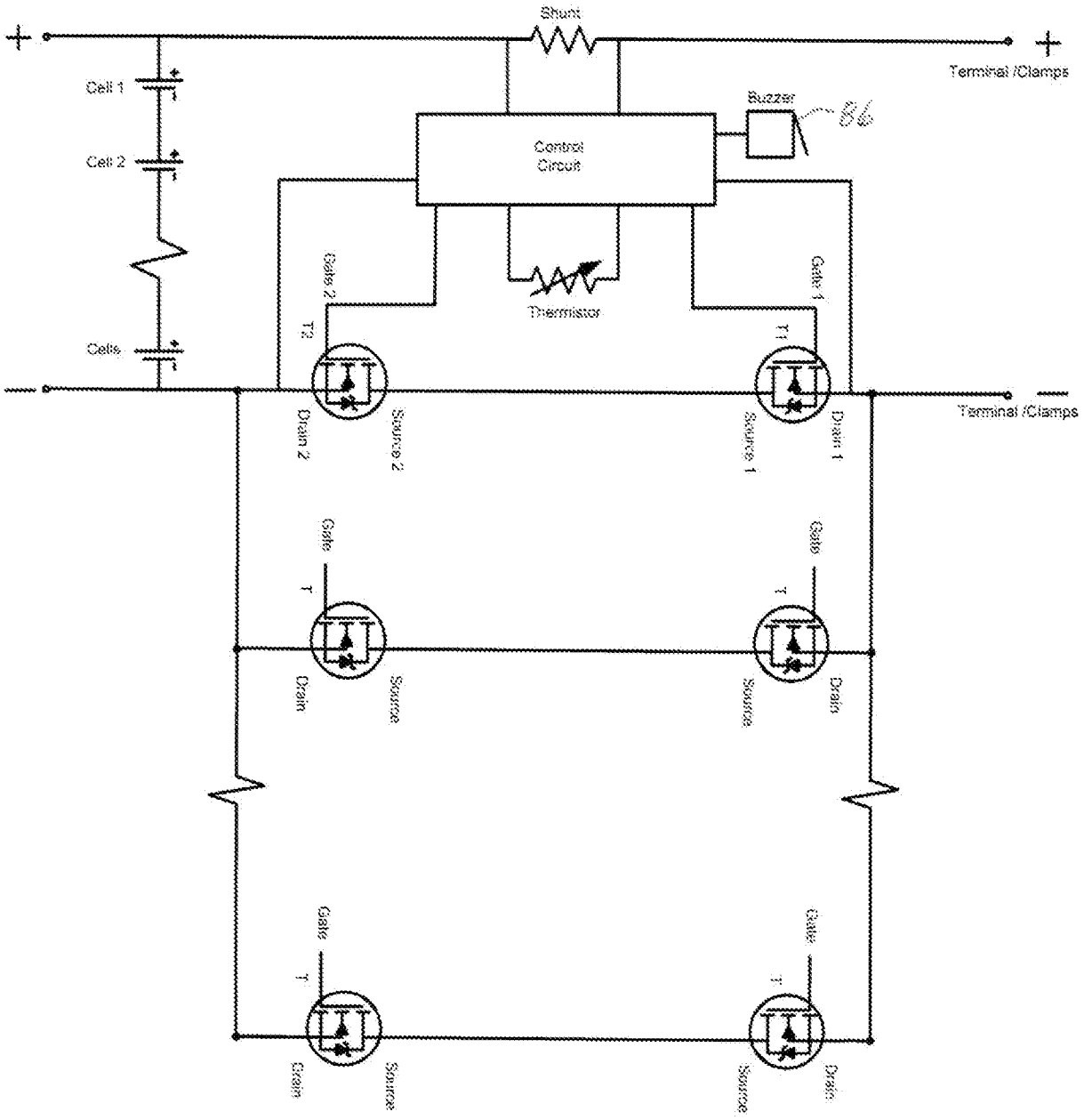

Shunt
+
Terminal /Clamps
Cell 1
Cell 2
Cells
Buzzer
86
Control Circuit
Thermistor
Gate 2
T2
Gate 1
T1
Drain 2
Source 2
Source 1
Drain 1
—
Terminal /Clamps
Gate
T
Drain
Source
Source
Drain
Gate
T
Drain
Source
Source
Drain
Gate
T
Drain
Source
Source
Drain
Gate
T

Fig. 49

Doc Code: Oath

Document Description: Oath or declaration filed

PTO/AIA/08 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

Attorney Docket Number	5094
First Named Inventor	KOEBLER, Martin
COMPLETE IF KNOWN	
Application Number	
Filing Date	
Art Unit	
Examiner Name	

■ Declaration Submitted With Initial Filing OR ☐ Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required)

LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY WITH SOLID STATE SWITCH THEREFOR

(Title of the invention)

As a below named inventor, I hereby declare that:

This declaration is directed to:

■ The attached application.

OR

☐ United States Application Number or PCT International application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Authorization To Permit Access To Application by Participating Office

☐ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/08 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☐ The address associated with Customer Number: 00162 OR ☐ Correspondence address below

Name		
Address		
City	State	Zip
Country	Telephone	Email

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available. Petitioner/applicant is advised that documents which form the record of a patent application (such as the PTO/SB/01) are placed into the Privacy Act system of records DEPARTMENT OF COMMERCE, COMMERCE-PAT-7, System name: *Patent Application Files*. Documents not retained in an application file (such as the PTO-2038) are placed into the Privacy Act system of COMMERCE/PAT-TM-10, System name: *Deposit Accounts and Electronic Funds Transfer Profiles*.

LEGAL NAME OF SOLE OR FIRST INVENTOR:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Martin KOEBLER

Inventor's Signature	Date (Optional)
Martin Koebler	March 12 2015

Residence: City	State	Country
Davidson	NC	US

Mailing Address: 630 Portside Drive

City	State	Zip	Country
Davidson	NC	28036	US

☐ Additional inventors are being named on the _____ supplemental sheet(s) PTO/AIA/10 attached hereto

PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 00162

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☐ The address associated with Customer Number:

OR

☐	Firm or Individual Name			
	Address			
	City		State	Zip
	Country			
	Telephone		Email	

Assignee Name and Address:

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Martin Koebler	Date	March 12, 2015
Name	Martin Koebler	Telephone	704-804-4464
Title	Applicant - Inventor		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR
First Named Inventor/Applicant Name:	Martin Koebler
Filer:	Ralph Dougherty
Attorney Docket Number:	5094

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Claims in excess of 20	2202	1	40	40
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**770**

Electronic Acknowledgement Receipt

EFS ID:	21762724
Application Number:	14657101
International Application Number:	
Confirmation Number:	6889
Title of Invention:	LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR
First Named Inventor/Applicant Name:	Martin Koebler
Customer Number:	00162
Filer:	Ralph Dougherty
Filer Authorized By:	
Attorney Docket Number:	5094
Receipt Date:	13-MAR-2015
Filing Date:	
Time Stamp:	13:40:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$770
RAM confirmation Number	10308
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1Application.pdf	132470 629623376b072fa3762e5b08b8df984ff25264a5	yes	36
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	28	
	Claims		29	35	
	Abstract		36	36	
Warnings:					
Information:					
2	Transmittal of New Application	Transmittal.pdf	461108 26ce169ac060dd2c59e01b8213de450b1a0abe88	no	1
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Figures1thru25.pdf	1542470 49f863b34584de2101cc5c2782644f4a8ce0b8ee	no	10
Warnings:					
Information:					
4	Drawings-only black and white line drawings	Figures26to49.pdf	1851273 e44f86f4f0d3c5bc8f7e9a1738854ee2f6b43f8c	no	14
Warnings:					
Information:					
5	Oath or Declaration filed	Declaration.pdf	873927 c846c927e359a2266660a7e87fbffc5c913c9c78	no	2
Warnings:					
Information:					
6	Power of Attorney	Power.pdf	445838 36914fe150d75afd63b3e5a151aee59711e7ce8a	no	1

Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	37021 23524a87daabc9e258a3704fb79c010094c829ec	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	5344107		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

SPECIFICATION

LITHIUM STARTER, JUMP STARTER, AND DEEP CYCLE BATTERY, WITH SOLID STATE SWITCH THEREFOR

MARTIN KOEBLER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-in-part of US Patent Application No. 13/989,273, filed May 23, 2013, and also claims the benefit of priority of the following applications: PCT Application No. PCT/US2011/001937, filed 28 November 2011; US Provisional Patent Application Serial No. 61/458,657, filed 29 November 2010; and US Provisional Patent Application Serial No. 61/463,736, filed 22 February 2011.

FIELD OF THE INVENTION

[0002] The present invention relates to an apparatus for starting an internal combustion (IC) engine. More particularly, the invention is a lithium-based cell for starting such engines. The invention includes a solid state switching configuration for high powered battery systems for protecting against over-charging, over- discharging and short circuiting of batteries, especially starter batteries for internal combustion engines (ICE). In addition, the invention is useful for powering an electric motor for starting an internal combustion engine, and as a dep cycle battery.

BACKGROUND OF THE INVENTION

[0003] Presently, internal combustion engines use a starter battery comprised of lead-acid to turn over an electric motor to start an IC engine. Lead-acid batteries are heavy, bulky, and have short

PETITIONERS Ex. 1004
267 of 304

cycle life, short calendar life, and low turn around efficiency. Lead-acid batteries also have a high internal impedance (resistance) that is greater in cold weather making it more difficult to start an IC engine in cold weather with less current available. To overcome these variables, lead-acid starter batteries are provided with oversized battery capacity in order to produce the necessary current needed for an electric starter to start an IC engine. The oversized lead-acid battery increases the weight, space requirement, and cost needed to start an IC engine.

[0004] In order to turn off power terminals in presently known starter batteries, expensive electronic/electrical components are required to handle the high current loads that a starter motor needs to turn over an IC engine. These embody electronic protection circuitry for upper voltage cut-off (overcharging), lower level voltage cut-off (over discharging) and temperature measurements. These circuits also induce heat losses and electrical losses that can be large, as well as taking up additional space. (Noise) spikes can trigger false voltage, temperature or current readings that can terminate the battery system's operation, when in fact all the cells are working within safe specifications. Some of these protection circuits are temperamental and difficult to reactivate once they have been triggered. For example, if an under-voltage condition happens and the cells are still in under-voltage condition with a relay approach, current can not be provided to the cells since a path has been broken thus another button needs to be pressed to activate the system for a short duration in order to allow the cells to charge. Also, in some cases such as a military application or racing application, every last bit of energy needs to be extracted, even if it damages the battery.

[0005] With any type of rechargeable (secondary) battery used, the battery does not operate well in a low state of charge (SOC), which in most cases is a low battery voltage. Whenever a battery

is at a low voltage level, the battery can suffer internal damage permanently or the battery life can be drastically reduced. With battery chemistries such as lithium, over- charging a battery can be even more dangerous, potentially leading to an exothermal runaway reaction, which can create a fire. With a solid state switch placed in-line with the battery output power terminals, the solid state switch can be electronically controlled to open or close the current pathway leaving or entering the battery. This can prevent battery damage from happening if the battery voltage is brought too low or too high. This can be applied to any type of battery chemistry at any voltage. An example is to apply the solid state switch to a 12V car battery that starts a vehicle. A vehicle might have a voltage drain source left on, in which case the solid state switch would automatically turn off the current flow from the battery before the battery is damaged.

[0006] A relay or contactor could be used as well, but has the following disadvantages:

1) A relay or contactor continuously needs current to keep the contactor open or closed. That requires energy to do so.

2) A relay or contactor having a closed pathway allows current to flow in both directions and can not be controlled for a single direction.

3) A relay or contactor can only be ON or OFF. During a switching process for large currents large arcing can occur inside the relay or contactor, and that can cause the relay or contactor to "weld" shut. Once a relay or contactor is welded shut, no switching can occur at that point, which can be a safety issue, i.e., by not allowing switching to occur when needed.

4) Relays and contactors are large and bulky for larger current applications.

[0007] A better approach is to use a solid state switch either a FET, a MOSFET (metal–oxide–semiconductor field-effect transistor), or IGBT (insulated gate bipolar transistor)

format, but not limited to these, in a unique configuration. The unique configuration involves connecting two solid state devices such as MOSFET or IGBT with the "Sources" or "Drains" tied together electrically. These solid state devices can be either N or P type. A doped semiconductor containing excess holes is called "p-type", and when it contains excess free electrons it is known as "n-type", where p (positive for holes) or n (negative for electrons) is the sign of the charge of the majority mobile charge carriers. This arrangement simplifies the control electronics needed and also allows current to flow in one direction but not the other with the internal diode. An FET (field-effect transistor) is a majority-charge-carrier device having an active channel through which majority charge carriers, electrons or holes, flow from the source to the drain. Source and drain terminal conductors are connected to semiconductor through ohmic contacts. The majority charge carriers enter the channel through the source and leave the channel through the drain. Figure 15 shows the "Drain" of each terminal being connected, and Figure 16 shows the "Source" of each terminal being connected.

[0008] The advantages of a solid state switch are:

1) A solid state switch needs very little energy to activate an allowed pathway to be open or close.

2) A solid state device can gradually increase current, controlling inrush current that might occur switching ON large power applications or providing instant short circuit protection if the current is too high.

3) A solid state switch can be very compact and light for higher power applications.

DESCRIPTION OF THE PRIOR ART

[0009] Applicant is aware of the following U. S. Patent concerning battery packs for starting

engines:

US Patent No.	Issue Date	Inventor	Title
7,525,287	April 28, 2009	Miyashi	BATTERY PACK FOR DRIVING ELECTRIC MOTOR OF COMPACT ENGINE STARTING DEVICE, ENGINE STARTING DEVICE DRIVEN BY THE BATTERY PACK, AND MANUAL WORKING MACHINE HAVING THE ENGINE STARTING DEVICE

SUMMARY OF THE INVENTION

[0010] The invention provides means for increasing the efficiency of a starter battery for a starter motor of an internal combustion engine. By replacing a lead-acid starter battery with a lithium base or lithium-iron-phosphate ($LiFePO_4$ or LiFePO) or $LiFeMgPO_4$ or $LiFeYPO_4$ cell, the needed capacity, weight and size is drastically reduced while increasing the cycle life, calendar life and turn around efficiency for a starter battery. The lithium iron phosphate ($LiFePO_4$) cell is a type of rechargeable cell, specifically a lithium ion cell, which uses $LiFePO_4$ as a cathode material. It may also include magnesium or yttrium in the lithium iron compound. Connecting four cylindrical cells in series, each of which has a standard industry cell format size of both 18650 (less than 3Ah) or 26650 (less than 4Ah), or prismatic flat or other type cells, enough current is available to penetrate to a starter motor rated for 12V system to start large IC engines that use 1, 2, 3, 4, 5, 6, 8, or 12 cylinders. Larger cells may be utilized in the invention, from 1 Ah to 5000 Ah, common sizes being 5Ah, 10Ah, 20 Ah, 50Ah, 100Ah, 400Ah, and 500 Ah.

[0011[With a configuration of 4 cells in series, no protection circuit board is needed to protect the individual cells from over-voltage or undervoltage, unlike larger system using more cells which require a protection circuit board in them for safety protection. Individual cell balancing is also

not needed for such a small starter battery but may be included to increase the product life. A smaller and lighter starter battery increases the performance of mobile systems that use starter batteries. The resulting increase of cycle life and calendar life reduces user costs.

[0012] No separate nor special charging system is needed with the invented system

[0013] The invention also comprises a housing for the lithium-based cells, with upper and lower mating casings, a contoured pad within the lower casing for receiving at least one lithium-based cell, and electrical connections from the at least one lithium-based batter to the exterior of the housing. Optionally, an upper battery pad may be placed in the upper casing, and, if desired, a protection circuit board, such as a balancing board or a cut-off circuit, may be placed within the upper casing for safety protection.

[0014] The invented solid state switch apparatus allows current to flow in one direction and not the other. A minimum of two solid state switches are arranged in a unique configuration, which allows current to flow in a controlled manner bidirectionally when needed. This is particularly useful for preventing overcharging or over- discharging an entire battery pack. A separate cell balancing circuit is used to balance out the individual cells. The solid state switch can be used on each individual cell, if desired, to prevent overcharging or over-discharging of the individual cell. It can be used with any battery application in which charging and discharging is required, and is particularly useful with lithium-based batteries. It can also be used with lead-acid batteries, nickel-cadmium (NiCd) batteries, and low self-discharge nickel metal hydride (NiMH) batteries. More sophisticated items of equipment to which a battery may be attached have programmable shut-off settings, but less sophisticated equipment does not have shut-off parameters in place. Using a

battery in a starter applications (for instance, to start an IC engine) will prevent the battery from overcharging, as well as prevent the battery from being discharged to too low a level if a current drain (leakage) is present in the system, even though everything is turned off.

[0015] By connecting the "Sources" or the "Drains" together using a minimum of two solid state devices allows for automation and simplification to fully and partially switch the batteries power terminals ON and OFF. The two solid state devices can either be N or P type and connected either on the Positive or Negative side of the battery terminal and controlled by simple electronic circuit to control the drivers of the solid state devices.

[0016] This invented switch configuration also allows for short circuit protection across the battery power terminals, along with allowing the maximum current control when charging.

OBJECTS OF THE INVENTION

[0017] The principal object of the present invention is to provide means for increasing the performance of a starter battery for a starter motor of an internal combustion engine.

[0018] Another object of the invention is to provide a starter battery for an internal combustion engine that is lighter, more reliable, has less bulk, longer cycle life, longer calendar life, and higher turn around efficiency than lead-acid batteries.

[0019] A further object of this invention is to provide a starter battery system for an internal combustion engine that is easy to assemble, waterproof, and maintenance free.

[0020] Another object of the invention is to provide a starter battery for an internal combustion engine that can be used in existing vehicles.

[0021] Another object of the invention is to provide a starter battery for an internal combustion engine that has a wide operating temperature range with exceptional cold-weather cranking performance.

[0022] Another object of the invention is to provide an improved apparatus for protecting a single cell or battery from being overcharged or over-discharged.

[0023] Another object of the invention is to provide apparatus for charging a cell having a very low charge.

[0024] Another object of the invention is to provide apparatus for short circuit protection for one or more cells or batteries.

[0025] Another object of the invention is to provide apparatus for discharging a cell having too high a charge.

[0026] A further object of the invention is to provide an apparatus for short circuit protection in case a metal object causes a short circuit across the terminals.

[0027] Another object of the invention is to provide a jump starter for internal combustion engines of all sizes, including large engines such as those used in over the road tractors (18 wheelers), compressors, and generators.

[0028] Another object of the invention is to provide a deep cycle battery for use in wheel chairs, boats, hospital beds, campers and recreational vehicles, golf carts, and solar panels for remote areas.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The foregoing and other objects will become more readily apparent by referring to the following detailed description and the appended drawings in which:

[0030] Figure 1 is an exploded isometric view of one embodiment of the invention, in which 4 cells are arranged into a starter battery pack.

[0031] Figure 2 is an exploded isometric view of another embodiment of the invention, in which 8 cells are arranged into a starter battery pack.

[0032] Figure 3 is an exploded isometric view of another embodiment of the invention, in which a prismatic cell is arranged into a starter battery pack.

[0033] Figure 4 is a front view of the assembled battery pack of Figure 3, the rear view being identical.

[0034] Figure 5 is a top view of the assembled battery pack of Figure 3.

[0035] Figure 6 is a right end view of the assembled battery pack of Figure 3, the left end view being a mirror image thereof.

[0036] Figure 7 is a schematic diagram of a block of 4 lithium prismatic cells in series connected to a balancing circuit board.

[0037] Figure 8 is a schematic diagram of a block of 4 lithium prismatic cells in series connected to a balancing and cutoff circuit board

[0038] Figure 9 is an isometric view of an alternative embodiment of a housing showing contacts for switches.

[0039] Figure 10 is a top view of the housing of Figure 9 showing the contact locations.

[0040] Figure 11 is a front view of the housing of Figure 9, the rear view being identical.

[0041] Figure 12 is an end view of the housing of Figure 9, the opposite end being identical.

[0042] Figure 13 is an exploded isometric view of an alternative embodiment of the invention of Figure 3, in which 2 blocks of prismatic cells and a control board of cutoff switch are arranged into the housing of Figure 9.

[0043] Figure 14 is a schematic diagram of a Solid State Switch with "Drain" connection.

[0044] Figure 15 is a schematic diagram of a Solid State Switch with "Source" connection.

[0045] Figure 16 is a schematic diagram showing a preferred embodiment of the invention in which the "Drain" of each gate is connected together using N type MOSFET or IGBT with the cells being above the solid state switches.

[0046] Figure 17 is a schematic diagram example of connecting the "Drain" of each gate together using N type FET, MOSFET, or IGBT with the cells being below the solid state switches.

[0047] Figure 18 is a schematic diagram illustrating connecting the "Source" of each gate together using N type FET, MOSFET or IGBT with the cells being above the solid state switches.

[0048] Figure 19 is a schematic diagram illustrating connecting the "Source" of each gate together using N type FET, MOSFET or IGBT with the cells being below the solid state switches.

[0049] Figure 20 is a schematic diagram illustrating connecting the "Drain" of each gate together using P type FET, MOSFET or IGBT with the cells being above the solid state switches.

[0050] Figure 21 is a schematic diagram illustrating connecting the "Drain" together using P type FET, MOSFET or IGBT with the cells being below the solid state switches.

[0051] Figure 22 is a schematic diagram illustrating connecting the "Source" together using P type FET, MOSFET or IGBT with the cells being above the solid state switches.

[0052] Figure 23 is a schematic diagram illustrating connecting the "Source" together using P type FET, MOSFET or IGBT with the cells being below the solid state switches.

[0053] Figure 24 is a schematic diagram illustrating the invention utilized in engine restarting.

[0054] Figure 25 is a schematic diagram illustrating short circuit protection of a battery.

[0055] Figure 26 is a schematic diagram illustrating a circuit with diodes on the negative side to prevent overcharging of a battery.

[0056] Figure 27 is a schematic diagram illustrating an alternative circuit with diodes on the positive side for preventing battery overcharging.

[0057] Figure 28 is a schematic diagram illustrating another alternative circuit for preventing battery overcharging, utilizing a series of relays on the negative side..

[0058] Figure 29 is a schematic diagram illustrating another alternative circuit for preventing battery overcharging, utilizing a series of relays on the positive side..

[0059] Figure 30 is an isometric drawing of a battery clamping arrangement with a diode in one lead and a fuse in the other lead to prevent overcharging of a battery.

[0060] Figure 31 is an isometric drawing of a battery clamping arrangement with a diode in one lead to prevent overcharging of a battery.

[0061] Figure 32 is an isometric drawing of a battery clamping arrangement with both leads connected to a MOSFET arrangement to prevent overcharging of a battery

[0062] Figures 33 through 40 are schematic diagrams illustrating circuits having various MOSFET arrangements for providing under-voltage protection to a battery.

[0063] Figure 41 through 48 are schematic diagrams illustrating circuits having various MOSFET arrangements for providing under-voltage protection to a battery.

[0064] Figure 49 is a schematic control circuit diagram illustrating short circuit protection, as well as protection from reverse polarity, high temperature, overvoltage, over-discharge voltage, and having an audible alarm.

DETAILED DESCRIPTION

[0065] Lithium containing LiFePO, $LiFePO_4$, $LiFeMgPO_4$, and $LiFeYPO_4$ cells have a low nominal cell voltage (3.2V-3.3V) that match directly with existing 12V lead-acid equivalent systems. Four LiFePO cells in series have a nominal voltage of 13.2V. Thus they can directly replace existing 12V lead-acid equivalent systems without requiring any electrical modification.

[0066] Other lithium chemistries have a higher nominal voltage, such as: lithium-cobalt (3.6V), lithium-manganese (3.7V-3.8V), lithium-nickel-cobalt-manganese (3.7V). Each of these thus have

a higher system voltage when 4 cells are used in series. With the higher cell voltages, most existing 12V direct replacement systems will not be able to charge other lithium cell chemistries above 60% of their capacity. Other lithium-based cells that can be utilized in this invention are lithium-cobalt-oxide ($LiCoO_2$), lithium-manganese-oxide ($LiMn_2O_4$), lithium-nickel-cobalt-manganese-oxide ($LiNiCoAlO_2$), lithium-nickel-manganese-cobalt-oxide ($LiNiMnCoO_2$), and lithium-titanate ($Li_4Ti_5O_{12}$).

[0067] LiFePO, $LiFePO_4$, $LiFeMgPO_4$, and $LiFeYPO_4$ cells also have a higher thermal runaway condition than lead-acid cells. For a thermal runaway to occur, the cell temperature must be extremely hot (over 200°C). When a cell reaches a certain temperature, mostly caused by overcharging, then the cell will start producing more heat by an internal reaction that fuels itself in most cases with a fire, which phenomenon is known as "thermal runaway". All other Lithium cell chemistries have a lower thermal runaway temperature making those cells more prone to catch on fire.

[0068] A thermal venting cap is usually placed inside each individual cylindrical cell casing to minimize the chances of explosion. The venting cap allows the electrolyte of a cell to leak out before an internal fire can occur.

[0069] Although it is advantageous to use protective circuitry, it is possible to operate the present invention without protective circuitry, which simplifies the system to allow charging or discharging. Omitting all of the electronic protection circuitry for upper voltage cut-off (overcharging), lower level voltage cut-off (over discharging) and temperature measurements reduces the overall manufacturing cost of the starter battery. This also simplifies the system to

allow charging or discharging in all conditions and not be restricted by any suggested or specified operating range.

[0070] By using lithium cells, a battery housing structure is both smaller and lighter than with lead-acid cells. Any time less internal mass is involved the housing structure size can be reduced, which also results in reducing cost.

[0071] The housing structure of the embodiment of Figures 1 and 2 may vary in depth to accommodate varying numbers of cells which provides for different capacity. The lid structure of the housing (or casing) for cylindrical cells is the same for most battery packs, as shown. Such cells can be stacked in parallel to allow for larger capacity for different battery packs to be assembled. The lid of the housing also incorporates a threaded bushing made from aluminum to minimize weight, but that has similar electrical properties to aluminum, copper or brass, or an internally threaded hole to receive an electrical connector screw.

[0072] Referring now to the drawings, and particularly to Figure 1, the invented battery pack 10 comprises a housing12, having a lower receptacle 14 and a mating top 16, at least one lithium-based rechargeable battery 18, or cell, within the housing, with appropriate electrical connections. The total discharging amount of each lithium-based cell in the battery pack is one (1) to 5000 Ah, and charging voltage per one cell is 3.0 to 4.2 V.

[0073] The lower portion of the housing 16 can be provided with bottom padding 20 which fits therein, receives the cell or cells, and mates with the lower receptacle 14. A top pad 22 can be provided in the top 16 of the housing, as desired.

[0074] Electrical connections 24 are provided between the cells, as shown, positive to negative, with screws 26 connecting the cells through holes 28 the bottom of the housing to electrical leads, not shown, but which leads connect to bottom screws 30. Alternatively, a welded connection can be used instead of screws.

[0075] Optionally, a protection circuit board 32 may be placed within the upper casing or top 14 for safety protection. Such a protection circuit board may be a cutoff board or a cell-balancing circuit board. A cell-balancing circuit board may include a cutoff function. A lithium iron battery having two or more cells in series has a battery voltage equal to the sum of the individual cell voltages. Over the life of the battery, it may be charged and discharged for hundreds or thousands of cycles. The individual cells may age differently. Some cells may become mismatched with respect to the others. This phenomenon is corrected, by balancing. Balancing is the process of forcing all of the cells to have identical voltages. This is accomplished by a balancing circuit.

[0076] Starter battery systems can utilize a greater number of lithium cells as desired for greater capacity.

[0077] Lithium cells have substantially less weight than a lead-acid cell, and are 80% smaller. A lithium cell will last about 3 times as long as a lead-acid cell with 100% full discharge cycles. Lithium cells are maintenance free, whereas lead-acid cells need to be refilled with distilled water to maintain the acid level above the plates. Lithium cells do not freeze. They have a discharge power 8 times that of lead-acid. Their charging time is less than 2 hours.

[0078] Lithium cell self discharge rate is less than 2% monthly, whereas the self discharge rate for a lead-acid cell is 10% monthly.

[0079] Lithium cells can operate at very high temperature, up to 70°C without major degradation. They can also operate at very low temperature, down to -30°C with slight capacity degrade at that temperature, but power is available.

[0080] Lithium cells are 98% energy efficient (energy going in and out of the cell), whereas lead-acid cells are only 90% energy efficient.

[0081] For each 12 volt increment, four $LiFePO_4$ cells are required in series, and some cases fewer cells with other lithium chemistries. The following Table compares the lead-acid battery voltages to the $LiFePO_4$ cell requirements and for other lithium-based battery cells:

TABLE I

Nominal Lead-Acid Voltage	$LiFePO_4$ (3.3V nominal)	($LiCoO_2$), ($LiMn_2O_4$), ($LiNiCoAlO_2$), ($LiNiMnCoO_2$), or ($Li_4Ti_5O_{12}$) (3.7V nominal)
12V	3 to 4 cells in series	2 to 4 cells in series
24V	5 to 9 cells in series	5 to 8 cells in series
36V	8 to 13 cells in series	7 to 12 cells in series
48V	11 to 17 cells in series	10 to 16 cells in series
60V	14 to 22 cells in series	12 to 19 cells in series

72V	16 to 26 cells in series	15 to 23 cells in series
84V	19 to 31 cells in series	17 to 27 cells in series
96V	22 to 35 cells in series	19 to 31 cells in series
108V	25 to 39 cells in series	22 to 35 cells in series
120V	27 to 44 cells in series	24 to 39 cells in series

[0082] As shown in Figures 3 through 6, a block 40 formed of one or more flat prismatic cells connected in series is fitted into a housing 12, each block of cells having a common set of electrical connections 42A and 42B. A protection circuit board 30 is provided within the housing, and is electrically connected to the block. Figures 4 through 6 show the assembled housing with the electrical connections 24A and 24B in the top thereof.

[0083] Figure 7 shows a block of 4 flat lithium based prismatic cells connected to a balancing circuit board 46, which has a balancing controller or microprocessor 60. Figure 8 shows a block of 4 flat prismatic cells connected to a balancing and cutoff circuit board 48, which includes a controller 60 and a solid state cutoff switch 62, such as an FET. Figures 9 through 12 show the housing 12 for the battery pack 10 with positive terminal 34 and negative terminal 36.

[0084] Figure 13 shows multiple blocks 40 of flat cells along with bottom padding, packing, or spacers 50, flat packing 52, and large packing blocks 54, all of which packing is optional. The upper portion or top section 56 of the housing is advantageously provided with three contacts on each end thereof, as shown.

[0085] An auto-detect restart feature is especially useful for a motorcycle: "IQ Restart technology" protects the battery from a deep cycle discharge by monitoring battery voltage level and shutting the battery power off prior to a full discharge, such as in the case of leaving a headlight or electrical component on for an extended period of time while the engine is off. Enough reserve power is left in the battery, to automatically detect (by measuring a change in resistivity) a starting effort and allow the user to start the engine again. This avoids the cyclist being stranded or the headache of replacing a battery. The auto-detect apparatus has at least one lithium-based cell, a voltage detector, an associated switch such as a cutoff board, or a micro-controller in a balancing circuit connected to a solid state switch, such as an FET. One function turns off an FET in the circuit when the voltage drops to a preselected level, leaving sufficient reserve capacity for starting the engine. A second function detects a "keying cycle" or the resistance change upon attempting to start the engine, which turns on the FET. This resistance change is a reaction to a key turn, push button, or remote activator.

[0086] To control the solid state switches, electronic controls are needed for the different voltages, currents and/or temperature with specified parameters in which cells work to prevent damage. The control electronics used in battery systems are often referred to a Battery Management System (BMS) or Battery Management Unit (BMU). The BMS or BMU can individual monitor all the cell or battery voltages, and/or temperatures. To protect a single cell or battery from being over charged, that might lead to an exothermal runaway reaction creating a fire and/or to prevent the cell from damaging when discharging them too low, the solid state switch would close or open the current pathway to prevent cell damage from occurring.

[0087] The arrangement of devices shown in Figures 15 and 16 are examples of how solid state switches can be configured to connect the "Drains" or "Sources" together which is an unconventional approach. The solid state switches in parallel are examples to increase the current capabilities.

[0088] Referring particularly to Figure 17, under normal operations both T1 and T2 are ON allowing power pathway to go in both directions: discharge and charge. Should a cell be outside of its specified working specification (cell voltage), both D1 and D2 can be turned off but current can still flow through the internal diode to allow for added functionality.

[0089] In the event that the cell voltage drops too low, below the set voltage configuration, from a drain on the battery, T1 will turn off, preventing further discharge from occurring. However, with the internal diode in place of T1, and T2 still on, the circuit will allow charging to occur.

[0090] If the cell voltage goes too high, above the set voltage configuration, T2 will turn off, preventing further over charging from occurring. However, with the internal diode in place of T2, and T1 still on, the circuit will allow discharging to occur.

[0091] Using solid state switching in the configuration shown in Figure 17 allows for user friendly reactivation of the circuit without any pushbuttons or reset buttons. Both Charge and Discharge current can go through the internal MOSFET or IGBT diode to bring the cell back to the specified operating voltage.

[0092] Alternative switch and gate arrangements are set forth in Figures 18 through 23. Each such arrangement works in a similar manner as that describing the Figure 17 operation.

[0093] The invention's restart function is illustrated by Figure 24. Controller 60 is connected to a battery pack having a block of cells 64 and to MOSFETs Q1 and Q2. After a low voltage cutoff, the controller periodically tests the load to detect a change in the load impedance. When an abrupt change in the load impedance is detected, for example connecting or disconnecting a load such as the headlight(s), the ignition switch, or the starter switch, the controller 60 turns on power MOSFETs Q1 and Q2, which reconnects the battery to the vehicle and allows the vehicle to be restarted.

[0094] When the controller drives the base of Q3 high through R1, Q3 and Q4 turn on. When Q4 turns on, it connects the battery to the load through R4 and D1. R4 and the load impedance form a voltage divider, and the resulting voltage at node A will depend on the load impedance. D2 steers the node A voltage to the R5/R6 voltage divider which scales down the voltage at node B to a level that the controller can read using an analog-to-digital converter (ADC). The ADC may be of the type commonly included as a built-in peripheral in a micro-controller or a digital signal processor; alternatively the ADC may be a standalone device. After turning on Q4, the controller may make one or more ADC readings after one or more fixed or variable delay periods. By reading the ADC at different times after turn-on, the controller can infer not only the resistive, but also the inductive and/or capacitive components of the load impedance. By tracking the periodic ADC readings and applying the appropriate digital filtering, abrupt changes in the load impedance can be determined. Gradual changes in the ADC readings, which may be caused for example by temperature changes or battery charge depletion, are disregarded (i.e., filtered out). Immediately

after making the required ADC reading(s) the Controller turns off Q3 and Q4 to minimize battery drain. It should be noted that while Q3 and Q4 are shown here as bipolar junction transistors, a number of other types of electronic devices could be used to accomplish the switching function of Q4, including but not limited to one or more MOSFETs or a relay.

[0095] In order to conserve battery charge as long as possible in low voltage cutoff mode, the controller tests the load impedance only as often as necessary. The testing period is determined by the application, and is approximately 1 to 5 seconds. In a vehicle application, this period represents the maximum time that a user would have to hold a starter switch in the start position in order to effect a restart after a low voltage cutoff. To further reduce drain on the battery, the testing period may be extended if the battery remains in low voltage shutdown mode for a long time, or if the battery voltage (in one or more cells) continues to drop.

[0096] The invention is useful for short circuit protection as shown in Figure 25. Cross-coupled NAND gates E and F form a set-reset (SR) latch that controls the gate drive of power MOSFET Q2. The latch is set when the controller 60 drives Q2 ENABLE low. When Q2 ENABLE is driven high again, the output of NAND gate G is low and NAND gate H turns on Q3, which turns on Q4, which supplies the boosted gate drive voltage to turn on Q2. C3 and C4 help ensure fast turn-on of Q2 even with the relatively high value resistors for R4, R5, and R8 required to satisfy the application's low power requirements.

[0097] Current monitor A monitors the voltage drop across the drain-source ON resistance ($R_{DS(on)}$) of power MOSFET Q1 and sources a current into node B that is proportional to the MOSFET current. R1 converts this current to a voltage that is compared to VREF at comparator

D. When a short circuit occurs, the voltage at node B will exceed VREF (at least momentarily) and cause the output of D to go low, resetting the S-R latch. When the S-R latch is reset the output of G will go high, and C2 will differentiate a positive going pulse into the base of Q5, causing Q5 to turn on for a few microseconds and rapidly discharge the gate of Q2. Rapid turn-off of Q2 is essential to limiting the energy associated with a short circuit event. By monitoring the status of the S-R latch, the controller 60 can determine when a short circuit cut-off event has occurred. C1 low pass filters the signal at node B so that extremely short duration overcurrent conditions can be tolerated if desired. The controller 60 may adjust VREF to compensate for Q2's $R_{DS(on)}$ variation with temperature if desired, or to adjust the over current trip threshold.

[0098] The solid state switches can be transistors, FET (field-effect transistors), JFET or JUGFET (junction gate field-effect transistors), BJT bipolar junction transistors, CMOS (complementary metal–oxide–semiconductors), VMOS (Vertical Metal Oxide Silicon), TMOS transistors, vertical DMOS (Double-Diffused MOS), or HEXFET.(hexagonal shape MOSFET).

[0099] It should be noted that the invented solid state switch apparatus can also be used in any battery system that requires charging and discharging in order to extend the battery life, and for safety. This is extremely useful and is a first for starter batteries.

[0100] The solid state devices all need to be the same (N) or (P) type used in the same circuit, as illustrated.

[0101] The present invention is a battery pack for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system.

The battery pack consists of a battery pack housing and at least one lithium-based rechargeable cell within the housing. A total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and the charging voltage per single cell is 2.0 to 4.2 V. Preferably, the battery pack consists of from three to sixteen lithium-based rechargeable cells in series in the battery housing.

[0102] The following Table shows the peak current developed at room temperature in amperes per pound of lithium cell weight at the indicated amp-hour (Ah) capacities of the lithium battery. The peak current is less at lower temperatures.

TABLE 2

Capacity	Lithium Cell Weight	Peak Current
1 Ah	0.17 lb	160 A
2Ah	0.5 lb	400A
4Ah	0.7 lb	600A
8Ah	1.5 lbs	1200A
15Ah	3.3 lbs	2400A

[0103] The circuit arrangement shown in Figure 26 prevents overcharging of a battery, as the diode 66 on the positive side allows the lithium battery to be discharged. The circuit of Figure 27 has the diode 68 on the negative side, which allows the lithium battery to discharge, but not to accept a charge from battery clamps 72 (See Figure 30). In either of these circuits, multiple diodes may be used in parallel.

[0104] The circuits of Figures 28 and 29 utilize relays 70 in the place of diodes, and operate generally in the same manner as the circuits of Figures 26 and 27. Relays can prevent acceptance

of a charge, and prevent discharging to an unacceptably low level.

[0105] Figure 30 shows jumper cables 74 with attached battery clamps 72 for starting (or jump starting) an engine, the cables being connectable to a lithium battery pack by a connector 76, with one cable having a diode within it, and the other cable containing a fuse. This prevents back charging of the lithium battery from the output of an alternator or magneto after an engine is started. Figure 31 shows an alternative jumper cable arrangement in which there is no fuse. Figure 32 shows a jumper cable arrangement in which MOSFETs 82 are employed within the cable housing, which can be in any electrical configuration shown in Figures 14 through 23.

[0106] When undervoltage protection is desired, the circuit of Figure 33 may be utilized, with either a single MOSFET or multiple MOSFETs in parallel. Figures 34 through 40 show alternative circuits with different source and drain arrangements to provide the same protection. Multiple lithium based cells are shown in Figures 26 through 29 and in Figures 33 through 49 which form battery pack 10 as depicted in Figure 35.

[0107] When overvoltage protection is desired, the circuit of Figure 41 may be utilized, with either a single MOSFET or multiple MOSFETs in parallel. Figures 42 through 48 show alternative circuits with different source and drain arrangements to provide the same protection.

[0108] The invention also comprehends a jump starter battery pack for driving a battery device in a 12 volt to 120 volt internal combustion engine, the battery pack being situated in a battery pack housing, and having at least one lithium-based rechargeable cell within the housing, the total discharging amount of each lithium-based cell in the battery pack being from three (3) Ah to 5000

Ah, and charging voltage per one single cell being 3.0 to 4.2 V, a pair cables, each cable having a cable housing in which it is situated, one end of each cable being provided with and being connected to a respective terminal clamp, the opposite end of each cable having a connector for connecting to the battery pack, and at least one of a solid state switch, MOSFET, diode, or relay being situated within one of the cable housings.

[0109] As shown in Figure 49, short circuit protection can be provided by the control circuit depicted. An audible alarm such as a buzzer can be provided, which will sound when the lithium base battery is outside its operating range of either voltage or temperature. This circuit will protect against reverse polarity, overvoltage, over-discharge voltage, and excessively high temperature by opening the circuit to terminate the charging. Either single MOSFETs can be employed, or multiple MOSFETs in parallel. There are 8 different configurations that can be employed in this circuit, with with either the Sources or Drains connected using either the N type or P type MOSFETs. Using different types of MOSFETs requires them to be either on the Positive or Negative side of the battery. Figures 16 through 23 show the variations of the control circuit board, which can be located within either the battery housing or the cable housing.

[0110] Figure 35 indicates that the battery pack 10 includes only the lithium based cells, whereas Figure 36 shows that the battery pack 10A includes one or more solid state switches within the battery pack. The solid state switches can also be located within a cable housing, or connected to a cable.

[0111] The invention also comprehends a deep cycle battery for use in wheel chairs, boats, hospital beds, campers and recreational vehicles, golf carts, solar panels for remote areas, and

other uses. A deep cycle battery in a 6 volt to 800 volt operating system consists of a battery pack housing, at least one lithium-based rechargeable cell within the housing, and a battery management system including a processor and a circuit board which includes at least one of a solid state switch, MOSFET, diode, or relay, the arrangement of which protects against at least one of overvoltage, undervoltage, reverse polarity, and extremes of temperature. A total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and the charging voltage per one cell is 2.0 to 4.2 V. The lithium-based cell can be any of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells. The deep cycle battery can have from two to 250 lithium-based rechargeable cells in series in one or more of said housings.

[0112] It should be noted that MOSFETs can function as solid state switches having an ON/OFF function. MOSFETs, diodes, and relays can be positioned in a battery housing, as well as in a cable housing.

SUMMARY OF THE ACHIEVEMENT OF THE OBJECTS OF THE INVENTION

[0113] From the foregoing, it is readily apparent that I have invented an improved means for increasing the performance of a starter battery for a starter motor of an internal combustion engine, and a starter battery for an internal combustion engine that is lighter, more reliable, has less bulk, longer cycle life, longer calendar life, and higher turn around efficiency than lead-acid batteries. The starter battery system for an internal combustion engine is easy to assemble, waterproof, and maintenance free, can be used in existing vehicles, and has a wide operating temperature range with exceptional cold-weather cranking performance. The invention also apparatus for protecting a

single cell or battery from being over charged, as well as providing apparatus for charging a cell having a very low charge, more effectively, and more economically than heretofore has been possible.

[0114] It is to be understood that the foregoing description and specific embodiments are merely illustrative of the best mode of the invention and the principles thereof, and that various modifications and additions may be made to the apparatus by those skilled in the art, without departing from the spirit and scope of this invention, which is therefore understood to be limited only by the scope of the appended claims.

What is claimed is:

1. A battery pack for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system, said battery pack comprising:

a battery pack housing; and

at least one lithium-based rechargeable cell within said housing;

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

2. A battery pack according to claim 1 wherein the lithium-based cell is selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

3. A battery pack according to claim 1, wherein said battery pack comprises from three to sixteen lithium-based rechargeable cells in series in said housing.

4. A battery pack according to claim 1, further comprising a protection circuit board within said battery housing, said protection circuit board including at least one of a solid state switch, MOSFET, diode, or relay, which protects against temperature, reverse polarity, undervoltage or overvoltage.

5. A battery pack according to claim 1, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

6. Apparatus according to claim 5, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

7. Apparatus according to claim 5, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

8. A battery pack according to claim 1, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

9. Apparatus according to claim 8, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

10. Apparatus according to claim 8, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

11. Apparatus according to claim 1, wherein the operating system of said internal combustion engine includes a battery, said apparatus further comprising a pair cables, each cable situated in a cable housing, one end of each cable connecting to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack, and at least one of a MOSFET, diode, or relay being situated within one of said cable housings.

12. A deep cycle battery in a 6 volt to 800 volt operating system, comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing;

a battery management system including a processor and a circuit board having a MOSFET arrangement which protects from one of overvoltage, undervoltage, reverse polarity, short circuit, and extremes of temperature;

wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.

13. A deep cycle battery according to claim 12 wherein the lithium-based cell is selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, and $Li_4Ti_5O_{12}$ cells.

14. A deep cycle battery according to claim 12, wherein said battery comprises from two to 250 lithium-based rechargeable cells in series in one or more of said housings.

15. A deep cycle battery according to claim 12, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the positive pole of said one or more cells in series, and to said positive terminal, the negative pole of said one or more cells being connected to said negative terminal.

16. Apparatus according to claim 15, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

17. Apparatus according to claim 15, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$ $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

18. A deep cycle battery according to claim 12, further comprising a solid state switching apparatus for one or more of said lithium based cells in said battery pack encased in said battery pack housing, said battery pack having a positive terminal and a negative terminal, each of said cells having a positive pole and a negative pole, said apparatus comprising:

at least one solid state switch within said battery pack housing, such switch being connected between the battery pack and a terminal;

said solid state switch being connected to the negative pole of said one or more cells in series, and to said negative terminal, the positive pole of said one or more cells being connected to said positive terminal.

19. Apparatus according to claim 18, wherein the solid state switches are transistors, FET, MOSFET, IGBT, JFET, BJT, CMOS, VMOS, TMOS, vertical DMOS or HEXFET.

20. Apparatus according to claim 18, wherein said one or more cells are selected from the group consisting of LiFePO, $LiFePO_4$, $LiFeMgPO_4$, $LiFeYPO_4$, $LiCoO_2$, $LiMn_2O_4$, $LiNiCoAlO_2$, $LiNiMnCoO_2$, $Li_4Ti_5O_{12}$, lead-acid, NiCd, and nickel metal hydride (NiMH) batteries.

21. A battery pack for driving a battery device in a 12 volt to 120 volt internal combustion engine, said battery pack comprising:

a battery pack housing;

at least one lithium-based rechargeable cell within said housing, the total discharging amount of each lithium-based cell in the battery pack being from three (3) Ah to 5000 Ah, and charging voltage per one cell being 3.0 to 4.2 V;

a pair cables, each cable having a cable housing in which it is situated;

one end of each cable being provided with and connected to a respective terminal clamp, the opposite end of each cable having a connector for connecting to said battery pack; and

at least one of a solid state switch, MOSFET, diode, or relay being situated within one of said cable housings.

ABSTRACT OF THE DISCLOSURE

[0115] Apparatus for increasing the efficiency of a starter battery for a starter motor of an internal combustion engine in a battery pack arrangement with one or more lithium based cells. The invention includes a solid state switching configuration for high powered battery systems for protecting against over-charging, over-discharging and short circuiting of batteries, especially starter batteries for internal combustion engines. The invention is also useful as a Deep Cycle battery.

SCORE Placeholder Sheet for IFW Content

Application Number: 14657101 Document Date: 03/13/2015

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions below.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (http://Score.uspto.gov/ScoreAccessWeb/).
- External customers may access SCORE content via the Public and Private PAIR interfaces.

Form Revision Date: September 30, 2013

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/657,101	Filing Date 03/13/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☒ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	**70**
☒ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	**300**
☒ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	**360**
TOTAL CLAIMS (37 CFR 1.16(i))	21 minus 20 =	* 1	x $40 =	**40**
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	* 0	x $210 =	**0**
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	**770**

APPLICATION AS AMENDED – PART II

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LDRC
/EVA GILLIS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.