AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas - Midland-Odessa Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
7:26-cv-00100	3/23/2026	Western District of Texas - Midland-Odessa Division

PLAINTIFF	DEFENDANT
ChargeLogic LLC	Tesla, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,090,567	10/2/2018	ChargeLogic LLC
2	11,258,107	2/22/2022	ChargeLogic LLC
3	11,721,844	8/8/2023	ChargeLogic LLC
4	11,508,996	11/22/2022	ChargeLogic LLC
5	11,909,010	2/20/2024	ChargeLogic LLC

In the above---entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 11,909,011	2/20/2024	ChargeLogic LLC
2		
3		
4		
5		

In the above---entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

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.
12/737,803	10/02/2018	10090567		2226

7590 09/12/2018

CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

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 646 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):

Christopher B. Austin, Grafton, WI;

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
12/737,803	02/17/2011	2859	525		20	3

CONFIRMATION NO. 2226

CORRECTED FILING RECEIPT

CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

OC000000102083232

Date Mailed: 09/05/2018

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)

Christopher B. Austin, Grafton, WI;

Applicant(s)

Christopher B. Austin, Grafton, WI;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/US09/54174 08/18/2009
which claims benefit of 61/189,353 08/18/2008

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: 03/02/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/737,803**

IPR2026-00377
Tesla EX1002 Page 3

Projected Publication Date: Not Applicable

Non-Publication Request: No

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

VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

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).

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Tesla EX1002 Page 4

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.

Receipt date: 02/17/2011

IAP03Rec'd PCT 17 FEB 2011
12737803 - GAU: 2859

PTO/SB/08A

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.

Substitute for form 1449/PTO	Complete if Known 12/737803	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	**Application Number**	Not yet Known
	Filing Date	February 17, 2011
	First named Inventor	Christopher B. Austin
	Group Art Unit	Not yet Known
(use as many sheets as necessary)	Examiner name	Not yet Assigned
Sheet 1 of 1		

U.S. Patent Documents

Examiner Initials		U.S. Patent Document Number	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document
Change(s) applied to document. /D.D./ 5/16/2018		6,983,186	~~Hobbs~~ Navani, et al.	~~11/8/2005~~ 01-2006
		5,462,439	Keith	10/31/1995
		7,243,746	Vasant	7/17/2007
		5,548,200	Nor et al.	8/20/1996
		2007/0164704	McGinley et al.	7/19/2007
		2008/0052145	Kaplan et al.	2/28/2008

FOREIGN PATENT DOCUMENTS

Examiner Initials		Country Code	Foreign Patent Document Number	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document	Translation	English Abstract

Examiner Signature	/Nathaniel Pelton/	Date Considered	07/14/2013

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer. Patent and Trademark Office, Washington, DC 0231.

DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box Alexandria, VA 22313-1450.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.P./

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.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 08/29/2018

CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

EXAMINER	
PELTON, NATHANIEL R	

ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
08/29/2018	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.

Response to Rule 312 Communication	Application No.	Applicant(s)
	12/737,803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

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

1. ☒ The amendment filed on *30 July 2018* under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☒ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

/NATHANIEL PELTON/
Primary Examiner, Art Unit 2859

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Tesla EX1002 Page 8

OK TO ENTER: /N.R.P/

08/22/2018

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 2859

In re

Patent Application of

Christopher B. Austin

App. No.: 12/737,803

Confirmation No.: 2226

Filed: February 17, 2011

Examiner: Nathanial R. Pelton

Title: "VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD"

AMENDMENT PURSUANT TO 37 C.F.R. § 1.312

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

Sir:

Dear Commissioner:

Applicant requests entry of the following amendment. A Notice of Allowance was mailed by the U.S. Patent and Trademark Office on May 18, 2018. This amendment is submitted prior to submission of the issue fee.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 2859

In re

Patent Application of

Christopher B. Austin

Application No.: 12/737,803

Confirmation No.: 2226

Filed: February 17, 2011

Examiner: Nathaniel R. Pelton

"VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD"

Atty. Docket No.: 013350-9003 US02

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

The following comments are submitted in response to the Notice of Allowance dated May 8, 2018, issued in the above-referenced patent application. In the Reasons for Allowance accompanying the Notice of Allowance, the Examiner indicates that independent claims 1, 46, and 95 are allowable based upon a claimed sub-combination of elements and features recited in independent claims 1, 46, and 95, respectively.

The Applicant respectfully submits that the Reasons for Allowance set forth only some of the elements and features found in independent claims 1, 46, and 95. The Applicant respectfully submits that the Reasons for Allowance set forth only some of the reasons why independent claims 1, 46, and 95 are allowable. In addition, a number of other elements and features claimed in dependent claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, 68, 100, 101, 104, 105, and 113 provide additional and different bases for allowance of the claims.

The Applicant also respectfully submits that each of claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 is separately patentable

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Tesla EX1002 Page 10

based upon the combinations of features, elements, and relationships thereof claimed in claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 rather than upon any sub-combination of elements and features as suggested in the Examiner's Reasons for Allowance.

Respectfully submitted,

/christopher b. austin/

Christopher B. Austin
Inventor

IPR2026-00377
Tesla EX1002 Page 11

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)

7590 05/08/2018
CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

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)
ELECTRONICALLY FILED (Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

TITLE OF INVENTION: VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0	$0	$500	08/08/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
PELTON, NATHANIEL R	2859	320-109000

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 133080 (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
  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.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
  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.
- ☐ Applicant changing to regular undiscounted fee 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 /christopher b. austin/ Date August 6, 2018

Typed or printed name Christopher B. Austin Registration No. 41,592

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

IPR2026-00377
Tesla EX1002 Page 12

Electronic Patent Application Fee Transmittal				
Application Number:	12737803			
Filing Date:	17-Feb-2011			
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD			
First Named Inventor/Applicant Name:	Christopher B. Austin			
Filer:	Christopher B. Austin/Dorothy Hauser			
Attorney Docket Number:				
Filed as Small Entity				
Filing Fees for U.S. National Stage under 35 USC 371				
Description	**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**500**

Electronic Acknowledgement Receipt	
EFS ID:	33387960
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	CHRISTOPHER B. AUSTIN - 935 17TH AVENUE - GRAFTON WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
Filer Authorized By:	Christopher B. Austin
Attorney Docket Number:	
Receipt Date:	06-AUG-2018
Filing Date:	17-FEB-2011
Time Stamp:	17:40:14
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$500

RAM confirmation Number	080718INTEFSW17403900
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	Post Allowance Communication - Incoming	23911304_013350-9003-US02_As_Filed_Comments.PDF	61621 006b833762b6aaba79675dfc5bbbcd8d1c3e1bca	no	2
Warnings:					
Information:					
2	Issue Fee Payment (PTO-85B)	23911315_013350-9003-US02_As_Filed_Issue_Fee_Transmittal.PDF	1590494 bc1c1a4ba82197dea49c84602b12202bfe3ca3f9	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30155 c7ac3ee3f9b1c8f21cbcddbb5e0abc375dddcf35	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1682270		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 2859

In re

Patent Application of

Christopher B. Austin

App. No.: 12/737,803

Confirmation No.: 2226

Filed: February 17, 2011

Examiner: Nathanial R. Pelton

Title: "VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD"

AMENDMENT PURSUANT TO 37 C.F.R. § 1.312

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

Sir:

Dear Commissioner:

Applicant requests entry of the following amendment. A Notice of Allowance was mailed by the U.S. Patent and Trademark Office on May 18, 2018. This amendment is submitted prior to submission of the issue fee.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

Amendments to the Specification:

Please amend the title of the invention as follows:

VEHICULAR ~~BATERY~~ BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

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REMARKS

The foregoing amendment merely corrects a typographical error in the title of the invention to correspond with the specification, claims and abstract. The title was correct on the Application Data Sheet and specification filed on February 17, 2011.

No new matter is added by this amendment. Entry of the amendment is requested.

Respectfully submitted,

/christopher b. austin/

Christopher B. Austin
Inventor

935 17th Avenue
Grafton, WI 53024
Telephone: 414-331-0988

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Tesla EX1002 Page 20

Electronic Acknowledgement Receipt	
EFS ID:	33322691
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	CHRISTOPHER B. AUSTIN - 935 17TH AVENUE - GRAFTON WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
Filer Authorized By:	Christopher B. Austin
Attorney Docket Number:	
Receipt Date:	30-JUL-2018
Filing Date:	17-FEB-2011
Time Stamp:	18:00:10
Application Type:	U.S. National Stage under 35 USC 371

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		23865116_As_Filed_312_Amendment_7-30-2018.PDF	73341 5febbe8bd3eee94ba1d45f3fd13532b03bb1629c	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	1
	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:	
Information:	
Total Files Size (in bytes):	73341

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.

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

7590 05/08/2018

CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

EXAMINER
PELTON, NATHANIEL R

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 05/08/2018

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

TITLE OF INVENTION: VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0	$0	$500	08/08/2018

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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

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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)

7590 05/08/2018
CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

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.
12/737,803	02/17/2011	Christopher B. Austin		2226

TITLE OF INVENTION: VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0	$0	$500	08/08/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
PELTON, NATHANIEL R	2859	320-109000

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 — 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.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — 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.
- ❑ Applicant changing to regular undiscounted fee 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. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 05/08/2018

CHRISTOPHER B. AUSTIN
935 17TH AVENUE
GRAFTON, WI 53024

EXAMINER	
PELTON, NATHANIEL R	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 05/08/2018

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

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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. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	AIA (First Inventor to File) Status No

-- 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 *amendment filed on 03/21/2018*.
   ☐ 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 *1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113*. 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 a reply 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 03/06/2018
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 *see detailed action*.

/NATHANIEL PELTON/
Primary Examiner, Art Unit 2859

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DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

Acknowledgements is made of the amendment filed on 03/21/2018, in which claims 1, 7, 11, 12, 26, 42, 46, 55, 56, 95, 100, and 101 were amended. Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are pending for examination below.

Allowable Subject Matter

Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are allowed.

The following is an examiner's statement of reasons for allowance:

With respect to claim 1, the prior art of record does not suggest or disclose the claimed combination of elements or steps as recited, most particularly the claimed, "a third controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the third controller and adapted for communication with the first controller and the second controller, wherein the third controller is responsive to at least one signal from the first controller by automatically changing a

charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, the at least one signal related to a cost of electrical power, changing the charging state of the vehicle charger including automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power, wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller, and wherein the user-manipulatable control is operable by the user to start a manual charge of the battery or enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger."

With respect to claim 46, the prior art of record does not suggest or disclose the claimed combination of elements or steps as recited, most particularly the claimed, "the vehicle charger comprising: a controller; a display coupled to the controller and adapted to display a time; and a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, wherein the controller automatically changes the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by

the user, wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power, and wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user- manipulable control on a screen associated with the remote controller."

With respect to claim 95, the prior art of record does not suggest or disclose the claimed combination of elements or steps as recited, most particularly the claimed, "the vehicle charger comprising: a display mounted within the vehicle within reach of a user seated within the vehicle; a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user, wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is

reached, and wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery, and wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller."

Claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, 68, 100, 101, 104, 105, and 113 depend from the claims above and are allowed for the same reasons.

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

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL PELTON whose telephone number is (571)270-1761. The examiner can normally be reached on M-F 9:00-5:00 and by e-mail at nathaniel.pelton@uspto.gov (please include authorization to communicate via e-mail through AIR).

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, Richard Isla-Rodas can be reached on 571-272-5056. 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.

/NATHANIEL PELTON/
Primary Examiner, Art Unit 2859

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

CPC- SEARCHED		
Symbol	Date	Examiner
H02J 7/0042, 7/0047, 7/088	4-27-16	nrp
H01M 10/44	4-27-16	nrp
B60L 11/1824	4-27-16	nrp
H02J 7/0042, 7/0047, 7/088	8-9-16	nrp
H01M 10/44	8-9-16	nrp
B60L 11/1824	8-9-16	nrp
H02J 7/0042, 7/0047, 7/088	4-15-17	nrp
H01M 10/44	4-15-17	nrp
B60L 11/1824	4-15-17	nrp
H02J 7/0042, 7/0047, 7/088	9-30-17	nrp
H01M 10/44	9-30-17	nrp
B60L 11/1824	9-30-17	nrp
H02J 7/0042, 7/0047, 7/088	4-14-18	nrp
H01M 10/44	4-14-18	nrp
B60L 11/1824		

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
320	109	7-13-13	nrp
320	109	4-27-16	nrp
320	109	8-9-16	nrp
320	109	4-15-17	nrp
320	109	9-30-17	nrp
320	109	4-14-18	nrp

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

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

SEARCH NOTES		
Search Notes	**Date**	**Examiner**
requested PLUS search on spec and clalms	7-13-13	nrp
performed inventor search	7-13-13	nrp
updated East search (see attached)	4-27-16	nrp
updated East search (see attached)	8-9-16	nrp
updated East search (see attached)	4-15-17	nrp
updated East search (see attached)	9-30-17	nrp
updated East search (see attached)	4-14-18	nrp

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
	((vehicle or auto or automobile or car)(charg$5 or recharg$5)(control$4)(user)(time or period)(day)(cost or price)(power or energy)).clm.	4-14-18	nrp

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	"US 20110175569"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2013/07/14 21:18
S2	0	302/109.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/07/14 21:18
S3	1050	320/109.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/07/14 21:18
S4	48	((CHRISTOPHER) near2 (AUSTIN)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/07/14 21:18
S5	138	US-5194799-$.DID. OR US-5760569-$.DID. OR US-4389608-$.DID. OR US-5765656-$.DID. OR US-5793185-$.DID. OR US-5772309-$.DID. OR US-5444352-$.DID. OR US-5798630-$.DID. OR US-5631536-$.DID. OR US-5803760-$.DID. OR US-5670861-$.DID. OR US-5844384-$.DID. OR US-5773962-$.DID. OR US-5889384-$.DID. OR US-4248942-$.DID. OR US-5905360-$.DID. OR US-4334819-$.DID. OR US-5933010-$.DID. OR US-5202617-$.DID. OR US-6036574-$.DID. OR US-5219034-$.DID. OR US-6087805-$.DID. OR US-5229703-$.DID. OR US-6104312-$.DID. OR US-5397991-$.DID. OR US-6114833-$.DID. OR US-5402056-$.DID. OR US-6154005-$.DID. OR US-5528148-$.DID. OR US-6160374-$.DID. OR US-5545046-$.DID. OR US-6242889-$.DID. OR US-5548200-$.DID. OR US-5583418-$.DID. OR US-3603860-$.DID. OR US-5602459-$.DID. OR US-3694729-$.DID. OR US-5610499-$.DID. OR US-3673379-$.DID. OR US-5710502-$.DID. OR US-3898547-$.DID. OR US-5807129-$.DID. OR US-3870855-$.DID. OR US-3841428-$.DID. OR US-5952813-$.DID. OR US-4012681-$.DID. OR US-5997333-$.DID. OR US-4139896-$.DID. OR US-6225780-$.DID. OR US-4141425-$.DID. OR US-4252217-$.DID. OR US-4286911-$.DID. OR US-4292578-$.DID. OR US-4309644-$.DID. OR US-4333134-$.DID. OR US-4435675-$.DID. OR US-4435486-$.DID. OR US-4450400-$.DID. OR US-4777416-$.DID. OR US-4906815-$.DID. OR US-4983904-$.DID. OR US-5179494-$.DID. OR US-5206578-$.DID. OR US-5281792-$.DID. OR US-5351283-$.DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/07/14 21:19

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S8	1	"6963186".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/07/14 21:21
S9	2	"20110175569".pn.	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2016/03/21 11:27
S10	1	"20110175569".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/21 11:27
S11	74	((Christopher) near2 (Austin)).INV.	US-PGPUB;	OR	OFF	2016/03/21

			USPAT; USOCR			11:28
S12	1	S11 and ((vehicle or car or automobile) with (charg$5 or recharg$5))	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:29
S13	3	S11 and (charg$5 or recharg$5)	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:30
S14	7153	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:38
S15	2140	S14 and @ad<"20080818"	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:38
S16	287	S15 and (tim$3 near5 (end$3 or complet$4 or finish$3))	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:39
S17	2	"6963186".pn. or "5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:39
S18	1	"2007029965".pn. or "7495414".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/22 14:56
S19	1	"20070029965".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/22 14:57
S20	2	"20100194336".pn. or "7180265".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/22 15:00
S21	32353	h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/088.cpc. or h01m10/44.cpc. or b60l11/1824.cpc. or 320/109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 13:15
S22	3660	S21 and @ad<"20080818"	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:16
S23	2	"6963186".pn. or "5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:17
S24	2	"6963186".pn. or "5548200".pn. or "7243746".pc.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:24
S25	3	"6963186".pn. or "5548200".pn. or "7243746".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:24
S26	12280	S21 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 13:27
S27	369	S26 and ((enter$3 or input$4) near5 time)	US-PGPUB; USPAT; USOCR;	OR	ON	2016/04/27 13:28

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S28	1	"20090243549".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 14:04
S29	1	S27 and S28	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 14:04
S30	1	"20080052145".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 14:49
S31	39	S26 and (automatic$4 near3 communicat$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 14:55
S32	6	"20140253024".pn. or "20130214931".pn. or "20100194336".pn.	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2016/04/27 15:44
S33	3	"20140253024".pn. or "20130214931".pn. or "20100194336".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/27 15:45
S34	1	"8193769".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/27 16:00
S35	1	"20150229158".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/27 19:35
S36	3	"9054749".pn. or "20090096422".pn. or "20110234157".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/27 19:51
S37	7940	320/108 or h02j7/025.cpc.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/04/27 19:59
S38	20884	320/108 or h02j7/025.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 20:00
S39	10630	S38 and @ad<"20120321"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 20:00
S40	42	S39 and ((first and second) near5 regulat$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2016/04/27 20:04

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			IBM_TDB			
S41	6455	(g01r19/0084.cpc. or h04b5/0037.cpc. or h04b5/0081.cpc.) and @ad<"20120321"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 20:26
S42	33	S41 and ((first and second) near5 regulat$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 20:26
S43	127	S41 and ((first and second) near5 (regulat$3 or convert$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 20:27
S44	265	S39 and ((first and second) near5 (regulat$3 or convert$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 20:27
S45	368	S43 or S44	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 20:27
S46	1	"US 20110175569"	US-PGPUB; USPAT; USOCR	OR	OFF	2016/08/09 16:11
S47	29042	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:17
S48	8357	S47 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:19
S49	16	S48 and (automatic$4 with ((cost$3 or pric$3 or money) near5 (power or electricity or energy)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:22

S50	5	"5548200".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:23
S51	1	"5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/08/09 16:23
S52	1	"20090243549".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/08/09 16:32
S53	10	S48 and (overrid$3 with (below or lower or less))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:35
S54	51	"320".clas. and (overrid$3 with (below or lower or less)) and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:39
S55	2	"20020079868".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 17:33
S56	38844	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/14 14:21
S57	9252	S56 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/14 14:21
S58	363	S57 and (((cost$3 or pric$3 or money) near5 (power or electricity or energy)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/14 14:21
S59	3	"8772970".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2017/04/15 13:19

			IBM_TDB			
S60	1	"8772970".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/15 13:20
S61	3	"6963186".pn. or "20090243549".pn. or "5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/16 09:33
S62	1	"20020079868".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/16 09:48
S63	38868	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/16 10:53
S64	9253	S63 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/16 10:53
S65	10	S64 and (overrid$3 with (below or lower or less))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/16 10:53
S66	41747	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:39
S67	9450	S66 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:39
S68	0	S67 and (automatic$4 with ((cost$3 or pric$3 or money) near5 (power or electricity or energy)) with (start$4 or initiat$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:42
S69	8	("320".clas. or h02j7/$$.cpc. or b60l11/$$.cpc.) and (automatic$4 with ((cost$3 or pric$3 or money) near5 (power or electricity or energy)) with (start$4 or initiat$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:43
S70	83	S67 and (((cost$3 or pric$3 or money)	US-PGPUB;	OR	ON	2017/09/30

		near5 (power or electricity or energy)) with (below or lower or less))	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:59
S71	2	"20040164711".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 11:53
S72	1	"20040164711".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 11:53
S73	171	"320".clas. and (decrypt$3)	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 11:56
S74	5	"320".clas. and (decrypt$3 with (manufacturer or supplier))	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 11:57
S75	1	"20100076825".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:00
S76	2222	(decrypt$3 with (manufacturer or supplier))	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:04
S77	1513	S76 and @ad<"20110114"	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:04
S78	1216	((decrypt$3 near5 key) with (manufacturer or supplier))	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:05
S79	856	S78 and @ad<"20110114"	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:05
S80	82	((decrypt$3 near5 key) with (manufacturer or supplier) with server)	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:07
S81	47	S80 and @ad<"20110114"	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:07
S82	242	((decrypt$3 near5 key) with (manufacturer or supplier) with request$3)	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:13
S83	131	S82 and @ad<"20110114"	US-PGPUB; USPAT; USOCR	OR	ON	2017/09/30 12:13
S84	7666	(g01r19/0084.cpc. or h04b5/0037.cpc. or h04b5/0081.cpc.) and @ad<"20120321"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/04/14 13:09
S85	135	S84 and ((first and second) near5 (regulat$3 or convert$3))	US-PGPUB; USPAT;	OR	ON	2018/04/14 13:09

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S86	48376	h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/088.cpc. or h01m10/44.cpc. or b60l11/1824.cpc. or 320/109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/04/14 15:31
S87	13871	S86 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/04/14 15:31
S88	379	S87 and ((enter$3 or input$4) near5 time)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/04/14 15:31
S89	48376	h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/088.cpc. or h01m10/44.cpc. or b60l11/1824.cpc. or 320/109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/04/14 17:36
S90	13871	S89 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/04/14 17:36
S91	148	S90 and (second near5 user)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/04/14 17:36

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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S93	77	((vehicle or auto or automobile or car)(charg$5 or recharg$5)(control$4)(user)(time or period)(day)(cost or price)(power or energy)).clm.	US-PGPUB; USPAT	AND	ON	2018/04/14 18:07

4/14/2018 6:25:30 PM
C:\Users\npelton\Documents\EAST\Workspaces\12737803.wsp

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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	07/13/2013	04/27/2016	08/09/2016	04/15/2017	09/30/2017	04/14/2018			
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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CLAIM		DATE								
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CLAIM		DATE								
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CLAIM		DATE								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
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CLAIM		DATE								
Final	Original	07/13/2013	04/27/2016	08/09/2016	04/15/2017	09/30/2017	04/14/2018			
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

CPC						
Symbol					**Type**	**Version**
H01M		10	/	44	F	2013-01-01
B60L		11	/	1824	I	2013-01-01
B60L		11	/	1844	I	2013-01-01
B60L		2230	/	16	A	2013-01-01
G01R		31	/	3689	A	2013-01-01
H02J		7	/	0042	A	2013-01-01
H02J		7	/	0047	A	2013-01-01
Y02T		10	/	7005	A	2013-01-01
Y02T		10	/	7088	A	2013-01-01
Y02T		90	/	128	A	2013-01-01
Y02T		90	/	14	A	2013-01-01
Y02T		90	/	16	A	2013-01-01
Y02T		90	/	163	A	2013-01-01
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B60L		2230	/	40	A	2013-01-01
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CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
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			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/NATHANIEL PELTON/ Primary Examiner.Art Unit 2859	4-14-18	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
320	109	H	0	2	J	7 / 00 (2006.0)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/NATHANIEL PELTON/ Primary Examiner.Art Unit 2859	4-14-18	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

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

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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/NATHANIEL PELTON/ Primary Examiner.Art Unit 2859	4-14-18	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	12737803
	Filing Date	2011-02-17
	First Named Inventor	Christopher B. Austin
	Art Unit	2859
	Examiner Name	Nathanial R. Pelton
	Attorney Docket Number	N/A

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5650710	A	1997-07-22	Yoshihiko Hotta	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080007202	A1	2008-01-10	Bryan K. Pryor	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.R.P/

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	Filing Date	2011-02-17
	First Named Inventor	Christopher B. Austin
	Art Unit	2859
	Examiner Name	Nathanial R. Pelton
	Attorney Docket Number	N/A

	1	European Search Report, Application No. 09808718.2, dated October 10, 2017.	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/NATHANIEL R PELTON/	Date Considered	04/14/2018

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.R.P/

UNITED STATES PATENT AND TRADEMARK OFFICE

Title	:	VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD
Application No.	:	12/737,803
Inventor(s)	:	Christopher B. Austin
Filed	:	February 17, 2011
Confirmation No.	:	2226
Group Art Unit	:	2859
Examiner	:	Nathanial R. Pelton
Attorney Docket No.	:	N/A

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

RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT AND SUPPLEMENTAL AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Commissioner:

This communication responds to the Notice of Non-Compliant Amendment mailed March 15, 2018. Submitted herein is the properly signed Amendment and Response previously filed on February 5, 2018 which responds to the non-final Office Action mailed October 4, 2017.

Applicant requests that any necessary extension of time fee be charged to Deposit Account No. 13-3080. Please charge any shortage of fees associated with this communication to Deposit Account No. 13-3080.

CONTENTS OF COMMUNICATION

CLAIMS	:	Amendments to the claims begin on page 2.
REMARKS	:	Remarks begin on page 8.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger ~~and~~ adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a third ~~second~~ controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the third ~~second~~ controller and adapted for communication with the first controller and the second controller,

wherein the third ~~second~~ controller is responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, the at least one signal related to a cost of electrical power, ~~wherein~~ changing the charging state of the vehicle charger including ~~includes~~ automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power,

wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller,[[;]] and

wherein the ~~at least one~~ user-manipulatable control is ~~coupled to the second controller and~~ operable by the [[a]] user to start a manual charge of the battery or enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

2-6. (Canceled)

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Tesla EX1002 Page 56

7. (Currently Amended) The vehicle charger of claim 1, wherein the third ~~second~~ controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

8-10. (Canceled)

11. (Currently Amended) The vehicle charger of claim 1, further comprising a display coupled to the third ~~second~~ controller, the display displaying a level of charge of the battery.

12. (Currently Amended) The vehicle charger of claim 1, further comprising a display coupled to the third ~~second~~ controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the third ~~second~~ controller.

13-19. (Canceled)

20. (Original) The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21-25. (Canceled)

26. (Currently Amended) The vehicle charger of claim 1, wherein the third ~~second~~ controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27-41. (Canceled)

42. (Currently Amended) The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the third ~~second~~ controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

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43-45. (Canceled)

46. (Currently Amended) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end,

wherein the controller automatically changes ~~changing~~ the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user,

wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power, and

wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.

47. (Canceled)

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48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49-54. (Canceled)

55. (Currently Amended) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the remote controller of the computer ~~another controller remote from the vehicle and the vehicle charger~~ via the at least one of the transmitter and receiver.

56. (Currently Amended) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with a second ~~another~~ controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

57-58. (Canceled)

59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61-67. (Canceled)

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69-94. (Canceled)

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95. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,

wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached, ~~and~~

wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery, and

wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.

96-99. (Canceled)

100. (Currently Amended) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the remote controller of the computer ~~another controller remote from the vehicle and the vehicle charger~~ via the at least one of the transmitter and the receiver.

101. (Currently Amended) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with a second ~~another~~ controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

102-103. (Canceled)

104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

106-112. (Canceled)

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114-152. (Canceled)

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REMARKS

Prior to this communication, claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 were pending. Claims 1, 7, 11, 12, 26, 42, 46, 55, 56, 95, 100, and 101 are hereby amended. No new matter has been added.

I. Claim Rejections under 35 U.S.C. § 103

On pages 3-8 of the Office Action, claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,963,186 ("Hobbs") in view of U.S. Patent Application Publication No. 2009/0243549 ("Matsumura"), U.S. Patent No. 5,548,200 ("Nor"), and U.S. Patent Application Publication No. 2009/0313034 ("Ferro").

Also, on page 8 of the Office Action, claims 7 and 56 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, Ferro, and U.S. Patent Application Publication No. 2007/0144605 ("Horowitz").

In addition, on pages 8 and 9 of the Office Action, claim 42 stands rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, Ferro, and U.S. Patent Application Publication No. 2008/0052145 ("Kaplan").

Also, on pages 9 and 10 of the Office Action, claim 48 stands rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, Ferro, and U.S. Patent No. 7,243,746 ("Vasant").

In addition, on pages 10-13 of the Office Action, claims 95, 100, 104, 105, and 113 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Vasant, Ferro, and U.S. Patent Application Publication No. 2002/0079868 ("Gaza").

Lastly, on pages 13 and 14 of the Office Action, claim 101 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Vasant, Gaza, Ferro, and Horowitz.

A. Independent Claims 1, 46, and 95

Independent claim 1 is directed to a vehicle charger for charging a vehicle battery. The vehicle charger is able to start a manual charging operation in response to user selecting a user-manipulable control on a screen of a computer. After the user-manipulable control is selected, a controller of the vehicle charger receives a signal from a controller associated with the computer, and responds by starting the manual charge of the vehicle battery. The controller associated with

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the computer is remote from both a vehicle and the vehicle charger for that vehicle, but the controller wirelessly communicates with the controller of the vehicle charger. The computer could be, for example, a processor-based device such as a phone or similar device that is remote from the vehicle and the vehicle charger.

Specifically, independent claim 1 recites, among other things, a vehicle charger:

(1) "adapted for communication with a first controller remote from the vehicle and vehicle charger;"

(2) "adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer;"

(3) "wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller;" and

(4) "wherein the user-manipulatable control is operable by the user to start a manual charge of the battery."

The combination of Hobbs, Matsumura, Nor, Ferro, and any of the other references cited by the Examiner fails to disclose or suggest at least the above limitations of claim 1.

Hobbs discloses stationary and on-board battery chargers for charging vehicle batteries.[1] Hobbs does not contemplate or even mention wireless communication with a vehicle charger, let alone initiating a manual charge of a vehicle battery based on a signal received wirelessly from a remote computer (e.g., a phone, etc.).

Matsumura, like Hobbs, fails to contemplate or even mention wireless communication with a vehicle charger. In fact, Matsumura isn't related to vehicle battery charging at all. Rather, Matsumura is related to recharging batteries in gadgets such as PDAs, cellular phones, gaming devices, etc.[2] In each instance, the device that is being charged is directly coupled to an AC adapter to enable charging.[3] Matsumura makes no mention of receiving a wireless signal from a remote controller associated with a computer that starts a manual charge of a battery.

[1] *See* Hobbs at 5:3-13; FIG. 1.
[2] *See* Matsumura at ¶ 13.
[3] *See* Matsumura at ¶13.

Nor discloses a vehicle charger that communicates with a charging station that charges an on-board vehicle battery.[4] Nor does disclose the possibility of radio-frequency ("RF") communication between the vehicle charger and the charging station.[5] However, Nor does not teach wireless communication with a second controller or computer that is remote from the vehicle and vehicle charger. As a result, Nor also fails to teach such a second controller being associated with a user-manipulable control on a screen that can be selected to then start a manual charge of a vehicle battery via wireless communication with the vehicle charger.

Unlike Hobbs, Matsumura, and Nor, Ferro discloses a vehicle charging system that exchanges information wirelessly over a network. However, Ferro fails to cure the deficiencies of Hobbs, Matsumura, and Nor. Ferro discloses a resource planning system that generates a dynamic energy transaction plan.[6] The system of Ferro gathers a range of information from a variety of sources, such as financial institutions, electrical utilities, etc.[7] Ferro discloses two primary implementations of systems for generating the dynamic energy transaction plan, and the practice of interacting with utilities and other services to enable charging from a charging station. First, the dynamic energy transaction plan can be generated by a vehicle itself (i.e., on-board).[8] Alternatively, the dynamic energy transaction plan can be generated by a server or device that is remote from the vehicle.[9] In both instances, the dynamic energy transaction plan is stored within a vehicle's on-board data storage device.[10] The only difference between the two embodiments is where the dynamic energy transaction plan is generated.

After the dynamic energy transaction plan is stored in a data storage device of the vehicle, the vehicle's on-board controller will execute the dynamic energy transaction plan. For example, "[d]ynamic energy transaction plan 424 may be stored on data storage device 426 or sent to another component, such as dynamic energy transaction approval service 12 or energy transaction execution engine 316 in FIG. 3."[11] Both the dynamic energy transaction approval service 312 and energy transaction execution engine 316 are part of an electric vehicle energy

[4] *See* Nor at 8:15 – 9:15.
[5] *See* Nor at 10:8-11.
[6] *See* Ferro at ¶ 142.
[7] *See* Ferro at ¶¶ 110 – 112.
[8] *See* Ferro at ¶¶ 76-104.
[9] *See* Ferro at ¶¶ 105 – 117.
[10] *See* Ferro at ¶ 105.
[11] Ferro at ¶ 100.

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transaction infrastructure 300 associated with the particular vehicle.[12] The electric vehicle transaction infrastructure 300 for a vehicle is shown below in FIG. 3 of Ferro.

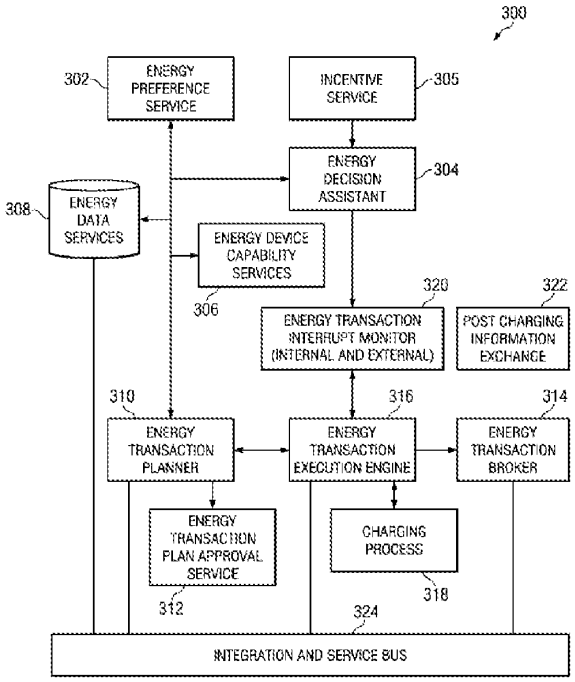


FIG. 3

Regardless of whether the above-illustrated energy transaction planner 310 requests approval of the terms of the dynamic energy transaction plan using the dynamic energy transaction approval service 312 or submits the dynamic energy transaction plan directly to the energy transaction execution engine 316, the vehicle battery will not be charged until after a dynamic energy transaction plan has been generated. Once the transaction plan is generated, a vehicle can finally be charged. Although waiting for such an elaborate process of many transactions and approvals produces a robust system for guiding interactions among multiple parties, such a system prevents users from causing a manual charge of a vehicle's battery to be initiated in a direct and convenient manner.

Unlike the elaborate multi-transactional system of Ferro, which requires a series of transactions before a vehicle can be charged, the invention of claim 1 provides a vehicle charger that wirelessly communicates with a controller remote from the vehicle charger and associated with a computer or processor-based device (e.g., a phone, etc.). The vehicle charger of amended

[12] *See* Ferro at ¶¶ 52 – 53.

claim 1 receives and is responsive to a signal from the remote controller associated with the computer to start a manual charging of a vehicle battery. The signal is received by the vehicle charger in response to a user selecting a user-manipulable control on a screen that is associated with the remote controller, and the user-manipulable control is operable, when selected, to start a manual charging of the vehicle battery.

None of Hobbs, Matsumura, Nor, Ferro, or any of the other references cited by the Examiner, whether taken alone or in combination, teach the initiation of a manual charge based on such a signal from a remote controller or computer in response to a user's input to a screen. Specifically, the combined teachings of Hobbs, Matsumura, Nor, Ferro, and the other references cited by the Examiner fail to teach at least the claim 1 limitations of a vehicle charger:

(1) "adapted for communication with a first controller remote from the vehicle and vehicle charger;"

(2) "adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer;"

(3) "wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller;" and

(4) "wherein the user-manipulatable control is operable by the user to start a manual charge of the battery."

Accordingly, independent claim 1 is allowable. Claims 7, 11, 12, 20, 26, and 42, which depend from independent claim 1, are also allowable for at least the same reasons as claim 1. Claims 7, 11, 12, 20, 26, and 42 are also allowable for additional independent reasons not discussed herein.

Independent claim 46 includes limitations that are similar to some of those described above with respect to independent claim 1. Rationale similar to that described above with respect to independent claim 1 is applicable to those similar limitations in claim 46, with the conclusion that independent claim 46 is also allowable. Claims 48, 55, 56, 59, 60, and 68, which depend from independent claim 46, are also allowable for at least the same reasons as claim 46. Claims 48, 55, 56, 59, 60, and 68 are also allowable for additional independent reasons not discussed herein.

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Independent claim 95 includes limitations that are similar to some of those described above with respect to independent claim 1. Rationale similar to that described above with respect to independent claim 1 is applicable to those similar limitations in claim 95, with the conclusion that independent claim 95 is also allowable. Claims 100, 101, 104, 105, and 113, which depend from independent claim 95, are also allowable for at least the same reasons as claim 95. Claims 100, 101, 104, 105, and 113 are also allowable for additional independent reasons not discussed herein.

B. Dependent Claims 7 and 56

Claim 7 depends from independent claim 1. As described above, independent claim 1 is allowable. Horowitz fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to claim 7. Claim 7 is also, therefore, allowable.

Claim 56 depends from independent claim 46. As described above, independent claim 46 is allowable. Horowitz fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to claim 56. Claim 56 is also, therefore, allowable.

C. Dependent Claim 42

Claim 42 depends from independent claim 1. As described above, independent claim 1 is allowable. Kaplan fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, Nor, and Ferro with respect to claim 42. Claim 42 is also, therefore, allowable.

D. Dependent Claim 48

Claim 48 depends from independent claim 46. As described above, independent claim 46 is allowable. Vasant fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, Nor, and Ferro with respect to claim 48. Claim 48 is also, therefore, allowable.

E. Dependent Claim 101

Claim 101 depends from independent claim 95. As described above, independent claim 95 is allowable. Horowitz fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, Vasant, Gaza, and Ferro with respect to claim 101. Claim 101 is also, therefore, allowable.

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II. Conclusion

In light of the above, Applicant submits that the application is in condition for allowance, and respectfully requests that a Notice of Allowance be issued in this case. Applicant also requests that the Examiner telephone the Applicant in the event a telephone discussion would be helpful in advancing the prosecution of this application.

Respectfully submitted,

/christopher b. austin/

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Electronic Acknowledgement Receipt	
EFS ID:	32116260
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	Christopher B. Austin - 935 17th Avenue - Grafton WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		22991745_As_Filed_Response_3-21-2018.PDF	281769 a36a3a2bfd1a31b0aa2414ee9342aeacdef03f2b	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Supplemental Response or Supplemental Amendment	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	14

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/737,803	Filing Date 02/17/2011	☒ 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 **02/05/2018**

	(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))	* 20	Minus	** 20	= 0	X $50 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $230 =	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.
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The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
SHERRY DAVIS

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.**

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Christopher B. Austin
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Paper No.

Application No.:	**12/737,803**	**Date Mailed:**	**2018-03-15** **PAPER**
First Named Inventor:	Christopher B. Austin	Examiner:	PELTON, NATHANIEL R
Attorney Docket No.:		Art Unit:	2859
Confirmation No.:	2226	Filing Date:	02/17/2011

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

Commissioner for Patents

PTO-90c (Rev.08-06)

Notice of Non-Compliant Amendment (37 CFR 1.121)	Application No. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.

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

The amendment document filed on *05 February, 2018* is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
  - ☐ A. Amended paragraph(s) do not include markings.
  - ☐ B. New paragraph(s) should not be underlined.
  - ☐ C. Other _____.
- ☐ 2. Abstract:
  - ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
  - ☐ B. Other _____.
- ☐ 3. Amendments to the drawings:
  - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet," "New Sheet," or "Annotated Sheet" as required by 37 CFR 1.121(d).
  - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
  - ☐ C. Other _____.
- ☐ 4. Amendments to the claims:
  - ☐ A. A complete listing of all of the claims is not present.
  - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
  - ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
  - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
  - ☐ E. Other: _____.
- ☒ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4): For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period if the non-compliant amendment is an** after-final amendment or an amendment filed after allowance, or a drawing submission (only) If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.

2. Applicant is given **two months** from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a Quayle action. If any of above boxes 1 to 4 are checked, the correction required is only the corrected section of the non-compliant amendment in compliance with 37 CFR 1.121.

   Extensions of time are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.
   Failure to timely respond to this notice will result in:
   Abandonment of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or
   Non-entry of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

Legal Instruments Examiner (LIE), if applicable SHERRY DAVIS Telephone No: (571)272-1566

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	12737803
	Filing Date	2011-02-17
	First Named Inventor	Christopher B. Austin
	Art Unit	2859
	Examiner Name	Nathanial R. Pelton
	Attorney Docket Number	N/A

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	12737803
	Filing Date	2011-02-17
	First Named Inventor	Christopher B. Austin
	Art Unit	2859
	Examiner Name	Nathanial R. Pelton
	Attorney Docket Number	N/A

	1	European Search Report, Application No. 09808718.2, dated October 10, 2017.

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	12737803
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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/christopher b. austin/	Date (YYYY-MM-DD)	2018-03-06
Name/Print	Christopher B. Austin	Registration Number	41592

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

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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 record s.

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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.

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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.

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Electronic Patent Application Fee Transmittal					
Application Number:	12737803				
Filing Date:	17-Feb-2011				
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD				
First Named Inventor/Applicant Name:	Christopher B. Austin				
Filer:	Christopher B. Austin/Dorothy Hauser				
Attorney Docket Number:					
Filed as Small Entity					
Filing Fees for U.S. National Stage under 35 USC 371					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**120**

Electronic Acknowledgement Receipt	
EFS ID:	31974800
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	Christopher B. Austin - 935 17th Avenue - Grafton WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
Filer Authorized By:	Christopher B. Austin
Attorney Docket Number:	
Receipt Date:	06-MAR-2018
Filing Date:	17-FEB-2011
Time Stamp:	16:50:59
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$120

RAM confirmation Number	030718INTEFSW16513800
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	Information Disclosure Statement (IDS) Form (SB08)	22896083_As_Filed_IDS_03-06-2018.PDF	612084 250235dd1bffe2be9b79711128e0c12df7458747	no	4
Warnings:					
Information:					
2	Non Patent Literature	22896294_EP_Search_10-10-2017.PDF	259716 5e0a99a6ba74b10de6a36ff9d51d9fee77fbaef6	no	9
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30178 1c6d3956956aeb252f8182606644ce3a79c0861a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	901978		

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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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Title	:	VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD
Application No.	:	12/737,803
Inventor(s)	:	Christopher B. Austin
Filed	:	February 17, 2011
Confirmation No.	:	2226
Group Art Unit	:	2859
Examiner	:	Nathanial R. Pelton
Attorney Docket No.	:	N/A

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

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Commissioner:

This communication responds to the non-final Office Action mailed October 4, 2017. Applicant hereby requests a one-month extension of time to file this Amendment and Response. Applicant also requests that the necessary extension of time fee be charged to Deposit Account No. 13-3080. Please charge any shortage of fees associated with this communication to Deposit Account No. 13-3080.

CONTENTS OF COMMUNICATION

CLAIMS	:	Amendments to the claims begin on page 2.
REMARKS	:	Remarks begin on page 8.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger ~~and~~ adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a third ~~second~~ controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the third ~~second~~ controller and adapted for communication with the first controller and the second controller,

wherein the third ~~second~~ controller is responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, the at least one signal related to a cost of electrical power, ~~wherein~~ changing the charging state of the vehicle charger including ~~includes~~ automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power,

wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller,[[;]] and

wherein the ~~at least one~~ user-manipulatable control is ~~coupled to the second controller and~~ operable by the [[a]] user to start a manual charge of the battery or enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

2-6. (Canceled)

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7. (Currently Amended) The vehicle charger of claim 1, wherein the third ~~second~~ controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

8-10. (Canceled)

11. (Currently Amended) The vehicle charger of claim 1, further comprising a display coupled to the third ~~second~~ controller, the display displaying a level of charge of the battery.

12. (Currently Amended) The vehicle charger of claim 1, further comprising a display coupled to the third ~~second~~ controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the third ~~second~~ controller.

13-19. (Canceled)

20. (Original) The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21-25. (Canceled)

26. (Currently Amended) The vehicle charger of claim 1, wherein the third ~~second~~ controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27-41. (Canceled)

42. (Currently Amended) The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the third ~~second~~ controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

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43-45. (Canceled)

46. (Currently Amended) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end,

wherein the controller automatically changes ~~changing~~ the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user,

wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power, and

wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.

47. (Canceled)

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48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49-54. (Canceled)

55. (Currently Amended) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the remote controller of the computer ~~another controller remote from the vehicle and the vehicle charger~~ via the at least one of the transmitter and receiver.

56. (Currently Amended) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with a second ~~another~~ controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

57-58. (Canceled)

59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61-67. (Canceled)

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69-94. (Canceled)

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95. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,

wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached, ~~and~~

wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery, and

wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.

96-99. (Canceled)

100. (Currently Amended) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the remote controller of the computer ~~another controller remote from the vehicle and the vehicle charger~~ via the at least one of the transmitter and the receiver.

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101. (Currently Amended) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with a second ~~another~~ controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

102-103. (Canceled)

104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

106-112. (Canceled)

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114-152. (Canceled)

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REMARKS

Prior to this communication, claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 were pending. Claims 1, 7, 11, 12, 26, 42, 46, 55, 56, 95, 100, and 101 are hereby amended. No new matter has been added.

I. Claim Rejections under 35 U.S.C. § 103

On pages 3-8 of the Office Action, claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,963,186 ("Hobbs") in view of U.S. Patent Application Publication No. 2009/0243549 ("Matsumura"), U.S. Patent No. 5,548,200 ("Nor"), and U.S. Patent Application Publication No. 2009/0313034 ("Ferro").

Also, on page 8 of the Office Action, claims 7 and 56 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, Ferro, and U.S. Patent Application Publication No. 2007/0144605 ("Horowitz").

In addition, on pages 8 and 9 of the Office Action, claim 42 stands rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, Ferro, and U.S. Patent Application Publication No. 2008/0052145 ("Kaplan").

Also, on pages 9 and 10 of the Office Action, claim 48 stands rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, Ferro, and U.S. Patent No. 7,243,746 ("Vasant").

In addition, on pages 10-13 of the Office Action, claims 95, 100, 104, 105, and 113 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Vasant, Ferro, and U.S. Patent Application Publication No. 2002/0079868 ("Gaza").

Lastly, on pages 13 and 14 of the Office Action, claim 101 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Vasant, Gaza, Ferro, and Horowitz.

A. Independent Claims 1, 46, and 95

Independent claim 1 is directed to a vehicle charger for charging a vehicle battery. The vehicle charger is able to start a manual charging operation in response to user selecting a user-manipulable control on a screen of a computer. After the user-manipulable control is selected, a controller of the vehicle charger receives a signal from a controller associated with the computer, and responds by starting the manual charge of the vehicle battery. The controller associated with

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the computer is remote from both a vehicle and the vehicle charger for that vehicle, but the controller wirelessly communicates with the controller of the vehicle charger. The computer could be, for example, a processor-based device such as a phone or similar device that is remote from the vehicle and the vehicle charger.

Specifically, independent claim 1 recites, among other things, a vehicle charger:

(1) "adapted for communication with a first controller remote from the vehicle and vehicle charger;"

(2) "adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer;"

(3) "wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller;" and

(4) "wherein the user-manipulatable control is operable by the user to start a manual charge of the battery."

The combination of Hobbs, Matsumura, Nor, Ferro, and any of the other references cited by the Examiner fails to disclose or suggest at least the above limitations of claim 1.

Hobbs discloses stationary and on-board battery chargers for charging vehicle batteries.[1] Hobbs does not contemplate or even mention wireless communication with a vehicle charger, let alone initiating a manual charge of a vehicle battery based on a signal received wirelessly from a remote computer (e.g., a phone, etc.).

Matsumura, like Hobbs, fails to contemplate or even mention wireless communication with a vehicle charger. In fact, Matsumura isn't related to vehicle battery charging at all. Rather, Matsumura is related to recharging batteries in gadgets such as PDAs, cellular phones, gaming devices, etc.[2] In each instance, the device that is being charged is directly coupled to an AC adapter to enable charging.[3] Matsumura makes no mention of receiving a wireless signal from a remote controller associated with a computer that starts a manual charge of a battery.

[1] *See* Hobbs at 5:3-13; FIG. 1.
[2] *See* Matsumura at ¶ 13.
[3] *See* Matsumura at ¶13.

Nor discloses a vehicle charger that communicates with a charging station that charges an on-board vehicle battery.[4] Nor does disclose the possibility of radio-frequency ("RF") communication between the vehicle charger and the charging station.[5] However, Nor does not teach wireless communication with a second controller or computer that is remote from the vehicle and vehicle charger. As a result, Nor also fails to teach such a second controller being associated with a user-manipulable control on a screen that can be selected to then start a manual charge of a vehicle battery via wireless communication with the vehicle charger.

Unlike Hobbs, Matsumura, and Nor, Ferro discloses a vehicle charging system that exchanges information wirelessly over a network. However, Ferro fails to cure the deficiencies of Hobbs, Matsumura, and Nor. Ferro discloses a resource planning system that generates a dynamic energy transaction plan.[6] The system of Ferro gathers a range of information from a variety of sources, such as financial institutions, electrical utilities, etc.[7] Ferro discloses two primary implementations of systems for generating the dynamic energy transaction plan, and the practice of interacting with utilities and other services to enable charging from a charging station. First, the dynamic energy transaction plan can be generated by a vehicle itself (i.e., on-board).[8] Alternatively, the dynamic energy transaction plan can be generated by a server or device that is remote from the vehicle.[9] In both instances, the dynamic energy transaction plan is stored within a vehicle's on-board data storage device.[10] The only difference between the two embodiments is where the dynamic energy transaction plan is generated.

After the dynamic energy transaction plan is stored in a data storage device of the vehicle, the vehicle's on-board controller will execute the dynamic energy transaction plan. For example, "[d]ynamic energy transaction plan 424 may be stored on data storage device 426 or sent to another component, such as dynamic energy transaction approval service 12 or energy transaction execution engine 316 in FIG. 3."[11] Both the dynamic energy transaction approval service 312 and energy transaction execution engine 316 are part of an electric vehicle energy

[4] *See* Nor at 8:15 – 9:15.
[5] *See* Nor at 10:8-11.
[6] *See* Ferro at ¶ 142.
[7] *See* Ferro at ¶¶ 110 – 112.
[8] *See* Ferro at ¶¶ 76-104.
[9] *See* Ferro at ¶¶ 105 – 117.
[10] *See* Ferro at ¶ 105.
[11] Ferro at ¶ 100.

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transaction infrastructure 300 associated with the particular vehicle.[12] The electric vehicle transaction infrastructure 300 for a vehicle is shown below in FIG. 3 of Ferro.

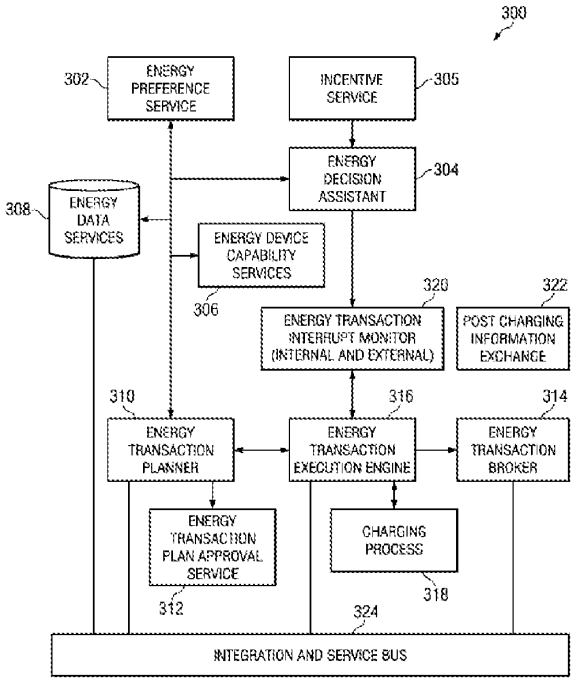


FIG. 3

Regardless of whether the above-illustrated energy transaction planner 310 requests approval of the terms of the dynamic energy transaction plan using the dynamic energy transaction approval service 312 or submits the dynamic energy transaction plan directly to the energy transaction execution engine 316, the vehicle battery will not be charged until after a dynamic energy transaction plan has been generated. Once the transaction plan is generated, a vehicle can finally be charged. Although waiting for such an elaborate process of many transactions and approvals produces a robust system for guiding interactions among multiple parties, such a system prevents users from causing a manual charge of a vehicle's battery to be initiated in a direct and convenient manner.

Unlike the elaborate multi-transactional system of Ferro, which requires a series of transactions before a vehicle can be charged, the invention of claim 1 provides a vehicle charger that wirelessly communicates with a controller remote from the vehicle charger and associated with a computer or processor-based device (e.g., a phone, etc.). The vehicle charger of amended

[12] *See* Ferro at ¶¶ 52 – 53.

claim 1 receives and is responsive to a signal from the remote controller associated with the computer to start a manual charging of a vehicle battery. The signal is received by the vehicle charger in response to a user selecting a user-manipulable control on a screen that is associated with the remote controller, and the user-manipulable control is operable, when selected, to start a manual charging of the vehicle battery.

None of Hobbs, Matsumura, Nor, Ferro, or any of the other references cited by the Examiner, whether taken alone or in combination, teach the initiation of a manual charge based on such a signal from a remote controller or computer in response to a user's input to a screen. Specifically, the combined teachings of Hobbs, Matsumura, Nor, Ferro, and the other references cited by the Examiner fail to teach at least the claim 1 limitations of a vehicle charger:

(1) "adapted for communication with a first controller remote from the vehicle and vehicle charger;"

(2) "adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer;"

(3) "wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller;" and

(4) "wherein the user-manipulatable control is operable by the user to start a manual charge of the battery."

Accordingly, independent claim 1 is allowable. Claims 7, 11, 12, 20, 26, and 42, which depend from independent claim 1, are also allowable for at least the same reasons as claim 1. Claims 7, 11, 12, 20, 26, and 42 are also allowable for additional independent reasons not discussed herein.

Independent claim 46 includes limitations that are similar to some of those described above with respect to independent claim 1. Rationale similar to that described above with respect to independent claim 1 is applicable to those similar limitations in claim 46, with the conclusion that independent claim 46 is also allowable. Claims 48, 55, 56, 59, 60, and 68, which depend from independent claim 46, are also allowable for at least the same reasons as claim 46. Claims 48, 55, 56, 59, 60, and 68 are also allowable for additional independent reasons not discussed herein.

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Independent claim 95 includes limitations that are similar to some of those described above with respect to independent claim 1. Rationale similar to that described above with respect to independent claim 1 is applicable to those similar limitations in claim 95, with the conclusion that independent claim 95 is also allowable. Claims 100, 101, 104, 105, and 113, which depend from independent claim 95, are also allowable for at least the same reasons as claim 95. Claims 100, 101, 104, 105, and 113 are also allowable for additional independent reasons not discussed herein.

B. Dependent Claims 7 and 56

Claim 7 depends from independent claim 1. As described above, independent claim 1 is allowable. Horowitz fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to claim 7. Claim 7 is also, therefore, allowable.

Claim 56 depends from independent claim 46. As described above, independent claim 46 is allowable. Horowitz fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to claim 56. Claim 56 is also, therefore, allowable.

C. Dependent Claim 42

Claim 42 depends from independent claim 1. As described above, independent claim 1 is allowable. Kaplan fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, Nor, and Ferro with respect to claim 42. Claim 42 is also, therefore, allowable.

D. Dependent Claim 48

Claim 48 depends from independent claim 46. As described above, independent claim 46 is allowable. Vasant fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, Nor, and Ferro with respect to claim 48. Claim 48 is also, therefore, allowable.

E. Dependent Claim 101

Claim 101 depends from independent claim 95. As described above, independent claim 95 is allowable. Horowitz fails to cure the above-described deficiencies of the combination of Hobbs, Matsumura, Vasant, Gaza, and Ferro with respect to claim 101. Claim 101 is also, therefore, allowable.

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II. Conclusion

In light of the above, Applicant submits that the application is in condition for allowance, and respectfully requests that a Notice of Allowance be issued in this case. Applicant also requests that the Examiner telephone the Applicant in the event a telephone discussion would be helpful in advancing the prosecution of this application.

Respectfully submitted,

Christopher B. Austin
Inventor

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Tesla EX1002 Page 96

PTO/AIA/22 (03-13)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional)
Application Number 12/737,803	Filed February 17, 2011
For VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	
Art Unit 2859	Examiner Nathanial R. Pelton

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$ 100
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

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

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 133080.

☑ Payment made via EFS-Web.

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.

I am the

☑ applicant.

☐ attorney or agent of record. Registration number _____.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/christopher b. austin/	February 5, 2018
Signature	Date
Christopher B. Austin	414-271-6560
Typed or printed name	Telephone Number

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

☑ * Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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: Mail Stop PCT, 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:

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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.

Electronic Patent Application Fee Transmittal					
Application Number:	12737803				
Filing Date:	17-Feb-2011				
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD				
First Named Inventor/Applicant Name:	Christopher B. Austin				
Filer:	Christopher B. Austin/Dorothy Hauser				
Attorney Docket Number:					
Filed as Small Entity					
Filing Fees for U.S. National Stage under 35 USC 371					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	2251	1	100	100
Miscellaneous:				
		Total in USD ($)		**100**

Electronic Acknowledgement Receipt	
EFS ID:	31697135
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	Christopher B. Austin - 935 17th Avenue - Grafton WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
Filer Authorized By:	Christopher B. Austin
Attorney Docket Number:	
Receipt Date:	05-FEB-2018
Filing Date:	17-FEB-2011
Time Stamp:	11:48:14
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$100

RAM confirmation Number	020518INTEFSW11490700
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		22724840_As_Filed_Response_to_10-04-2017_OA.PDF	141847 136b23df50ecd5b6a14dccc74205286c3a9735d3	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	14

Warnings:

Information:

2	Extension of Time	22724906_As_Filed_Extension_of_Time.PDF	162936 bf9f841d732920457c0c2fb07b96f82f8d942296	no	2

Warnings:

Information:

3	Fee Worksheet (SB06)	fee-info.pdf	30446 a7be343516dc3affde12c706ce6bd7c827ecf50f	no	2

Warnings:

Information:

Total Files Size (in bytes):	335229

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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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 10/04/2017

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

EXAMINER	
PELTON, NATHANIEL R	

ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
10/04/2017	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. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	AIA (First Inventor to File) Status No

-- 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 *RCE filed on 09/19/2017*.

☐ 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) *See Continuation Sheet* 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, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113* 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 _____ 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: _____.

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Continuation of Disposition of Claims: Claims pending in the application are 1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/19/2017 has been entered.

Response to Amendment

Acknowledgement is made of the amendments filed on 09/19/2017 in which claims 1, 46, and 95 were amended. Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are pending for examination below.

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been

obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549], Nor et al. [US 5,548,200], and Ferro et al [US 2009/0313034].

With respect to claims 1 and 26, Hobbs discloses a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger [**130 Fig. 1**], the vehicle charger comprising: an electrical power cord [**125 Fig. 1**] releasably attachable to at least one of the vehicle [**by plug 126 Fig.** 1] and a source of power [**105 Fig. 1; power grid**]; a second controller electrically coupled to the electrical power cord [**270 Fig. 1**]; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller [**col. 7 lines 29-51 and col. 11 lines 1-9**], the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger [**130 can program 100; col. 7 lines 29-51**]; and at least one user-manipulatable control coupled to the second controller and operable by a user to enter information [**130 or 104 Fig. 1**]. However Hobbs fails to explicitly disclose to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger and automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery and

wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power.

Matsumura teaches to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Nor teaches at least one signal related to a cost of electrical power that automatically changes a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery [**col. 4 lines 4-20 and col. 9 lines 29-61**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a threshold cost of power to the battery as taught by Nor for the benefit of reducing the cost of power to the user as suggested by Nor.

Ferro teaches wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power [**par. 0115; i.e. while the user is away a**

dynamic charging takes place on the vehicle by automatically starting charging when the price of electricity falls below a low price threshold].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a low threshold cost of power to the battery as taught by Ferro for the benefit of reducing the cost of power to the user.

With respect to claims 11 and 59, Hobbs further teaches comprising a display coupled to the second controller, the display displaying a level of charge of the battery [**107 Fig.1; indication to alert user when battery is charged; col. 3 lines 15-26**].

With respect to claims 12 and 60, Hobbs further discloses a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claims 20 and 68, Hobbs further discloses a display displaying a total power cost of a charging session [**col. 7 lines 16-19**].

With respect to claim 46, Hobbs discloses a vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller [**270 Fig. 2**]; a display coupled to the controller and adapted to display a time [**107 Fig. 1; col. 7 lines 1-28**]; and a user-manipulatable control coupled to the controller and operable by a user [**130 Fig. 1**] the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging [**col. 7 lines 29-51; col. 14 lines 47-56**]. However, Hobbs fails to explicitly disclose operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user and wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery and wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit

of more efficient charging based on available time to recharge as suggested by Matsumura.

Nor teaches wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery [**col. 4 lines 4-20 and col. 9 lines 29-61**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a threshold cost of power to the battery as taught by Nor for the benefit of reducing the cost of power to the user as suggested by Nor.

Ferro teaches wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power [**par. 0115; i.e. while the user is away a dynamic charging takes place on the vehicle by automatically starting charging when the price of electricity falls below a low price threshold**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a low threshold cost of power to the battery as taught by Ferro for the benefit of reducing the cost of power to the user.

With respect to claim 55, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with

another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

Claims 7 and 56 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], Nor et al. [US 5,548,200], and Ferro et al [US 2009/0313034] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claims 7 and 56, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Claim 42 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], Nor et al. [US 5,548,200], and Ferro et al [US 2009/0313034] as applied above, and further in view of Kaplan et al. [US 2008/0052145].

With respect to claim 42, Hobbs fails to explicitly teach a battery of the vehicle charger coupled to the second controller supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

Kaplan teaches further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger [**1508 Fig. 15; backup battery for operation in case of power outage; par. 0198**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to include the battery for the benefit of still being able to supply power during a power outage event.

Claims 48 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], Nor et al. [US 5,548,200], and Ferro et al [US 2009/0313034] as applied above, and further in view of Vasant [US 7,243,746].

With respect to claim 48, Hobbs fails to explicitly disclose the display is mounted in a console within the vehicle.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within

reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Claims 95, 100, 104, 105, and 113 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549], Vasant [US 7,243,746], Gaza [US 2002/0079868], and Ferro et al [US 2009/0313034].

With respect to claim 95, Hobbs discloses a vehicle charger for charging a battery of a vehicle, the vehicle charger comprising: a display [**107 Fig. 1**]; a user-manipulatable control within reach of the user seated within the vehicle [**130 Fig. 1; col. 7 lines 30-48; may be hand held PDA; additionally cord 131 provides freedom of movement**]; a controller coupled to the display and to the battery [**270 Fig. 2**], the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging [**col. 10 lines 32-67**]. However, Hobbs fails to explicitly disclose entering a time of day and the controller changes supply of power based on time of day entered by the user as well as the display being mounted within the vehicle and the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of

battery charge is reached, and wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Gaza teaches the controller supplies electric power to a battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by a user, the controller supplying electric power to the battery at least until

the threshold level of battery charge is reached [**claim 2; monitoring of battery level wherein a charge termination signal is override when battery level drops below predetermined level**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to supply electric power to the battery independent of the time of day cutoff when the batter is below a threshold as taught by Vasant for the benefit of preventing over-discharging of the battery as suggested by Gaza.

Ferro teaches wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery [**par. 0115; i.e. while the user is away a dynamic charging takes place on the vehicle by automatically starting charging when the price of electricity falls below a low price threshold**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a low threshold cost of power to the battery as taught by Ferro for the benefit of reducing the cost of power to the user.

With respect to claim 100, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

With respect to claim 104, Hobbs further discloses wherein the controller is also adapted to display a level of charge of the battery on the display [**107 Fig. 1; indication to alert user when battery is charged col. 3 lines 15-26**].

With respect to claim 105, Hobbs further discloses wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claim 113, Hobbs further disclose wherein the controller is also adapted to display on the display a total power cost of the charging session [**bill for the fuel (charge) is displayed col. 7 lines 16-19**].

Claim 101 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], Vasant [US 7,243,746], Gaza [US 2002/0079868], and Ferro et al [US 2009/0313034] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claim 101, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Response to Arguments

Applicant's arguments with respect to claims 1, 46, and 95 have been considered but are moot because the arguments do not apply to the new reference to Ferro being used in the current rejection. The Examiner appreciates Applicant's arguments, however construing the receiving/delivery of power based on cost is well-known in the art as evidenced by Ferro (see rejection above).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL PELTON whose telephone number is (571)270-1761. The examiner can normally be reached on M-F 9:00-5:00 and by e-mail at nathaniel.pelton@uspto.gov (please include authorization to communicate via e-mail through AIR).

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, Richard Isla-Rodas can be reached on 571-272-5056. 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.

/NATHANIEL PELTON/
Primary Examiner, Art Unit 2859

Notice of References Cited	Application/Control No. 12/737,803	Applicant(s)/Patent Under Reexamination AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	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-2009/0313034 A1	12-2009	Ferro; Erica Haefner	B60L8/003	705/1.1
*	B	US-2009/0243538 A1	10-2009	Kelty; Kurt Russell	B60L11/1851	320/104
*	C	US-2006/0276938 A1	12-2006	Miller; Craig Howard	G06Q50/06	700/295
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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.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

CPC- SEARCHED		
Symbol	Date	Examiner
H02J 7/0042, 7/0047, 7/088	4-27-16	nrp
H01M 10/44	4-27-16	nrp
B60L 11/1824	4-27-16	nrp
H02J 7/0042, 7/0047, 7/088	8-9-16	nrp
H01M 10/44	8-9-16	nrp
B60L 11/1824	8-9-16	nrp
H02J 7/0042, 7/0047, 7/088	4-15-17	nrp
H01M 10/44	4-15-17	nrp
B60L 11/1824	4-15-17	nrp
H02J 7/0042, 7/0047, 7/088	9-30-17	nrp
H01M 10/44	9-30-17	nrp
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CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
320	109	7-13-13	nrp
320	109	4-27-16	nrp
320	109	8-9-16	nrp
320	109	4-15-17	nrp
320	109	9-30-17	nrp

* 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

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

SEARCH NOTES		
Search Notes	**Date**	**Examiner**
requested PLUS search on spec and clalms	7-13-13	nrp
performed inventor search	7-13-13	nrp
updated East search (see attached)	4-27-16	nrp
updated East search (see attached)	8-9-16	nrp
updated East search (see attached)	4-15-17	nrp
updated East search (see attached)	9-30-17	nrp

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

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

✓	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								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

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	Examiner	Art Unit
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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
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	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S66	41747	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:39
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S69	8	("320".clas. or h02j7/$$.cpc. or b60l11/$$.cpc.) and (automatic$4 with ((cost$3 or pric$3 or money) near5 (power or electricity or energy)) with (start$4 or initiat$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:43
S70	83	S67 and (((cost$3 or pric$3 or money) near5 (power or electricity or energy)) with (below or lower or less))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/09/30 10:59

EAST Search History (Interference)

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9/30/2017 11:40:10 AM
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Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-14)
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 contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	12737803	Filing Date	2011-02-17	Docket Number (if applicable)		Art Unit	2859
First Named Inventor	Christopher B. Austin			Examiner Name	Nathanial R. Pelton		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☒ Other Petition for Extension of Time Under 37 CFR 1.136(a) and Small Entity Fee Under 37 CFR 1.17(a)(2)

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 133080

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
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Name	Christopher B. Austin	Registration Number	41592

This collection of information is required by 37 CFR 1.114. 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.

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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 inspections or an issued patent.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional)
Application Number 12/737,803	Filed February 17, 2011
For VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	
Art Unit 2859	Examiner Nathanial R. Pelton

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☑	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$ 300
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

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

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 133080.

☑ Payment made via EFS-Web.

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.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 41,592.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/christopher b. austin/	September 19, 2017
Signature	Date
Christopher B. Austin	414-331-0988
Typed or printed name	Telephone Number

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

☑ * Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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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.
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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.
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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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Title	:	VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD
Application No.	:	12/737,803
Inventor(s)	:	Christopher B. Austin
Filed	:	February 17, 2011
Confirmation No.	:	2226
Group Art Unit	:	2859
Examiner	:	Nathanial R. Pelton
Attorney Docket No.	:	N/A

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

AMENDMENT ACCOMPANYING A
REQUEST FOR CONTINUED EXAMINATION UNDER 37 C.F.R. § 1.114

Commissioner:

This communication responds to the final Office Action mailed April 20, 2017, and is filed with a Request for Continued Examination ("RCE") under 37 C.F.R. § 1.114. Applicant requests a two-month extension of time to file this Amendment and Response and the accompanying RCE, and requests that the necessary RCE fee and extension of time fee by charged to Deposit Account No. 13-3080. Please charge any shortage of fees associated with this communication to Deposit Account No. 13-3080.

CONTENTS OF COMMUNICATION

CLAIMS	:	Amendments to the claims begin on page 2.
REMARKS	:	Remarks begin on page 7.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, the at least one signal related to a cost of electrical power, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power; and

at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

2-6. (Canceled)

7. (Original) The vehicle charger of claim 1, wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

8-10. (Canceled)

11. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying a level of charge of the battery.

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12. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller.

13-19. (Canceled)

20. (Original) The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21-25. (Canceled)

26. (Original) The vehicle charger of claim 1, wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27-41. (Canceled)

42. (Original) The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

43-45. (Canceled)

46. (Currently Amended) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller automatically changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of

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charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user, wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power.

47. (Canceled)

48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49-54. (Canceled)

55. (Original) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver.

56. (Original) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

57-58. (Canceled)

59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

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60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61-67. (Canceled)

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69-94. (Canceled)

95. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,

wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached, and

wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery.

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96-99. (Canceled)

100. (Original) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and the receiver.

101. (Original) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

102-103. (Canceled)

104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

106-112. (Canceled)

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114-152. (Canceled)

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REMARKS

Prior to this communication, claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 were pending. Claims 1, 46, and 95 are hereby amended. No new matter has been added.

I. Claim Rejections under 35 U.S.C. § 103

On pages 2-6 of the Office Action, claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,963,186 ("Hobbs") in view of U.S. Patent Application Publication No. 2009/0243549 ("Matsumura") and U.S. Patent No. 5,548,200 ("Nor").

Also, on pages 6 and 7 of the Office Action, claims 7 and 56 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, and U.S. Patent Application Publication No. 2007/0144605 ("Horowitz").

In addition, on pages 7 and 8 of the Office Action, claim 42 stands rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, and U.S. Patent Application Publication No. 2008/0052145 ("Kaplan").

Also, on page 8 of the Office Action, claim 48 stands rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Nor, and U.S. Patent No. 7,243,746 ("Vasant").

In addition, on pages 8-11 of the Office Action, claims 95, 100, 104, 105, and 113 stand rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Vasant, and U.S. Patent Application Publication No. 2002/0079868 ("Gaza").

Lastly, on pages 11 and 12 of the Office Action, claim 101 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Matsumura, Vasant, Gaza, and Horowitz.

A. Independent Claims 1 and 46

1. Independent Claim 1

Independent claim 1 is directed to a vehicle charger for charging a vehicle battery. The vehicle charger is adapted to communicate with a first controller that is remote from both the vehicle and the vehicle charger. The vehicle charger includes a second controller that is adapted to communicate with the first controller and control charging of the vehicle battery in response to

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signals from the first controller. Among the signals from the first controller to which the second controller is responsive is a signal related to the cost of electrical power. When the cost of electrical power is less than or equal to a threshold cost of power, the second controller starts charging the vehicle battery.

Specifically, independent claim 1 recites a vehicle charger including a second controller:

(1) "the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery;" and

(2) "the at least one signal related to a cost of electrical power, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power."

The combination of Hobbs, Matsumura, and Nor fail to disclose or suggest at least the above limitations of claim 1. With respect to the above limitations, the Examiner acknowledges that the combination of Hobbs and Matsumura fails to teach a controller "automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery."[1]

Instead, the Examiner relies solely on the teachings of Nor with respect to automatically changing the charging state of the vehicle charger as recited in claim 1. However, Applicant respectfully submits that, even if the teachings of Nor were to be combined with the teachings of Hobbs and Matsumura as the Examiner suggests, the combined teachings still fail to teach the above limitations of claim 1.

Specifically, the Examiner asserts that "Nor teaches wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery."[2, 3] Claim 1 is distinguishable from the combined teachings of Hobbs, Matsumura, and Nor for at least two reasons: (1) the prior art combination's control of a charging state is based on aggregate costs incurred *while charging* a vehicle battery; and (2) the prior art combination is only concerned with the termination of a charging process—not starting charging.

[1] Office action dated April 20, 2017 at 6.
[2] Office action dated April 20, 2017 at 6.
[3] Applicant notes that the actual language of claim 1 differs from the Examiner's recitation of Nor's alleged teachings.

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First, the teachings of Nor relied upon by the Examiner describe monitoring an amount of money expended while charging a vehicle battery: "at 64 where a determination has been made as to whether or not preset values of total kWh to be delivered to the battery have been reached, or if a predetermined price of energy has been reached."[4] Therefore, the charger in Nor is acting like a traditional gasoline pump. For a normal gasoline pump, the supply of fuel is terminated when the tank is full (i.e., a preset number of gallons of gasoline present in the gas tank has been reached). Similarly, Nor teaches determining when a preset value of kilowatt hours ("kWh") has been reached. Both preset values correspond to, for example, an energy reservoir for a vehicle being "full"—the only difference being the type of energy that is being stored.

Alternatively, those using a traditional gasoline pump can stop the gasoline pump from pumping once a desired dollar amount for the gasoline has been reached. When Nor describes determining whether a predetermined price of energy has been reached, Nor is referring to a total cost of energy that has already been received.

Second, both of these determinations by the charger of Nor are highlighted by the actions the charger of Nor takes when either condition is satisfied. In both instances, Nor immediately *terminates* charging.[5] If neither termination condition is satisfied, the charger of Nor continues charging.[6] Accordingly, Nor merely teaches using a preset aggregate price of received energy to terminate a charging operation.

In contrast to Nor, independent claim 1 requires that, when a cost of electrical power is *equal to* or *less than* a threshold cost of power, the vehicle charger *starts* charging. The threshold cost of power can be any of a variety of values. For example, the threshold cost of power can correspond to a unit price of electricity (e.g., per kWh), a projected total cost of charging based on unit price and current state of charge, etc. Regardless of how the cost of electrical power is quantified, the signal from the first, remote controller that the vehicle charger responds to causes the vehicle charger to *start* charging the vehicle battery.

As set forth above, Nor merely teaches monitoring an aggregate cost of energy received during a charging operation and terminating charging when a desired value has been reached. Nor is silent regarding a cost of electrical power reaching a threshold cost of power and, in response, starting the charging of a vehicle battery.

[4] Nor at 9:31-37.
[5] Nor at 9:35-36.
[6] Nor at 9:45-50.

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Therefore, even if the teachings of charge termination in Nor were to be combined with the teachings of Hobbs and Matsumura as suggested by the Examiner, the combined teachings of Hobbs, Matsumura, and Nor fail to teach a vehicle charger starting charging of a vehicle battery when a cost of electrical power is equal to or less than a threshold cost of power. Specifically, the combined teachings of Hobbs, Matsumura, and Nor fail to disclose or suggest at least the claim 1 limitations of a vehicle charger including a second controller:

(1) "the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery;" and

(2) "the at least one signal related to a cost of electrical power, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power."

Accordingly, independent claim 1 is allowable. Claims 7, 11, 12, 20, 26, and 42, which depend from independent claim 1, are also allowable for at least the same reasons as claim 1. Claims 7, 11, 12, 20, 26, and 42 are also allowable for additional independent reasons.

2. Independent Claim 46

Independent claim 46 includes limitations that are similar to some of those described above with respect to independent claim 1. Rationale similar to that described above with respect to independent claim 1 can be applied to those similar limitations in claim 46, with the conclusion that independent claim 46 is also allowable. Claims 48, 55, 56, 59, 60, and 68, which depend from independent claim 46, are also allowable for at least the same reasons as claim 46. Claims 48, 55, 56, 59, 60, and 68 are also allowable for additional independent reasons.

B. Independent Claim 95

Independent claim 95 recites a vehicle charger for charging a vehicle battery "wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery."

However, unlike independent claim 1, independent claim 95 is rejected based on the combination of Hobbs, Matsumura, Vasant, and Gaza. As described above with respect to claim 1, the combination of Hobbs, Matsumura, and Nor fails to disclose or suggest a vehicle charger starting charging of a vehicle battery when a cost of electrical power is equal to or less than a threshold cost of power.

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Like Nor, Vasant and Gaza, whether their teachings are combined with the teachings of Hobbs and Matsumura or not, fail to disclose or suggest a vehicle charger starting charging of a vehicle battery when a cost of electrical power is equal to or less than a threshold cost of power. As indicated by the Examiner, Vasant merely teaches a display mounted in a vehicle console,[7] and Gaza merely teaches controlling battery charging based on battery state of charge. Neither Vasant nor Gaza teaches a vehicle charger starting charging of a vehicle battery when a cost of electrical power is equal to or less than a threshold cost of power.

Therefore, the combination of Hobbs, Matsumura, Vasant, and Gaza fails to disclose or suggest a vehicle charger for charging a vehicle battery "wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery."

Accordingly, independent claim 95 is also allowable. Claims 100, 101, 104, 105, and 113, which depend from independent claim 95, are also allowable for at least the same reasons as claim 95. Claims 100, 101, 104, 105, and 113 are also allowable for additional independent reasons.

C. Dependent Claims 7 and 56

Claim 7 depends from independent claim 1. As described above, independent claim 1 is allowable. Horowitz does not cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to this claim. Claim 7 is also, therefore, allowable.

Claim 56 depends from independent claim 46. As described above, independent claim 46 is allowable. Horowitz does not cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to this claim. Claim 56 is also, therefore, allowable.

D. Dependent Claim 42

Claim 42 depends from independent claim 1. As described above, independent claim 1 is allowable. Kaplan does not cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to this claim. Claim 42 is also, therefore, allowable.

[7] Office action dated April 20, 2017 at 10.

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E. Dependent Claim 48

Claim 48 depends from independent claim 46. As described above, independent claim 46 is allowable. Vasant does not cure the above-described deficiencies of the combination of Hobbs, Matsumura, and Nor with respect to this claim. Claim 48 is also, therefore, allowable.

F. Dependent Claim 101

Claim 101 depends from independent claim 95. As described above, independent claim 95 is allowable. Horowitz does not cure the above-described deficiencies of the combination of Hobbs, Matsumura, Vasant, and Gaza with respect to this claim. Claim 101 is also, therefore, allowable.

II. Conclusion

In light of the above, Applicant submits that the application is in condition for allowance and respectfully requests that a Notice of Allowance be issued in this case. Applicant also requests that the Examiner telephone the Applicant in the event a telephone discussion would be helpful in advancing the prosecution of this application.

Respectfully submitted,

/christopher b. austin/

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Tesla EX1002 Page 146

Electronic Patent Application Fee Transmittal	
Application Number:	12737803
Filing Date:	17-Feb-2011
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Filer:	Christopher B. Austin/Dorothy Hauser
Attorney Docket Number:	
Filed as Small Entity	

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	2252	1	300	300
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	2820	1	850	850
		Total in USD ($)		**1150**

Electronic Acknowledgement Receipt	
EFS ID:	30407811
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	Christopher B. Austin - 935 17th Avenue - Grafton WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
Filer Authorized By:	Christopher B. Austin
Attorney Docket Number:	
Receipt Date:	19-SEP-2017
Filing Date:	17-FEB-2011
Time Stamp:	15:27:29
Application Type:	U.S. National Stage under 35 USC 371

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RAM confirmation Number	092017INTEFSW15282900
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	Request for Continued Examination (RCE)	21746316_013350-9001_As_Filed_RCE.PDF	1349929 8b6765bfefffa0230a25158634d222561ffc1dde	no	3
Warnings:					
Information:					
2	Extension of Time	21746320_013350-9001_As_Filed_Extension.PDF	163269 ef65e9c3ea8ff68c1129a3730d99f19475ad29a7	no	2
Warnings:					
Information:					
3		21746441_013350-9001_As_Filed_Response.PDF	117086 1ff2dd5c14e4a4df28e98dc85acaa99e2592cc15	yes	12

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment Submitted/Entered with Filing of CPA/RCE	1	1
Claims	2	6
Applicant Arguments/Remarks Made in an Amendment	7	12

Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32100 69d5f26334d84a5140715f5c116602e950ae0ac6	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1662384

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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.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/737,803	Filing Date 02/17/2011	☐ 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 **09/19/2017**

	(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))	* 20	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	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.

SLIE
KAREN VESTAL

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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 04/20/2017

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

EXAMINER	
PELTON, NATHANIEL R	

ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
04/20/2017	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. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	AIA (First Inventor to File) Status No

-- 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 *RCE filed on 02/13/2017*.

☐ 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) *See Continuation Sheet* 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, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113* 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 _____ 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: _____.

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Continuation of Disposition of Claims: Claims pending in the application are 1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/13/2017 has been entered.

Response to Amendment

Acknowledgement is made of the amendment/arguments filed on 02/13/2017 in which claims 1 and 46 were amended. Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are pending for examination below.

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549] and Nor et al. [US 5,548,200].

With respect to claims 1 and 26, Hobbs discloses a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger [**130 Fig. 1**], the vehicle charger comprising: an electrical power cord [**125 Fig. 1**] releasably attachable to at least one of the vehicle [**by plug 126 Fig.** 1] and a source of power [**105 Fig. 1; power grid**]; a second controller electrically coupled to the electrical power cord [**270 Fig. 1**]; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller [**col. 7 lines 29-51 and col. 11 lines 1-9**], the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger [**130 can program 100; col. 7 lines 29-51**]; and at least one user-manipulatable control coupled to the second controller and operable by a user to enter information [**130 or 104 Fig. 1**]. However Hobbs fails to explicitly disclose to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger and automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery.

Matsumura teaches to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Nor teaches automatically changing a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery [**col. 4 lines 4-20 and col. 9 lines 29-61**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a threshold cost of power to the battery as taught by Nor for the benefit of reducing the cost of power to the user as suggested by Nor.

With respect to claims 11 and 59, Hobbs further teaches comprising a display coupled to the second controller, the display displaying a level of charge of the battery [**107 Fig.1; indication to alert user when battery is charged; col. 3 lines 15-26**].

With respect to claims 12 and 60, Hobbs further discloses a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller

[**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claims 20 and 68, Hobbs further discloses a display displaying a total power cost of a charging session [**col. 7 lines 16-19**].

With respect to claim 46, Hobbs discloses a vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising: a controller [**270 Fig. 2**]; a display coupled to the controller and adapted to display a time [**107 Fig. 1; col. 7 lines 1-28**]; and a user-manipulatable control coupled to the controller and operable by a user [**130 Fig. 1**] the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging [**col. 7 lines 29-51; col. 14 lines 47-56**]. However, Hobbs fails to explicitly disclose operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user and wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Nor teaches wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery [**col. 4 lines 4-20 and col. 9 lines 29-61**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a threshold cost of power to the battery as taught by Nor for the benefit of reducing the cost of power to the user as suggested by Nor.

With respect to claim 55, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

Claims 7 and 56 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Nor et al. [US 5,548,200] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claims 7 and 56, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Claim 42 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Nor et al. [US 5,548,200] as applied above, and further in view of Kaplan et al. [US 2008/0052145].

With respect to claim 42, Hobbs fails to explicitly teach a battery of the vehicle charger coupled to the second controller supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

Kaplan teaches further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger [**1508 Fig. 15; backup battery for operation in case of power outage; par. 0198**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to include the battery for the benefit of still being able to supply power during a power outage event.

Claims 48 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Nor et al. [US 5,548,200] as applied above, and further in view of Vasant [US 7,243,746].

With respect to claim 48, Hobbs fails to explicitly disclose the display is mounted in a console within the vehicle.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Claims 95, 100, 104, 105, and 113 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549], Vasant [US 7,243,746], and Gaza [US 2002/0079868].

With respect to claim 95, Hobbs discloses a vehicle charger for charging a battery of a vehicle, the vehicle charger comprising: a display [**107 Fig. 1**]; a user-

manipulatable control within reach of the user seated within the vehicle [**130 Fig. 1; col. 7 lines 30-48; may be hand held PDA; additionally cord 131 provides freedom of movement**]; a controller coupled to the display and to the battery [**270 Fig. 2**], the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging [**col. 10 lines 32-67**]. However, Hobbs fails to explicitly disclose entering a time of day and the controller changes supply of power based on time of day entered by the user as well as the display being mounted within the vehicle and the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Gaza teaches the controller supplies electric power to a battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by a user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached [**claim 2; monitoring of battery level wherein a charge termination signal is override when battery level drops below predetermined level**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to supply electric power to the battery independent of the time of day cutoff when the batter is below a threshold as taught by Vasant for the benefit of preventing over-discharging of the battery as suggested by Gaza.

With respect to claim 100, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

With respect to claim 104, Hobbs further discloses wherein the controller is also adapted to display a level of charge of the battery on the display [**107 Fig. 1; indication to alert user when battery is charged col. 3 lines 15-26**].

With respect to claim 105, Hobbs further discloses wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claim 113, Hobbs further disclose wherein the controller is also adapted to display on the display a total power cost of the charging session [**bill for the fuel (charge) is displayed col. 7 lines 16-19**].

Claim 101 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], Vasant [US 7,243,746], and Gaza [US 2002/0079868] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claim 101, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Response to Arguments

Applicant's arguments filed 02/13/2017 have been fully considered but they are not persuasive.

Applicant positively sets forth the following arguments:

I. The modification of a vehicle battery charger according to the combined teachings of Hobbs and Matsumura so that battery charging could be interrupted based upon power cost would be counter to the primary purpose of Matsumura (arguments page 10).

II. There is nothing in Nor that teaches or suggests automatically changing a charging state of a vehicle charger or electric supply to the vehicle battery "at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery" and that Nor does not automatically change the charging state of a vehicle or the electric supply to the vehicle battery (arguments page 11).

III. Hobbs, Matsumura, Vasant, and Gaza are all completely silent regarding any such ability of a vehicle battery controller to "override" a charger time setting input by a user (arguments page 12)

IV. Even though Gaza teaches independent control, Gaza does not disclose changing a supply of electric power to charge bases at least upon a time of day entered

by the user, “The only thing Gaza overrides is a timer….this has nothing to do with a particular time of day” (arguments page 13).

V. Gaza does not teach a charging override “independent of the time of day entered” (arguments page 13).

The Examiner respectfully submits:

I. Applicant fails to consider the 103 rejection of claim 1 as a whole. For instance, Hobbs and Matsumura were not used to teach interruption based upon power cost but rather, Matsumura was introduced to teach enabling a user to enter a time of day by which the battery must be charged. The benefit being more efficient charging and increased user control on the recharging operation. Therefore the combination is indeed proper.

II. On the contrary Nor explicitly states in col. 4 lines 4-20 that the system contains a meter which measures "the monetary price of the energy to be delivered to the battery" with col. 9 lines 29-61 giving the example that when the logic decision of whether or not a predetermined price of energy has been reached. The result of said decision is that "charging function is terminated". Therefore it is clear that at the time associated with a cost of power to the battery reaching the threshold cost of power to the battery (i.e. has a predetermined price of energy been reached) that the charging state is automatically changed (i.e. termination of charging function).

III. In response to applicant's argument that the references fail to show certain features of applicant’s invention, it is noted that the features upon which applicant relies

(i.e., a controller for overriding a charger time) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). For instance, the claims call for a controller to supply power independent of the time of day entered by the user.

IV. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case Matsumura was used to teach a user to enter a time of day at which the charging session will end and Gaza to teach a controller supplying power to a battery if a level of battery charge is below a threshold of battery charge independent of the time of day.

V. As Applicant notes, Gaza does not make any indication about the control being dependent upon a time of day entered by any user. Gaza does discloses overriding a charge termination signal based only on when the battery voltage drops below a threshold as required by the claim limitations (i.e. independent of the time of day).

Therefore the rejection is proper and thus maintained.

Conclusion

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL PELTON whose telephone number is (571)270-1761. The examiner can normally be reached on M-F 9:00-5:00 and by e-mail at nathaniel.pelton@uspto.gov (please include authorization to communicate via e-mail through AIR).

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, Richard Isla-Rodas can be reached on 571-272-5056. 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.

/NATHANIEL PELTON/
Primary Examiner, Art Unit 2859

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S56	38844	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/14 14:21
S57	9252	S56 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/14 14:21
S58	363	S57 and (((cost$3 or pric$3 or money) near5 (power or electricity or energy)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/14 14:21
S59	3	"8772970".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/15 13:19
S60	1	"8772970".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/15 13:20
S61	3	"6963186".pn. or "20090243549".pn. or "5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/16 09:33
S62	1	"20020079868".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/16 09:48
S63	38868	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/16 10:53
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S65	10	S64 and (overrid$3 with (below or lower or less))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/16 10:53

EAST Search History (Interference)

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4/16/2017 11:02:30 AM
C:\Users\npelton\Documents\EAST\Workspaces\12737803.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

CPC- SEARCHED		
Symbol	Date	Examiner
H02J 7/0042, 7/0047, 7/088	4-27-16	nrp
H01M 10/44	4-27-16	nrp
B60L 11/1824	4-27-16	nrp
H02J 7/0042, 7/0047, 7/088	8-9-16	nrp
H01M 10/44	8-9-16	nrp
B60L 11/1824	8-9-16	nrp
H02J 7/0042, 7/0047, 7/088	4-15-17	nrp
H01M 10/44	4-15-17	nrp
B60L 11/1824	4-15-17	nrp

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
320	109	7-13-13	nrp
320	109	4-27-16	nrp
320	109	8-9-16	nrp
320	109	4-15-17	nrp

SEARCH NOTES		
Search Notes	Date	Examiner
requested PLUS search on spec and clalms	7-13-13	nrp
performed inventor search	7-13-13	nrp
updated East search (see attached)	4-27-16	nrp
updated East search (see attached)	8-9-16	nrp
updated East search (see attached)	4-15-17	nrp

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

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

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	Art Unit
	NATHANIEL PELTON	2859

✓	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								
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	Examiner	**Art Unit**
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
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	151	-	-	-	-					
	152	-	-	-	-					

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-14)
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 contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	12737803	Filing Date	2011-02-17	Docket Number (if applicable)	000000-0977	Art Unit	2859
First Named Inventor	Christopher B. Austin			Examiner Name	Nathanial R. Pelton		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☒ Other Petition for Extension of Time Under 37 CFR 1.136(a) and Fee Under 37 CFR 1.17(a)(3)

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 133080

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
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 contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/christopher b. austin/	Date (YYYY-MM-DD)	2017-02-13
Name	Christopher B. Austin	Registration Number	41592

This collection of information is required by 37 CFR 1.114. 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.

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

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 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 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.

IPR2026-00377
Tesla EX1002 Page 182

PTO/AIA/22 (03-13)
Approved for use through 7/31/2016. 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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 000000-0977
Application Number 12/737,803	Filed February 17, 2011
For VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	
Art Unit 2859	Examiner Nathanial R. Pelton

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 700
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

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I am the

☐ applicant.

☑ attorney or agent of record. Registration number 41,592.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/christopher b. austin/	February 13, 2017
Signature	Date
Christopher B. Austin	414-331-0988
Typed or printed name	Telephone Number

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

☑ * Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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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:

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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.

REMARKS

By this Amendment, claims 1 and 46 are amended, leaving claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, 68, 100, 101, 104, 105, and 113 pending and unchanged. Claims 2-6, 8-10, 13-19, 21-25, 27-41, 43-45, 47, 49-54, 57, 58, 61-67, 69-94, 96-99, 102, 103, 106-112, and 114-152 were canceled in an earlier Amendment. The Applicant requests consideration of the pending claims in light of the following remarks.

On pages 2-6 of the Office Action, claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,963,186 issued to Hobbs ("Hobbs") in view of U.S. Patent Publication No. 2009/024359 in the name of Matsumura et al. ("Matsumura") and U.S. Patent No. 5,548,200 issued to Nor et al. ("Nor"). Also, on pages 6 of the Office Action, claims 7 and 56 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, and Nor, and further in view of U.S. Patent Publication No. 2007/0144605 in the name of Horowitz ("Horowitz"). In addition, on pages 7 and 8 of the Office Action, claim 42 is rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, and Nor, and further in view of U.S. Patent Publication No. 2008/0052145 in the name of Kaplan et al. ("Kaplan"), whereas claim 48 is rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, and Nor, and further in view of U.S. Patent No. 7,243,746 issued to Vasant ("Vasant"). Also, on pages 8-11 of the Office Action, claims 95, 100, 104, 105, and 113 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, Vasant, and U.S. Patent Publication No. 2002/0079868 in the name of Gaza ("Gaza"). Lastly, on page 11 of the Office Action, claim 101 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, Vasant, Gaza, and Horowitz.

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Independent claim 1 is hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:
>
> an electrical power cord releasably attachable to at least one of the vehicle and a source of power;
>
> a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery; and
>
> at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.
>
> (Amendment marks not shown).

Independent claim 46 is also hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:
>
> a controller;
>
> a display coupled to the controller and adapted to display a time; and
>
> a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller automatically changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user, wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery.
>
> (Amendment marks not shown).

In contrast, neither Hobbs, Matsumura, Nor, or their combination teach or suggest, among other things, a vehicle charger having a controller that (i) automatically changes a charging state of the vehicle charger or the supply of electric power to a vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery and (ii) enables a user to enter a time of day by which the battery must be charged or when the battery charging session will end, as

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claimed in amended claims 1 and 46. In the Office Action it is suggested that one of ordinary skill in the art would have found it obvious to modify the Hobbs charger 100 with Matsumura's teachings of a module 120 that enables a user to input a time value by which the battery charging cycle will end, to arrive at the vehicle battery charger of claims 1 and 46. Assuming *arguendo* that such a conclusion could be reached (and the Applicant respectfully disagrees with this conclusion), the Applicant notes that there is nothing in Hobbs, Matsumura, Nor, or their combined teachings to teach or suggest a controller that also automatically changes a charging state of the vehicle charger or electric power supply to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery.

Power cost is of no apparent concern to operations of the Hobbs charger. Hobbs only teaches a change in charging state (e.g., initiating or stopping a charging sequence) based upon user operation of the charger 100. *See* col. 7, lines 1-28 of Hobbs. Although Matsumura teaches the additional concept of setting a time point corresponding to the expected end of a charging session (Matsumura, par. 0023, lines 17-22 and par. 0050, lines 9-10) and changing charging parameters based upon the time available for charging, Matsumura also fails to teach or suggest any automatic change in a charging process at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery. Matsumura only teaches change of the charging process to "mitigate the current stress on battery life", and "extend long-term battery life" (Matsumura, par. 0016, lines 5-7, par. 0025, lines 1-3, respectively). In fact, modification of a vehicle battery charger according to the combined teachings of Hobbs and Matsumura so that battery charging could be interrupted based upon power cost would be counter to the primary purpose of Matsumura: extending the time during which current is supplied to the battery to thereby reduce the level of current to the battery for a complete charge. Charging processes that are interrupted due to cost thresholds would inherently shorten the available charging time ("Z" in Matsumura) during a charging session, which would require higher current levels to the battery to complete charging when the charger *is* charging, and would necessarily result in the higher current stresses that Matsumura is trying to eliminate (by spreading out charging time).

Nor is cited for its teaching of "automatically changing a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery" (Office Action, p. 4, lines 1-3). Although Nor teaches the ability to change the price of energy of a vehicle charging station based upon the time of day (see Nor, col. 4, lines 4-21, col. 9, lines 16-28, and col. 10, lines 34-38), Nor fails to teach or suggest an automatic change in a charging process at a time associated with a cost of

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power to a battery reaching a threshold cost of power to the battery. The battery charging stations taught by Nor are similar to the gas pumps of a standard gas station – enabling a user to quickly and conveniently identify the cost of energy (e.g., cost of gas per gallon, or cost of electricity per kWh), connect the user's vehicle to the station, transfer energy to the vehicle, and pay (e.g., "pay at the pump" or "pay at the station").

> [I]t is evident that there will exist the requirement for a significant number of charging stations to be available, as well as the requirement that each charging station should be capable of transferring electrical energy to the battery of the car as quickly as possible. Drivers of electric vehicles may be quite content to wait for 10 or 20 minutes for delivery of a significant amount of electrical energy (say, 20 to 50 kWh); but they will not be willing to wait a number of hours or overnight for their electric vehicle to be recharged. Nor, col. 2, lines 5-14.
>
> There is, therefore, the provision made by the present invention that charging stations in keeping with the guidelines established hereby will offer enhanced "user friendliness" through its features. They may, for example, include a credit or debit card interface, whereby a retail customer may simply and easily pay for the energy delivered to his electric vehicle battery. Nor, col. 3, lines 53-59.

There is nothing in Nor that teaches or suggests automatically changing a charging state of a vehicle charger or electric power supply to the vehicle battery "at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery" – no more so than a gas pump automatically interrupts a user pumping gas at a gas station when the price of gas changes as it does on a periodic basis. While Nor does indeed teach the ability to change "programmable registers or the like within the charging station to set the price per unit of energy depending on the time [of] day" (Nor, col. 10, lines 34-38), the stations of Nor do not automatically change the *charging state* of a vehicle or the electric power supply to a vehicle battery (e.g., to start, stop, increase, or decrease charging during a charging session) at any particular time, whether associated with power cost or otherwise.

Accordingly, Hobbs, Matsumura, Nor, and the other cited art fail to teach, describe, or suggest, among other things, a vehicle battery charger having a controller that (i) automatically changes a charging state of the vehicle charger or the supply of electric power to a vehicle battery at a time associated with a cost of power to a battery reaching a threshold cost of power to the battery and (ii) enables a user to enter a time of day by which the battery must be charged or when the battery charging session will end as claimed in amended claims 1 and 46. Amended claims 1 and 46 are therefore allowable for these and other reasons not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 1 and 46 is therefore respectfully requested.

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Claims 7, 11, 12, 20, 26, and 42, and claims 48, 55, 56, 59, 60, and 68 each depend from amended claims 1 and 46, respectively, and are therefore allowable based upon amended claims 1 and 46, and upon other features, elements, and limitations recited in amended claims 1 and 46 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, and 68 is therefore respectfully requested.

Claim 95 recites:

> A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:
> a display mounted within the vehicle within reach of a user seated within the vehicle;
> a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and
> a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,
> wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached.

In contrast, neither Hobbs, Matsumura, Vasant, Gaza, nor their combination teach or suggest, among other things, a vehicle charger that (i) enables a user to enter a time of day by which a controller of the battery charger changes a charging session while also (ii) supplying electric power to the battery despite the time entered (i.e., "independent of the time of day entered by the user") if the level of the battery charge is below a threshold, and (iii) continuing the supply of power despite the time entered at least until the threshold is reached as claimed in amended claim 95. Hobbs, Matsumura, and Vasant, and Gaza are all completely silent regarding any such ability of a vehicle battery controller to "override" a charger time setting input by a user. With regard to Hobbs, Matsumura, and Vasant, the user appears to have complete control over all operations of the disclosed vehicle charger, with no opportunity for the controller to override the user's command to start, stop, increase, or decrease battery charging. Indeed, nothing in Hobbs, Matsumura, or Vasant provides any motivation for such a feature, what purpose such a feature would have, or why such a feature would be necessary or desirable.

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The Examiner points to Gaza as teaching a controller the "supplies electric power to a battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by a user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached." Office Action, p. 9, line 21 to p.10, line 2. In support of this conclusion, the Examiner points to claim 2 of Gaza, which calls for a "device for measuring the battery cell voltage and overriding said termination signal when said battery voltage drops below a predetermined value."

Gaza does indeed teach an "override" charging device, as described in par. 0029 of Gaza. Specifically, when the system described in Gaza detects that a trickle charge is being provided to a battery, a timer is triggered that will cause charging to stop after trickle charging has taken place for a set period of time (e.g., two hours) in order to prevent damage to the battery due to long sustained charging. Gaza, par. 0029, lines 1-12. However, charging will continue if the measured voltage of the battery drops below a pre-set level during the period of time. Gaza, par. 0029, lines 21-24.

Assuming, *arguendo*, that one of ordinary skill in the art would apply the trickle charge "override" device of Gaza to the combined teachings of Hobbs, Matsumura, and Vasant as suggested by the Examiner, the Applicant respectfully submits that the combination of such art still fails to teach or suggest a vehicle battery charger having a controller that changes a supply of electric power to charge a battery based at least in part upon a time of day entered by a user, wherein the controller supplies electric power to the battery if the level of battery charge is below a threshold level *independent of the time of day entered by the user*, and supplies the power at least until the threshold is reached. The only thing Gaza overrides is a timer that will cause trickle charging to stop after a set period of time. This has nothing to do with a particular time of day (whether entered by a user or otherwise), so Gaza teaches nothing about a charging override "independent of the time of day entered by the user" as claimed in independent claim 95.

Turning to Hobbs, Matsumura, and Vasant, only Matsumura is cited for its teaching of enabling a user to enter a time of day by which a battery should be charged. In Matsumura, the time entered by a user (e.g., time "Y") indicating the end of the charging cycle is used to enable the disclosed system to set current values to "mitigate the current stress on battery life." There is no indication or suggestion that the charging "override" of Gaza as applied to Matsumura's teachings would be "independent of the time of day entered by the user" as claimed in independent claim 95. In fact, Matsumura teaches the very opposite: *insuring* that charging is taking place throughout a charging

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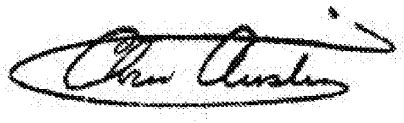
cycle to an available end time (Y) input by the user, yet with minimal stress on the battery. To supply power to the battery of Matsumura *independent of the time of day entered by the user* as suggested by the Examiner would ignore the principle of Matsumura: reducing battery stress while charging, and would do so without any need or advantage since the battery of Matsumura is already being charged (i.e., there is nothing to override). There is nothing in Gaza or Matsumura, or in Hobbs and Vasant, to teach or suggest that a controller would supply electric power to the battery if a level of charge of the battery is below a threshold *independent of the time of day entered by the user* as claimed in independent claim 95.

Accordingly, Hobbs, Matsumura, Vasant, Gaza, and their combination fail to teach, describe, or suggest, among other things, a vehicle battery charger having a controller that changes a supply of electric power to charge a battery based at least in part upon a time of day entered by a user, wherein the controller supplies electric power to the battery if the level of battery charge is below a threshold level independent of the time of day entered by the user, and supplies the power at least until the threshold is reached.

Claims 100, 101, 104, 105, and 113 each depend from amended claim 95, and are therefore allowable based upon amended claim 95 and upon other features, elements, and limitations recited in amended claim 95 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 100, 101, 104, 105, and 113 is therefore respectfully requested.

In light of the foregoing, the Applicant respectfully requests allowance of the pending claims. The undersigned is available during normal business hours by telephone if a telephone conference would facilitate prosecution of this application.

Respectfully submitted,



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Inventor

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LISTING OF THE CLAIMS

This listing of claims replaces all prior versions and listing of claims in the present application:

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger ~~based at least in part upon~~ at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery; and

at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

2-6. (Canceled)

7. (Original) The vehicle charger of claim 1, wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

8-10. (Canceled)

11. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying a level of charge of the battery.

12. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second

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controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller.

13-19. (Canceled)

20. (Original) The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21-25. (Canceled)

26. (Original) The vehicle charger of claim 1, wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27-41. (Canceled)

42. (Original) The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

43-45. (Canceled)

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46. (Currently Amended) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller automatically changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user, wherein the controller automatically changes the supply of electric power to the vehicle battery ~~based at least in part upon~~ at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery.

47. (Canceled)

48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49-54. (Canceled)

55. (Original) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver.

56. (Original) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

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57-58. (Canceled)

59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61-67. (Canceled)

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69-94. (Canceled)

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95. (Previously Presented) A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,

wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached.

96-99. (Canceled)

100. (Original) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and the receiver.

101. (Original) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

102-103. (Canceled)

104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to

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display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

106-112. (Canceled)

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114-152. (Canceled)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 2859

In re

Patent Application of

Christopher B. Austin

App. No.: 12/737,803

Confirmation No.: 2226

Filed: February 17, 2011

Examiner: Nathanial R. Pelton

Title: "VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD"

AMENDMENT AND RESPONSE TO OFFICE ACTION
ACCOMPANYING REQUEST FOR CONTINUED EXAMINATION

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

Sir:

This communication is in response to the non-final Office Action mailed August 12, 2016, is filed with a Request for Continued Examination ("RCE"), and is filed within three months of the shortened statutory period set for response to the Office Action. The Applicant hereby requests for a three-month extension of time to file this Amendment and Response and the accompanying RCE, and requests that the necessary RCE fee and extension of time fee by charged to Deposit Account No. 13-3080. Please charge any shortage of fees associated with this communication to Deposit Account No. 13-3080.

Listing of Claims begins on page 2; and

Remarks begin on page 8.

Electronic Patent Application Fee Transmittal					
Application Number:	12737803				
Filing Date:	17-Feb-2011				
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD				
First Named Inventor/Applicant Name:	Christopher B. Austin				
Filer:	Christopher B. Austin/Dorothy Hauser				
Attorney Docket Number:					
Filed as Small Entity					
Filing Fees for U.S. National Stage under 35 USC 371					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
RCE- 1st Request	2801	1	600	600
		Total in USD ($)		**1300**

Electronic Acknowledgement Receipt	
EFS ID:	28332813
Application Number:	12737803
International Application Number:	
Confirmation Number:	2226
Title of Invention:	VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD
First Named Inventor/Applicant Name:	Christopher B. Austin
Correspondence Address:	Christopher B. Austin - 935 17th Avenue - Grafton WI 53024 US - -
Filer:	Christopher B. Austin/Dorothy Hauser
Filer Authorized By:	Christopher B. Austin
Attorney Docket Number:	
Receipt Date:	13-FEB-2017
Filing Date:	17-FEB-2011
Time Stamp:	10:17:39
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1300

RAM confirmation Number	021317INTEFSW00009822133080
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	Request for Continued Examination (RCE)	20468278_As_Filed_RCE.PDF	1363947 3657663f886e002fa3d006d4acc65c3ad5e86895	no	3
Warnings:					
Information:					
2	Extension of Time	20468234_As_Filed_Extension_of_Time.PDF	163501 e2f8e6eb311a1b44fccac90a44cfd5b6222e3b6b	no	2
Warnings:					
Information:					
3		20468151_As_Filed_Response.PDF	126843 4515a24b513b541b8ab4e759264c538a65b62267	yes	14

Multipart Description/PDF files in .zip description

Document Description	Start	End
Applicant Arguments/Remarks Made in an Amendment	8	14
Claims	2	7
Amendment Submitted/Entered with Filing of CPA/RCE	1	1

Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32194 1d55ff0ca0d4928b7769734c3e212d3c542a9bb4	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1686485

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.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/737,803	Filing Date 02/17/2011	☐ 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 **02/13/2017**

	(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))	* 20	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	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
TRACEY 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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 08/12/2016

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

EXAMINER
PELTON, NATHANIEL R

ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
08/12/2016	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. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	AIA (First Inventor to File) Status No

-- 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 *amendment on 07/25/2016*.

☐ 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) *See Continuation Sheet* 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, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113* 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 _____ 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: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

Acknowledgement is made of the amendments/arguments filed on 07/25/2016, in which claims 1, 46, and 95 are amended. Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are pending for examination below.

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549] and Nor et al. [US 5,548,200].

With respect to claims 1 and 26, Hobbs discloses a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from

the vehicle and vehicle charger [**130 Fig. 1**], the vehicle charger comprising: an electrical power cord [**125 Fig. 1**] releasably attachable to at least one of the vehicle [**by plug 126 Fig.** 1] and a source of power [**105 Fig. 1; power grid**]; a second controller electrically coupled to the electrical power cord [**270 Fig. 1**]; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller [**col. 7 lines 29-51 and col. 11 lines 1-9**], the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger [**130 can program 100; col. 7 lines 29-51**]; and at least one user-manipulatable control coupled to the second controller and operable by a user to enter information [**130 or 104 Fig. 1**]. However Hobbs fails to explicitly disclose to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger and automatically changing a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery.

Matsumura teaches to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Nor teaches automatically changing a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery [**col. 4 lines 4-20 and col. 9 lines 29-61**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a threshold cost of power to the battery as taught by Nor for the benefit of reducing the cost of power to the user as suggested by Nor.

With respect to claims 11 and 59, Hobbs further teaches comprising a display coupled to the second controller, the display displaying a level of charge of the battery [**107 Fig.1; indication to alert user when battery is charged; col. 3 lines 15-26**].

With respect to claims 12 and 60, Hobbs further discloses a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claims 20 and 68, Hobbs further discloses a display displaying a total power cost of a charging session [**col. 7 lines 16-19**].

With respect to claim 46, Hobbs discloses a vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising: a controller [**270 Fig. 2**]; a display coupled to the controller and adapted to display a time [**107 Fig. 1; col. 7 lines 1-28**]; and a user-manipulatable control coupled to the controller and operable by a user [**130 Fig. 1**] the controller changing the supply of

electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging [**col. 7 lines 29-51; col. 14 lines 47-56**]. However, Hobbs fails to explicitly disclose operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user and wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Nor teaches wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery [**col. 4 lines 4-20 and col. 9 lines 29-61**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to automatically change the state at least in part upon a threshold cost of power to the battery as taught by Nor for the benefit of reducing the cost of power to the user as suggested by Nor.

With respect to claim 55, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

Claims 7 and 56 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Nor et al. [US 5,548,200] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claims 7 and 56, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Claim 42 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Nor et al. [US 5,548,200] as applied above, and further in view of Kaplan et al. [US 2008/0052145].

With respect to claim 42, Hobbs fails to explicitly teach a battery of the vehicle charger coupled to the second controller supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

Kaplan teaches further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger [**1508 Fig. 15; backup battery for operation in case of power outage; par. 0198**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to include the battery for the benefit of still being able to supply power during a power outage event.

Claims 48 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Nor et al. [US 5,548,200] as applied above, and further in view of Vasant [US 7,243,746].

With respect to claim 48, Hobbs fails to explicitly disclose the display is mounted in a console within the vehicle.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Claims 95, 100, 104, 105, and 113 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549], Vasant [US 7,243,746], and Gaza [US 2002/0079868].

With respect to claim 95, Hobbs discloses a vehicle charger for charging a battery of a vehicle, the vehicle charger comprising: a display [**107 Fig. 1**]; a user-manipulatable control within reach of the user seated within the vehicle [**130 Fig. 1; col. 7 lines 30-48; may be hand held PDA; additionally cord 131 provides freedom of movement**]; a controller coupled to the display and to the battery [**270 Fig. 2**], the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging [**col. 10 lines 32-67**]. However, Hobbs fails to explicitly disclose entering a time of day and the controller changes supply of power based on time of day entered by the user as well as the display being mounted within the vehicle and the

controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Gaza teaches the controller supplies electric power to a battery if a level of battery charge is below a threshold level of battery charge independent of the time of

day entered by a user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached [**claim 2; monitoring of battery level wherein a charge termination signal is override when battery level drops below predetermined level**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to supply electric power to the battery independent of the time of day cutoff when the batter is below a threshold as taught by Vasant for the benefit of preventing over-discharging of the battery as suggested by Gaza.

With respect to claim 100, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

With respect to claim 104, Hobbs further discloses wherein the controller is also adapted to display a level of charge of the battery on the display [**107 Fig. 1; indication to alert user when battery is charged col. 3 lines 15-26**].

With respect to claim 105, Hobbs further discloses wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claim 113, Hobbs further disclose wherein the controller is also adapted to display on the display a total power cost of the charging session [**bill for the fuel (charge) is displayed col. 7 lines 16-19**].

Claim 101 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], Vasant [US 7,243,746], and Gaza [US 2002/0079868] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claim 101, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Response to Arguments

Applicant's arguments with respect to claims 1, 46, and 95 have been considered but are moot because the arguments do not apply to any of the new references being used in the current rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL PELTON whose telephone number is (571)270-1761. The examiner can normally be reached on M-F 9:00-5:00 and by e-mail at nathaniel.pelton@uspto.gov (please include authorization to communicate via e-mail).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Isla-Rodas can be reached on 571-272-5056. 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.

/NATHANIEL PELTON/
Primary Examiner, Art Unit 2859

Notice of References Cited	Application/Control No. 12/737,803	Applicant(s)/Patent Under Reexamination AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	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-5,548,200 A	08-1996	Nor; Jiri K.	B60L11/184	320/106
*	B	US-2002/0079868 A1	06-2002	Gaza, Brian Scott	H02J7/0031	320/155
*	C	US-2009/0237034 A1	09-2009	Lindemann; Robert	H02J9/002	320/136
*	D	US-2008/0156553 A1	07-2008	Hoogenraad; Reinier	B60K6/48	180/65.29
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
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	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

CPC- SEARCHED		
Symbol	Date	Examiner
H02J 7/0042, 7/0047, 7/088	4-27-16	nrp
H01M 10/44	4-27-16	nrp
B60L 11/1824	4-27-16	nrp
H02J 7/0042, 7/0047, 7/088	8-9-16	nrp
H01M 10/44	8-9-16	nrp
B60L 11/1824	8-9-16	nrp

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
320	109	7-13-13	nrp
320	109	4-27-16	nrp
320	109	8-9-16	nrp

SEARCH NOTES		
Search Notes	Date	Examiner
requested PLUS search on spec and clalms	7-13-13	nrp
performed inventor search	7-13-13	nrp
updated East search (see attached)	4-27-16	nrp
updated East search (see attached)	8-9-16	nrp

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

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S46	1	"US 20110175569"	US-PGPUB; USPAT; USOCR	OR	OFF	2016/08/09 16:11
S47	29042	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc. or b60l11/1816.cpc. or b60l11/1824.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:17
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S50	5	"5548200".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/09 16:23
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EAST Search History (Interference)

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	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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

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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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✓	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								
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	NATHANIEL PELTON	2859

✓	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

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	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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								
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	152	-	-	-						

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JUL 25 2016

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 2859

In re

Patent Application of

Christopher B. Austin

App. No.: 12/737,803

Confirmation No.: 2226

Filed: February 17, 2011

Examiner: Nathanial R. Pelton

Title: "VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD"

Certificate of Facsimile Transmission
I, Dorothy A. Hauser, hereby certify that this correspondence is being facsimile transmitted on the date shown below to the United States Patent and Trademark office at 571-273-8300.

Signature

Dated: July 25, 2016

AMENDMENT AND RESPONSE TO OFFICE ACTION

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

Sir:

This communication is in response to the non-final Office Action mailed April 29, 2016, and is filed within the three-month shortened statutory period set for response to the Office Action. In the event the Applicant has failed to request any necessary extensions of time, please consider this a request for the same, and charge Deposit Account No. 13-3080 with any shortage or overpayment of fees associated with this communication.

Listing of Claims begins on page 2; and

Remarks begin on page 8.

LISTING OF THE CLAIMS

This listing of claims replaces all prior versions and listing of claims in the present application:

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery; and

at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

2-6. (Canceled)

7. (Original) The vehicle charger of claim 1, wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

8-10. (Canceled)

11. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying a level of charge of the battery.

12. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second

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controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller.

13-19. (Canceled)

20. (Original) The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21-25. (Canceled)

26. (Original) The vehicle charger of claim 1, wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27-41. (Canceled)

42. (Original) The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

43-45. (Canceled)

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46. (Currently Amended) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller automatically changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user, wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery.

47. (Canceled)

48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49-54. (Canceled)

55. (Original) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver.

56. (Original) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

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57-58. (Canceled)

59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61-67. (Canceled)

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69-94. (Canceled)

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95. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,

wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached.

96-99. (Canceled)

100. (Original) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and the receiver.

101. (Original) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

102-103. (Canceled)

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104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

106-112. (Canceled)

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114-152. (Canceled)

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REMARKS

By this Amendment, claims 1, 46, and 95 are amended, leaving claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, 68, 100, 101, 104, 105, and 113 pending and unchanged. Claims 2-6, 8-10, 13-19, 21-25, 27-41, 43-45, 47, 49-54, 57, 58, 61-67, 69-94, 96-99, 102, 103, 106-112, and 114-152 were canceled in an earlier Amendment. The Applicant requests consideration of the pending claims in light of the following remarks.

On pages 2-5 of the Office Action, claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,963,186 issued to Hobbs ("Hobbs") in view of U.S. Patent Publication No. 2009/024359 in the name of Matsumura et al. ("Matsumura"). Also, on pages 5 and 6 of the Office Action, claims 7 and 56 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs and Matsumura, and further in view of U.S. Patent Publication No. 2007/0144605 in the name of Horowitz ("Horowitz"). In addition, on pages 6 and 7 of the Office Action, claim 42 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs and Matsumura, and further in view of U.S. Patent Publication No. 2008/0052145 in the name of Kaplan et al. ("Kaplan"), whereas claim 48 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs and Matsumura, and further in view of U.S. Patent No. 7,243,746 issued to Vasant ("Vasant"). Also, on pages 7-9 of the Office Action, claims 95, 100, 104, 105, and 113 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, and Vasant. Lastly, on pages 9 and 10 of the Office Action, claim 101 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs, Matsumura, Vasant, and Horowitz.

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Independent claim 1 is hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:
>
> an electrical power cord releasably attachable to at least one of the vehicle and a source of power;
>
> a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery; and
>
> at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.
>
> (Amendment marks not shown).

Independent claim 46 is also hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:
>
> a controller;
>
> a display coupled to the controller and adapted to display a time; and
>
> a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller automatically changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user, wherein the controller automatically changes the supply of electric power to the vehicle battery based at least in part upon a threshold cost of power to the battery.
>
> (Amendment marks not shown).

In contrast, neither Hobbs, nor Matsumura, nor their combination teach or suggest, among other things, a vehicle charger having a controller that (i) automatically changes a charging state of the vehicle charger or the supply of electric power to a vehicle battery based at least in part upon a threshold cost of power to the battery and (ii) enables a user to enter a time of day by which the battery must be charged or when the battery charging session will end, as claimed in amended claims 1 and 46. In the Office Action it is suggested that one of ordinary skill in the art would have found it

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obvious to modify the Hobbs charger 100 with Matsumura's teachings of a module 120 that enables a user to input a time value by which the battery charging cycle will end, to arrive at the vehicle battery charger of claims 1 and 46. Assuming *arguendo* that such a conclusion could be reached (and the Applicant respectfully disagrees with this conclusion), the Applicant notes that there is nothing in Hobbs, Matsumura, or their combined teachings to teach or suggest a controller that also changes a charging state or electric power supply based at least in part upon a threshold cost of power to the battery. Hobbs only teaches a change in charging state (e.g., initiating or stopping a charging sequence) based upon user operation of the charger 100. *See* col. 7, lines 1-28 of Hobbs. Although Matsumura teaches the additional concept of setting a time point corresponding to the expected end of a charging session (Matsumura, par. 0023, lines 17-22 and par. 0050, lines 9-10) and changing charging parameters based upon the time available for charging, Matsumura also fails to teach or suggest any change in the charging process based in any part upon a threshold cost of power to the battery.

Power cost is of no apparent concern to operations of the Hobbs charger, whereas Matsumura only teaches change of the charging process to "mitigate the current stress on battery life", and "extend long-term battery life" (Matsumura, par. 0016, lines 5-7, par. 0025, lines 1-3, respectively). In fact, modification of a vehicle battery charger according to the combined teachings of Hobbs and Matsumura so that battery charging could be interrupted based upon power cost would be counter to the primary purpose of Matsumura: extending the time during which current is supplied to the battery to thereby reduce the level of current to the battery for a complete charge. Charging processes that are interrupted due to cost thresholds would inherently shorten the available charging time ("Z" in Matsumura) during a charging session, which would require higher current levels to the battery to complete charging when the charger *is* charging, and would necessarily result in the higher current stresses that Matsumura is trying to eliminate (by spreading out charging time).

Accordingly, Hobbs, Matsumura, and the other cited art fail to teach, describe, or suggest, among other things, a vehicle battery charger having a controller that (i) automatically changes a charging state of the vehicle charger or the supply of electric power to a vehicle battery based at least in part upon a threshold cost of power to the battery and (ii) enables a user to enter a time of day by which the battery must be charged or when the battery charging session will end as claimed in amended claims 1 and 46. Amended claims 1 and 46 are therefore allowable for these and other reasons not

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discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 1 and 46 is therefore respectfully requested.

Claims 7, 11, 12, 20, 26, and 42, and claims 48, 55, 56, 59, 60, and 68 each depend from amended claims 1 and 46, respectively, and are therefore allowable based upon amended claims 1 and 46, and upon other features, elements, and limitations recited in amended claims 1 and 46 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, and 68 is therefore respectfully requested.

Claim 95 is also hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:
> a display mounted within the vehicle within reach of a user seated within the vehicle;
> a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and
> a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,
> wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached.
> (Amendment marks not shown).

In contrast, neither Hobbs, Matsumura, Vasant, nor their combination teach or suggest, among other things, a vehicle charger that (i) enables a user to enter a time of day by which a controller of the battery charger changes a charging session while also (ii) supplying electric power to the battery despite the time entered (i.e., "independent of the time of day entered by the user") if the level of the battery charge is below a threshold, and (iii) continuing the supply of power despite the time entered at least until the threshold is reached as claimed in amended claim 95. Hobbs, Matsumura, and Vasant are all completely silent regarding any such ability of a vehicle battery controller to "override" a charger time setting input by a user. In every embodiment in these references and in the other cited art, the user appears to have complete control over all operations of the disclosed vehicle

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charger, with no opportunity for the controller to override the user's command to start, stop, increase, or decrease battery charging. Indeed, nothing in Hobbs, Matsumura, Vasant, or their combination provides any motivation for such a feature, what purpose such a feature would have, or why such a feature would be necessary or desirable.

Accordingly, Hobbs, Matsumura, Vasant, and their combination fail to teach, describe, or suggest, among other things, a vehicle battery charger having a controller that changes a supply of electric power to charge a battery based at least in part upon a time of day entered by a user, wherein the controller supplies electric power to the battery if the level of battery charge is below a threshold level independent of the time of day entered by the user, and supplies the power at least until the threshold is reached.

Claims 100, 101, 104, 105, and 113 each depend from amended claim 95, and are therefore allowable based upon amended claim 95 and upon other features, elements, and limitations recited in amended claim 95 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 100, 101, 104, 105, and 113 is therefore respectfully requested.

In light of the foregoing, the Applicant respectfully requests allowance of the pending claims. The undersigned is available during normal business hours by telephone if a telephone conference would facilitate prosecution of this application.

Respectfully submitted,



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RE: Amendment//IBC-000000-0977-US00

NUMBER OF PAGES, INCLUDING COVER:	14
CLIENT-MATTER NUMBER:	

NOTES/COMMENTS:
U.S. Patent Application No. 12/737,803
Inventor: Christopher B. Austin
Entitled: VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD
Attachment: Amendment - 12 pages

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/737,803	Filing Date 02/17/2011	☐ 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 **07/25/2016**

	(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))	* 20	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	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
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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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 04/29/2016

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EXAMINER
PELTON, NATHANIEL R

ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
04/29/2016	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. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	AIA (First Inventor to File) Status No

-- 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 *08/11/2015*.

☐ 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) *See Continuation Sheet* 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, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, 113* 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 _____ 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: _____.

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Continuation of Disposition of Claims: Claims pending in the application are 1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

Acknowledgement is made of the amendment/arguments filed on 08/11/2015, in which claims 1, 46, and 95 were amended. Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are pending for examination below.

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 11, 12, 20, 26, 46, 55, 59, 60, and 68 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549].

With respect to claims 1 and 26, Hobbs discloses a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from

the vehicle and vehicle charger [**130 Fig. 1**], the vehicle charger comprising: an electrical power cord [**125 Fig. 1**] releasably attachable to at least one of the vehicle [**by plug 126 Fig.** 1] and a source of power [**105 Fig. 1; power grid**]; a second controller electrically coupled to the electrical power cord [**270 Fig. 1**]; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller [**col. 7 lines 29-51 and col. 11 lines 1-9**], the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger [**130 can program 100; col. 7 lines 29-51**]; and at least one user-manipulatable control coupled to the second controller and operable by a user to enter information [**130 or 104 Fig. 1**]. However Hobbs fails to explicitly disclose to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

Matsumura teaches to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

With respect to claims 11 and 59, Hobbs further teaches comprising a display coupled to the second controller, the display displaying a level of charge of the battery [**107 Fig.1; indication to alert user when battery is charged; col. 3 lines 15-26**].

With respect to claims 12 and 60, Hobbs further discloses a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claims 20 and 68, Hobbs further discloses a display displaying a total power cost of a charging session [**col. 7 lines 16-19**].

With respect to claim 46, Hobbs discloses a vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising: a controller [**270 Fig. 2**]; a display coupled to the controller and adapted to display a time [**107 Fig. 1; col. 7 lines 1-28**]; and a user-manipulatable control coupled to the controller and operable by a user [**130 Fig. 1**] the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging [**col. 7 lines 29-51; col. 14 lines 47-56**]. However, Hobbs fails to explicitly disclose operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

With respect to claim 55, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

Claims 7 and 56 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] and Matsumura et al. [US 2009/0243549] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claims 7 and 56, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Claim 42 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] and Matsumura et al. [US 2009/0243549] as applied above, and further in view of Kaplan et al. [US 2008/0052145].

With respect to claim 42, Hobbs fails to explicitly teach a battery of the vehicle charger coupled to the second controller supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

Kaplan teaches further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger [**1508 Fig. 15; backup battery for operation in case of power outage; par. 0198**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to include the battery for the benefit of still being able to supply power during a power outage event.

Claims 48 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] and Matsumura et al. [US 2009/0243549] as applied above, and further in view of Vasant [US 7,243,746].

With respect to claim 48, Hobbs fails to explicitly disclose the display is mounted in a console within the vehicle.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

Claims 95, 100, 104, 105, and 113 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Matsumura et al. [US 2009/0243549] and Vasant [US 7,243,746].

With respect to claim 95, Hobbs discloses a vehicle charger for charging a battery of a vehicle, the vehicle charger comprising: a display [**107 Fig. 1**]; a user-manipulatable control within reach of the user seated within the vehicle [**130 Fig. 1; col. 7 lines 30-48; may be hand held PDA; additionally cord 131 provides freedom of movement**]; a controller coupled to the display and to the battery [**270 Fig. 2**], the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging [**col. 10 lines 32-67**]. However, Hobbs fails to explicitly disclose

entering a time of day and the controller changes supply of power based on time of day entered by the user as well as the display being mounted within the vehicle.

Matsumura teaches operable by a user to enter a time of day at which the charging session will end and controlling charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. [**par. 0023, 0048 and 0050; time input**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter a time of day at which the charging session will end and control charging based on that for the benefit of more efficient charging based on available time to recharge as suggested by Matsumura.

Vasant teaches wherein the display is mounted in a console within the vehicle [**110 Fig. 11**].

Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to modify Hobbs to have the display in a console within reach of a user as taught by Vasant for the benefit of enabling a user to monitor and control the re-charging process of the vehicle, for example, without exposing the user to the elements.

With respect to claim 100, Hobbs further discloses at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [**col. 11 lines 15-24**].

With respect to claim 104, Hobbs further discloses wherein the controller is also adapted to display a level of charge of the battery on the display [**107 Fig. 1; indication to alert user when battery is charged col. 3 lines 15-26**].

With respect to claim 105, Hobbs further discloses wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller [**107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38**].

With respect to claim 113, Hobbs further disclose wherein the controller is also adapted to display on the display a total power cost of the charging session [**bill for the fuel (charge) is displayed col. 7 lines 16-19**].

Claim 101 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186], Matsumura et al. [US 2009/0243549], and Vasant [US 7,243,746] as applied above, and further in view of Horowitz [US 2007/0144605].

With respect to claim 101, Hobbs the first and second controllers and connection of the vehicle charger with at least one of the battery and the source of power as detailed above, but fails to explicitly teach automatic establishment of communication.

Kaplan teaches automatic establishment of communication [**par. 0034**].

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment of communication for the benefit of automating the recharging process, thereby making is quicker.

Response to Arguments

Applicant's arguments, filed 08/11/2015, with respect to the rejection(s) of claim(s) 1, 46, and 95 under 103(a) 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 Matsumura et al as applied above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL PELTON whose telephone number is (571)270-1761. The examiner can normally be reached on M-F 9:00-5:00 and by e-mail at nathaniel.pelton@uspto.gov (please include authorization to communicate via e-mail).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Isla-Rodas can be reached on 571-272-5056. 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.

/NATHANIEL PELTON/
Examiner, Art Unit 2859

Notice of References Cited	Application/Control No. 12/737,803	Applicant(s)/Patent Under Reexamination AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	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-2009/0243549 A1	10-2009	Matsumura; Naoki	H01M10/44	320/155
*	B	US-2007/0144605 A1	06-2007	Horowitz; Alan M.	G06Q50/30	141/83
	C	US-				
	D	US-				
	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
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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								
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	2	-	-							
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	Art Unit
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☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

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=	Allowed	÷	Restricted	I	Interference	O	Objected

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

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IPR2026-00377
Tesla EX1002 Page 260

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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								
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S9	2	"20110175569".pn.	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2016/03/21 11:27
S10	1	"20110175569".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/21 11:27
S11	74	((Christopher) near2 (Austin)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/21 11:28
S12	1	S11 and ((vehicle or car or automobile) with (charg$5 or recharg$5))	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:29
S13	3	S11 and (charg$5 or recharg$5)	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:30
S14	7153	320/109 or h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/0088.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:38
S15	2140	S14 and @ad<"20080818"	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:38
S16	287	S15 and (tim$3 near5 (end$3 or complet$4 or finish$3))	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:39
S17	2	"6963186".pn. or "5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/21 11:39
S18	1	"2007029965".pn. or "7495414".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/22 14:56
S19	1	"20070029965".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/22 14:57
S20	2	"20100194336".pn. or "7180265".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/03/22 15:00
S21	32353	h02j7/0042.cpc. or h02j7/0047.cpc. or h02j7/088.cpc. or h01m10/44.cpc. or b60l11/1824.cpc. or 320/109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 13:15
S22	3660	S21 and @ad<"20080818"	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:16
S23	2	"6963186".pn. or "5548200".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:17
S24	2	"6963186".pn. or "5548200".pn. or "7243746".pc.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:24
S25	3	"6963186".pn. or "5548200".pn. or "7243746".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 13:24
S26	12280	S21 and @ad<"20080818"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 13:27
S27	369	S26 and ((enter$3 or input$4) near5 time)	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2016/04/27 13:28

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			EPO; JPO; DERWENT; IBM_TDB			
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S29	1	S27 and S28	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 14:04
S30	1	"20080052145".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/04/27 14:49
S31	39	S26 and (automatic$4 near3 communicat$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/27 14:55

EAST Search History (Interference)

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4/ 27/ 2016 3:26:16 PM
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

CPC- SEARCHED		
Symbol	Date	Examiner
H02J 7/0042, 7/0047, 7/088	4-27-16	nrp
H01M 10/44	4-27-16	nrp
B60L 11/1824	4-27-16	nrp

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
320	109	7-13-13	nrp
320	109	4-27-16	nrp

SEARCH NOTES		
Search Notes	Date	Examiner
requested PLUS search on spec and clalms	7-13-13	nrp
performed inventor search	7-13-13	nrp
updated East search (see attached)	4-27-16	nrp

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

/NATHANIEL PELTON/ Examiner.Art Unit 2859	

Office of Petitions: Routing Sheet

4700

Application No. 12737803

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

[X] **GRANTED**

[ ] **DISMISSED**

[ ] **DENIED**

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.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 01/12/2016

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

EXAMINER
PELTON, NATHANIEL R

ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
01/12/2016	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of	:	
Austin	:	
Application No. 12/737,803	:	DECISION ON PETITION
Filed: February 17, 2011	:	
For: VEHICULAR BATERY CHARGER,	:	
CHARGING SYSTEM, AND METHOD	:	

This is a decision on the petition under the unintentional provisions of 37 CFR 1.137(b), filed August 11, 2015, to revive the above-identified application. Effective December 18, 2013 this petition is properly treated under **37 CFR 1.137(a)**. See 78 Fed. Reg. 62368, 62405 (October 21, 2013).

The petition filed under 37 CFR 1.137(a) is **GRANTED**.

This above-identified application became abandoned for failure to timely file a reply to the non-final Office Action of July 16, 2013. The non-final Office Action set a three (3) month shortened statutory period for reply. No extension of time was obtained under the provisions of 37 CFR §1.136(a). Accordingly, this application became abandoned on October 17, 2013. A Notice of Abandonment was mailed on March 7, 2014.

The petition satisfies the requirements of 37 CFR 1.137(a) in that petitioner has supplied (1) the reply in the form of an amendment (2) the petition fee of $850.00, and (3) an adequate statement of unintentional delay.

37 CFR 1.137(a)(3) requires a statement that "the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.137(a) was unintentional." Since the statement appearing in the petition varies from the language required by 37 CFR 1.137(a)(3), the statement is being construed as the required statement. Petitioner must notify the Office if this is not a correct reading of the statement appearing in the petition.

This application is being referred to Technology Center AU 2859 for appropriate action by the Examiner in the normal course of business on the reply received.

Telephone inquiries concerning this decision should be directed to the undersigned at (571) 272-3215.

/Charlema Grant/
Charlema Grant
Attorney Advisor
Office of Petitions

Office of Petitions: Decision Count Sheet

Mailing Month

Application No. 12737803

12737803

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: GRANT, CHARLEMA

Count (1) - Palm Credit 12/737,803

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 502 - 37 CFR 1.137(b) - REVIVAL BASED ON UNINTENTIC

502

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: *1/9/2016*

Office of Petitions Internal Document - Ver. 5.0

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.

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(b)	Docket Number (Optional) 000000-0977

First named inventor: Christopher B. Austin

Application No.: 12/737,803 Art Unit: 2859

Filed: February 17, 2011 Examiner: Nathanial R. Pelton

Title: VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

Attention: Office of Petitions
Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
FAX (571) 273-8300

08/12/2015 JVONG1 00000026 133080 12737803
01 FC:2453 850.00 DA

NOTE: If information or assistance is needed in completing this form, please contact Petitions Information at (571) 272-3282.

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the office notice or action plus any extensions of time actually obtained.

APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION

NOTE: A grantable petition requires the following items:
(1) Petition fee;
(2) Reply and/or issue fee;
(3) Terminal disclaimer with disclaimer fee - required for all utility and plant applications filed before June 8, 1995; and for all design applications; and
(4) Statement that the entire delay was unintentional

1. Petition Fee

☑ Small entity-fee $ 850 (37 CFR 1.17(m)). Application claims small entity status. See 37 CFR 1.27.

☐ Other than small entity-fee $ _____ (37 CFR 1.17(m))

2. Reply and/or fee

A. The reply and/or fee to the above-noted Office action in the form of Amendment (identify type of reply):

☐ has been filed previously on _____.

☑ is enclosed herewith.

B. The issue fee and publication fee (if applicable) of $_____.

☐ has been paid previously on _____.

☐ is enclosed herewith.

This collection of information is required by 37 CFR 1.137(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 1.0 hour 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: Mail Stop Petition, 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
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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

3. Terminal disclaimer with disclaimer fee

☑ Since this utility/plant application was filed on or after June 8, 1995, no terminal disclaimer is required.

☐ A terminal disclaimer (and disclaimer fee (37 CFR 1.20(d)) of $_____ for a small entity or $_____ for other than a small entity) disclaiming the required period of time is enclosed herewith (see PTO/SB/63).

4. STATEMENT: The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(b) was unintentional. [NOTE: The United States Patent and Trademark Office may require additional information if there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137(b) was unintentional (MPEP 711.03(c), subsections (III)(C) and (D)).]

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.

/christopher b. austin/	August 11, 2015
Signature	Date
Christopher B. Austin	41,592
Type or Printed name	Registration Number, if applicable
935 17th Avenue	414-331-0988
Address	Telephone Number
Grafton, WI 53024	
Address	

Enclosures:

☑ Fee Payment

☑ Reply

☐ Terminal Disclaimer Form

☐ Additional sheets containing statements establishing unintentional delay

☐ Other: _____

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]

I hereby certify that this correspondence is being:

☐ Deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

☑ Transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (571) 273-8300.

August 11, 2015	/dorothy a. hauser/
Date	Signature
	Dorothy A. Hauser
	Typed or printed name of person signing certificate

PAGE 4/20 * RCVD AT 8/11/2015 8:31:08 PM [Eastern Daylight Time] * SVR:W-PTOFAX-001/44 * DNIS:2738300 * CSID: * DURATION (mm-ss):08-30

Privacy Act Statement

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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 inspections or an issued patent.
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FEE TRANSMITTAL

Complete if known	
Application Number	12/737,803
Filing Date	February 17, 2011
First Named Inventor	Christopher B. Austin
Examiner Name	Nathaniel R. Pelton
Art Unit	2859
Practitioner Docket No.	000000-0977

[✓] Applicant asserts small entity status. See 37 CFR 1.27.

[ ] Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

TOTAL AMOUNT OF PAYMENT ($) 850

METHOD OF PAYMENT (check all that apply)

[ ] Check [ ] Credit Card [ ] Money Order [ ] None [✓] Other (please identify): _____

[✓] Deposit Account Deposit Account Number: 133080 Deposit Account Name: Michael Best & Friedrich LLP

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

[✓] Charge fee(s) indicated below [ ] Charge fee(s) indicated below, **except for the filing fee**

[ ] Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 [✓] Credit any overpayment of fee(s)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	Fees Paid ($)
Utility	280	140*	70	600	300	150	720	360	180	
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee ($)	Small Entity Fee ($)	Micro Entity Fee ($)
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims		Extra Claims		Fee ($)		Fee Paid ($)
_____	-20 or HP =	_____	x	_____	=	_____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		Extra Claims		Fee ($)		Fee Paid ($)
_____	-3 or HP =	_____	x	_____	=	_____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		Extra Sheets		Number of each additional 50 or fraction thereof		Fee ($)		Fee Paid ($)
_____	- 100 =	_____	/ 50 =	_____ (round up to a whole number)	x	_____	=	_____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English specification, $130 fee (no small or micro entity discount)	
Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity)	
Other (e.g., late filing surcharge): Small Entity Petition Fee Under 37 CFR 1.17(m)	850

SUBMITTED BY

Signature	/christopher b. austin/	Registration No. (Attorney/Agent) 41,592	Telephone 414-331-0988
Name (Print/Type)	Christopher B. Austin		Date August 11, 2015

This collection of information is required by 37 CFR 1.136. 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 30 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.**

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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.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit 2859

In re

Patent Application of

Christopher B. Austin

App. No.: 12/737,803

Confirmation No.: 2226

Filed: February 17, 2011

Examiner: Nathanial R. Pelton

Title: "VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD"

Certificate of Facsimile Transmission
I, Dorothy A. Hauser, hereby certify that this correspondence is being facsimile transmitted on the date shown below to the United States Patent and Trademark office at 571-273-8300.

Signature

Dated: August 11, 2015

AMENDMENT AND RESPONSE TO OFFICE ACTION

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

Sir:

This communication is in response to the non-final Office Action mailed July 16, 2013, and is accompanied by a Petition For Revival Of An Application For Patent Abandoned Unintentionally Under 37 CFR 1.137(b), along with the necessary Petition Fee Under 37 CFR 1.17(m). In the event the Applicant has failed to request any necessary extensions of time, please consider this a request for the same, and charge Deposit Account No. 13-3080 with any shortage or overpayment of fees associated with this communication.

Listing of Claims begins on page 2; and

Remarks begin on page 8.

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LISTING OF THE CLAIMS

This listing of claims replaces all prior versions and listing of claims in the present application:

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger; and

at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

2-6. (Canceled)

7. (Original) The vehicle charger of claim 1, wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

8-10. (Canceled)

11. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying a level of charge of the battery.

12. (Original) The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based

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upon information regarding the battery received by the second controller.

13-19. (Canceled)

20. (Original) The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21-25. (Canceled)

26. (Original) The vehicle charger of claim 1, wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27-41. (Canceled)

42. (Original) The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

43-45. (Canceled)

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46. (Currently Amended) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, ~~or~~ [and] stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

47. (Canceled)

48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49-54. (Canceled)

55. (Original) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver.

56. (Original) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

57-58. (Canceled)

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59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61-67. (Canceled)

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69-94. (Canceled)

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95. (Currently Amended) A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day;

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery; decreasing the rate of charge of the battery, starting battery charging, ~~or~~ [and] stopping battery charging based at least in part upon the time of day entered by the user.

96-99. (Canceled)

100. (Original) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and the receiver.

101. (Original) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

102-103. (Canceled)

104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon

information regarding the battery received by the controller.

106-112. (Canceled)

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114-152. (Canceled)

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REMARKS

By this Amendment, claims 1, 46, and 95 are amended, leaving claims 7, 11, 12, 20, 26, 42, 48, 55, 56, 59, 60, 68, 100, 101, 104, 105, and 113 pending and unchanged. Claims 2-6, 8-10, 13-19, 21-25, 27-41, 43-45, 47, 49-54, 57, 58, 61-67, 69-94, 96-99, 102, 103, 106-112, and 114-152 were canceled in an earlier Amendment. The Applicant requests consideration of the pending claims in light of the following remarks.

On pages 2-5 of the Office Action, claims 1, 11, 12, 20, 26, 46, 55, 59, 60, 68, 100, 104, 105, and 113 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,963,186 issued to Hobbs ("Hobbs") in view of U.S. Patent No. 5,548,200 issued to Nor et al. ("Nor"). Also, on pages 5 and 6 of the Office Action, claims 7, 42, 56, and 101 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of U.S. Patent Publication No. 2008/0052145 in the name of Kaplan et al. ("Kaplan"). Lastly, on pages 7 and 8 of the Office Action, claims 48 and 95 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hobbs in view of Nor, and further in view of U.S. Patent No. 7,243,746 issued to Vasant ("Vasant").

Claim 1 is hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:
>
> an electrical power cord releasably attachable to at least one of the vehicle and a source of power;
>
> a second controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger; and
>
> at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.
>
> (Amendment marks not shown).

In contrast, and as noted by the Examiner, Hobbs teaches battery chargers and charging methods which do not provide for user entry of a time of day by which a battery must be charged. Although the Examiner points to a portion of Nor as disclosing a battery charger having such a feature (see p.3

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of Office Action, where the Examiner cites col. 10, lines 17-49 of Nor as teaching "entering at least one of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger"), no such teaching exists in the cited passages of Nor or in any other portion of Nor or the other cited art. In this regard, Nor only teaches battery power stations 82 having:

> (i) a key pad 96 or a key slot 98 by which a user may enter "nominal charging voltage and maximum charging current" (Nor, col. 10, lines 17-30); and
> (ii) "other annunciators... to give a running indication of the amount of energy being delivered in kWh or its cost in local currency, such as dollars" (Nor, col. 10, lines 30-33).

Although Nor also discloses that "programmable registers or the like" can be used to set the price per unit of energy depending on the time of day, Nor fails entirely to teach, describe, or suggest (among other things) a user-manipulatable control that is operable by a user to enter a time of day by which the battery must be charged and/or a command to delay charging of the battery by a vehicle charger, as called for in amended claim 1. Nor also fails to provide any indication or motivation regarding why such functionality would be necessary or desirable. Nothing in Nor or the other cited art identifies any problem with permitting a charging session to take as long as needed. Also, none of the devices or systems disclosed in Nor or in the other cited art provides any mechanism by which a user can input a command to delay a battery charging session – leaving the user simply to wait for a later time to use the charger (see Nor, col. 10, lines 35-49).

Accordingly, Hobbs, Nor, and the other cited art fail to teach, describe, or suggest, among other things, a vehicle battery charger having an electrical power cord as claimed, a controller electrically coupled thereto, adapted for communication with a first controller, and responsive to at least one signal from the first controller by changing a charging state of the charger, and at least one user-manipulatable control coupled to the second controller and user-operable to enter a time of day by which the battery must be charged and/or a command to delay charging of the battery by the vehicle charger. Amended claim 1 is therefore allowable for these and other reasons not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejection of claim 1 is therefore respectfully requested.

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Claims 7, 11, 12, 20, 26, and 42 each depend from amended claim 1, and are therefore allowable based upon amended claim 1 and upon other features, elements, and limitations recited in amended claim 1 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 7, 11, 12, 20, 26, and 42 is therefore respectfully requested.

Claim 46 is also hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:
>
> a controller;
>
> a display coupled to the controller and adapted to display a time; and
>
> a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

(Amendment marks not shown).

In contrast, and as noted again by the Examiner, Hobbs teaches battery chargers and charging methods which do not provide for user entry of a time of day at which a charging session will end. Again, although the Examiner points to a portion of Nor as disclosing a battery charger having such a feature (see p.4 of Office Action, where the Examiner cites col. 10, lines 17-49 of Nor as teaching "entering a time of day at which the charging session will end", no such teaching exists in the cited passages of Nor or in any other portion of Nor or the other cited art. As discussed above, Nor only teaches battery power stations 82 having:

> (i) a key pad 96 or a key slot 98 by which a user may enter "nominal charging voltage and maximum charging current" (Nor, col. 10, lines 17-30); and
>
> (ii) "other annunciators... to give a running indication of the amount of energy being delivered in kWh or its cost in local currency, such as dollars" (Nor, col. 10, lines 30-33).

Although Nor also discloses that "programmable registers or the like" can be used to set the price per unit of energy depending on the time of day, Nor fails entirely to teach, describe, or suggest (among other things) a user-manipulatable control that is operable by a user to enter a time of day by which a battery charging session will end, as called for in amended claim 46. Nor also fails to provide any

indication or motivation regarding why such functionality would be necessary or desirable. Nothing in Nor or the other cited art identifies any problem with permitting a charging session to take as long as needed.

Accordingly, Hobbs, Nor, and the other cited art fail to teach, describe, or suggest, among other things, a vehicle battery charger having a controller, a display coupled thereto, and a user-manipulatable control operable by a user to enter a time of day at which a charging session will end, wherein the controller changes the supply of electric power to the vehicle battery by increasing a rate of charge of the battery, decreasing the rate of charge, starting battery charging, and/or stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user. Amended claim 46 is therefore allowable for these and other reasons not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejection of claim 46 is therefore respectfully requested.

Claims 48, 55, 56, 59, 60, and 68 each depend from amended claim 46, and are therefore allowable based upon amended claim 46 and upon other features, elements, and limitations recited in amended claim 46 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 48, 55, 56, 59, 60, and 68 is therefore respectfully requested.

Claim 95 is also hereby amended, and recites:

> A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:
> a display mounted within the vehicle within reach of a user seated within the vehicle;
> a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day;
> a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user.
> (Amendment marks not shown).

In contrast, and as noted again by the Examiner, Hobbs teaches battery chargers and charging methods which do not provide for user entry of a time of day, nor power supply changes "based on

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Tesla EX1002 Page 285

time of day entered by the user". Although the Examiner points to a portion of Nor as disclosing a battery charger having such features (see p.4 of Office Action, where the Examiner cites col. 10, lines 17-49 of Nor as teaching "entering a time of day" and "changing the state of charging based on the time of day", no such teaching exists in the cited passages of Nor or in any other portion of Nor or the other cited art. As discussed above, Nor only teaches battery power stations 82 having:

> (i) a key pad 96 or a key slot 98 by which a user may enter "nominal charging voltage and maximum charging current" (Nor, col. 10, lines 17-30); and
> (ii) "other annunciators...to give a running indication of the amount of energy being delivered in kWh or its cost in local currency, such as dollars" (Nor, col. 10, lines 30-33).

Although Nor also discloses that "programmable registers or the like" can be used to set the price per unit of energy depending on the time of day, Nor fails entirely to teach, describe, or suggest (among other things) a controller that changes a supply of electric power to charge a vehicle battery during the course of a charging session by increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and/or stopping battery charging based at least in part upon the time of day entered by a user as called for in amended claim 95. Nor also fails to provide any indication or motivation regarding why such functionality would be necessary or desirable. Nothing in Nor or the other cited art identifies any problem with supplying electric power of a charging session completely independently of any particular time entered or desired by a user. Vasant is cited for teaching the use of a display mounted in a console within a vehicle, and entirely fails to cure the deficiencies of Hobbs and Nor described above.

Accordingly, Hobbs, Nor, Vasant, and the other cited art fail to teach, describe, or suggest, among other things, a vehicle battery charger having a display mounted within a vehicle within reach of a user seated within the vehicle, a user-manipulatable control within reach of the user seated within the vehicle and by which the user can enter a time of day, and a controller coupled to the display and battery, and changing a supply of electric power to charge the battery during the course of a charging session by increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and/or stopping battery charging based at least in part upon the time of day entered by a user. Amended claim 95 is therefore allowable for these and other reasons not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejection of claim 95 is therefore respectfully requested.

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Claims 100, 101, 104, 105, and 113 each depend from amended claim 95, and are therefore allowable based upon amended claim 95 and upon other features, elements, and limitations recited in amended claim 95 but not discussed herein. Withdrawal of the 35 U.S.C. §103(a) rejections of claims 100, 101, 104, 105, and 113 is therefore respectfully requested.

In light of the foregoing, the Applicant respectfully requests allowance of the pending claims. The undersigned is available during normal business hours by telephone if a telephone conference would facilitate prosecution of this application.

Respectfully submitted,

/christopher b. austin/

Christopher B. Austin
Inventor

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Grafton, WI 53024
Telephone: 414-331-0988

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Tesla EX1002 Page 287

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FROM: Dorothy A. Hauser PHONE: (414) 223-2511

RE: Petition_For_Revival//IBC-000000-0997-US00

NUMBER OF PAGES, INCLUDING COVER:	20
CLIENT-MATTER NUMBER:	

NOTES/COMMENTS:
U.S. Patent Application No. 12/737,803
Inventor: Christopher B. Austin
Entitled: VEHICLE BATTERY CHARGER, CHARGING SYSTEM, AND METHOD
Attachments:
Petition for Revival of an Application - 3 pages
Fee Transmittal - 2 pages
Amendment - 13 pages

****

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/737,803	Filing Date 02/17/2011	☐ 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 **08/11/2015**

	(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))	* 7	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 1	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.

SLIE
/BRENDA L. GRAY/

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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 03/07/2014

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

EXAMINER	
PELTON, NATHANIEL R	
ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
03/07/2014	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.

Notice of Abandonment	Application No.	Applicant(s)
	12/737,803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

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

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on *16 July 2013*.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
   (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 to the final rejection.
   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
   (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
   (d) ☒ No reply has been received.

2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.
   The issue fee required by 37 CFR 1.18 is $_____. The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☐ The issue fee and publication fee, if applicable, has not been received.

3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawings have been received.

4. ☐ The letter of express abandonment which is signed by the attorney or agent of record or other party authorized under 37 CFR 1.33(b). See 37 CFR 1.138(b).

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34) upon the filing of a continuing application.

6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☒ The reason(s) below:

Multiple attempts to reach Applicant at the given number (414) 331-0988 to verify no response has been filed were unsuccessful as the number did not seem to be a working number.

/DREW A. DUNN/ Supervisory Patent Examiner, Art Unit 2859	/NATHANIEL PELTON/ Examiner, Art Unit 2859

Petitions to revive under 37 CFR 1.137, or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/737,803	02/17/2011	Christopher B. Austin		2226

7590 07/16/2013

Christopher B. Austin
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EXAMINER	
PELTON, NATHANIEL R	
ART UNIT	PAPER NUMBER
2859	

MAIL DATE	DELIVERY MODE
07/16/2013	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. 12/737,803	Applicant(s) AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	AIA (First Inventor to File) Status No

-- 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* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 *17 February 2011*.

☐ 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) *See Continuation Sheet* 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) *1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113* 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 *17 February 2011* 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/08) Paper No(s)/Mail Date *02/17/2011*.

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

4) ☐ Other: _____.

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Continuation of Disposition of Claims: Claims pending in the application are 1,7,11,12,20,26,42,46,48,55,56,59,60,68,95,100,101,104,105 and 113.

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the preliminary amendment in which claim 1 was amended and claims 2-6, 8-10, 13-19, 21-35, 27-41, 43-45, 47, 49-54, 57, 58, 61-67, 69-94, 96-99, 102, 103, 106-112, and 114-–52 were cancelled. Claims 1, 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 are pending for examination below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1, 11, 12, 20, 26, 46, 55, 59, 60, 68, 100, 104, 105, and 113 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] in view of Nor et al. [US 5,548,200].**

4. With respect to claim 1, Hobbs discloses a vehicle charger for charging a battery of a vehicle [abstract] and adapted for communication with a first controller remote from the vehicle and vehicle charger [130; col. 7 lines 30-48], the vehicle charger comprising: an electrical power cord releasably attachable to at least one of the vehicle [by plug 126 Fig. 1; col. 8 lines 1-5] and a source of power [105 Fig. 1; power grid]; a second controller electrically coupled to the electrical power cord [see cord 125 connected to controller 100 Fig. 1]; at least one of a transmitter and a receiver coupled to the second

controller and adapted for communication with the first controller [network 275 Fig. 1], the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger [130 can program 100; col. 7 lines 30-43]; and at least one user-manipulatable control coupled to the second controller and operable by a user to enter information [130 or 104 Fig. 1]. However Hobbs fails to explicitly disclose entering a time of day by which the must be charged.

5. Nor teaches entering at least one of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger [col. 10 lines 17-49].

6. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter the time of day to complete charge for the benefit of reducing charging costs.

7. With respect to claim 11, Hobbs further teaches comprising a display coupled to the second controller, the display displaying a level of charge of the battery [107 Fig.1; indication to alert user when battery is charged; col. 3 lines 15-26].

8. With respect to claim 12, Hobbs further discloses a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller [107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38].

9. With respect to claim 20, Hobbs further discloses a display displaying a total power cost of a charging session [col. 7 lines 16-19].

10. With respect to claim 26, Hobbs fails to explicitly disclose changing the charging state based on a time of day.

11. Nor teaches wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day [col. 10 lines 17-49].

12. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter the time of day to complete charge for the benefit of reducing charging costs.

13. With respect to claim 46, Hobbs discloses a vehicle charger for charging a battery of a vehicle in the course of a charging session [abstract], the vehicle charger comprising: a controller [100 Fig. 1]; a display coupled to the controller and adapted to display a time [107 Fig. 1; col. 7 lines 17-18]; and a user-manipulatable control coupled to the controller and operable by a user [130 Fig. 1; col. 6 line 59 to col. 7 line 27] the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging [col. 14 lines 47-56] based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user [time estimated is displayed col. 7 lines 17-18]. However, Hobbs fails to explicitly disclose entering a time of day to end the charging session.

14. Nor teaches entering a time of day at which the charging session will end [col. 10 lines 17-49].

15. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter the time of day to complete charge for the benefit of reducing charging costs.

16. With respect to claims 55 and 100, Hobbs further discloses at least one of a transmitter and a receiver [network 275 Fig. 2], wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver [col. 11 lines 15-24].

17. With respect to claims 59 and 104, Hobbs further discloses wherein the controller is also adapted to display a level of charge of the battery on the display [107 Fig. 1; indication to alert user when battery is charged col. 3 lines 15-26].

18. With respect to claims 60 and 105, Hobbs further discloses wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller [107 Fig. 1; time to complete charge col. 7 lines 16-19; controller 270 controls display col. 10 lines 31-38].

19. With respect to claims 68 and 113, Hobbs further disclose wherein the controller is also adapted to display on the display a total power cost of the charging session [bill for the fuel (charge) is displayed col. 7 lines 16-19].

20. **Claims 7, 42, 56, and 101 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] and Nor et al. [US 5,548,200] as applied above, and further in view of Kaplan et al. [US 2008/0052145].**

21. With respect to claims 7, 56, and 101, Hobbs fails to explicitly teach automatic establishment of communication.

22. Kaplan teaches wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power [remote IPF module 134 initials connection to adjust flow of power; par. 0135].

23. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have automatic establishment for the benefit of notifying grid operators when there is a problem as suggested by Kaplan [par. 0140-0142].

24. With respect to claim 42, Hobbs fails to explicitly teach a battery of the vehicle charger coupled to the second controller supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

25. Kaplan teaches further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger [1508 Fig. 15; backup battery for operation in case of power outage; par .0198].

26. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to include the battery in order to retain settings during power outage.

27. **Claims 48 and 95 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hobbs [US 6,963,186] and Nor et al. [US 5,548,200] as applied above, and further in view of Vasant [US 7,243,746].**

28. With respect to claim 48, Hobbs and Nor fail to explicitly disclose the display is mounted in a console within the vehicle.

29. Vasant teaches wherein the display is mounted in a console within the vehicle [110 Fig. 11].

30. Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to have the display in a console for the benefit of enabling a user to monitor or control the charge the vehicle without exposing himself to the elements.

31. With respect to claim 95, Hobbs discloses a vehicle charger for charging a battery of a vehicle [abstract], the vehicle charger comprising: a display [107 Fig. 1]; a user-manipulatable control within reach of the user seated within the vehicle [130 Fig.1; col. 7 lines 30-48; may be hand held PDA]; a controller coupled to the display and to the battery [100 Fig. 1], the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging [col. 10 lines 34-49]. However, Hobbs fails to explicitly disclose entering a time of day or controller changes supply of power based on time of day entered by the user or the display being mounted within the vehicle.

32. Nor teaches entering a time of day [col. 10 lines 17-33] and changing the state of charging based on the time of day [col. 10 lines 34-49].

33. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hobbs to have the user enter the time of day to complete charge for the benefit of reducing charging costs.

34. Vasant teaches wherein the display is mounted in a console within the vehicle [110 Fig. 11].

35. Therefore it would have been obvious to a person have ordinary skill in the art at the time the invention was made to have the display in a console for the benefit of enabling a user to monitor or control the charge the vehicle without exposing himself to the elements.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL PELTON whose telephone number is (571)270-1761. The examiner can normally be reached on M-F 9:00-5:00 and by e-mail at nathaniel.pelton@uspto.gov.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. 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.

/NATHANIEL PELTON/
Examiner, Art Unit 2859

Drew A. Dunn
/Drew A. Dunn/
Supervisory Patent Examiner, Art Unit 2859

Notice of References Cited	Application/Control No. 12/737,803	Applicant(s)/Patent Under Reexamination AUSTIN, CHRISTOPHER B.	
	Examiner NATHANIEL PELTON	Art Unit 2859	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,963,186	11-2005	Hobbs, Raymond	320/128
*	B	US-2007/0164704	07-2007	McGinley et al.	320/114
*	C	US-2008/0052145	02-2008	Kaplan et al.	705/008
*	D	US-5,462,439	10-1995	Keith, Arlie L.	320/109
*	E	US-7,243,746	07-2007	Vasant, Abraham	180/6.5
*	F	US-5,548,200	08-1996	Nor et al.	320/109
	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	Classification
	N					
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	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*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.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	Art Unit
	NATHANIEL PELTON	2859

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
320	109	7-13-13	nrp

SEARCH NOTES		
Search Notes	Date	Examiner
requested PLUS search on spec and clalms	7-13-13	nrp
performed inventor search	7-13-13	nrp

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

Receipt date: 02/17/2011

IAP03Rec'd PCT 17 FEB 2011
12737803 - GAU: 2859

PTO/SB/08A

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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Substitute for form 1449/PTO	Complete if Known	12/737803
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	**Application Number**	Not yet Known
	Filing Date	February 17, 2011
	First named Inventor	Christopher B. Austin
	Group Art Unit	Not yet Known
(use as many sheets as necessary)	Examiner name	Not yet Assigned
Sheet 1 of 1		

U.S. Patent Documents

Examiner Initials		U.S. Patent Document Number	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document
		6,983,186	Hobbs	11/8/2005
		5,462,439	Keith	10/31/1995
		7,243,746	Vasant	7/17/2007
		5,548,200	Nor et al.	8/20/1996
		2007/0164704	McGinley et al.	7/19/2007
		2008/0052145	Kaplan et al.	2/28/2008

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Examiner Initials		Country Code	Foreign Patent Document Number	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document	Translation	English Abstract

Examiner Signature	/Nathaniel Pelton/	Date Considered	07/14/2013

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	"US 20110175569"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2013/07/14 21:18
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S3	1050	320/109.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/07/14 21:18
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EAST Search History (Interference)

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CONFIRMATION NO. 2226

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/737,803	02/17/2011 RULE	320	2859	

APPLICANTS
Christopher B. Austin, Grafton, WI;

**** CONTINUING DATA **************************
This application is a 371 of PCT/US09/54174 08/18/2009
which claims benefit of 61/189,353 08/18/2008

**** FOREIGN APPLICATIONS **************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
03/02/2011

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /NATHANIEL R PELTON/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		WI	22	20	3

ADDRESS
Christopher B. Austin
935 17th Avenue
Grafton, WI 53024
UNITED STATES

TITLE
VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD

FILING FEE RECEIVED		
525	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

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12737803	AUSTIN, CHRISTOPHER B.
	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	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

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	Examiner	Art Unit
	NATHANIEL PELTON	2859

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	NATHANIEL PELTON	2859

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	**Art Unit**
	NATHANIEL PELTON	2859

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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PLUS Search Results for S/N 12737803, Searched Thu Dec 20 16:02:57 EST 2012

The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

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PLUS Search Results for S/N 12737803, Searched Thu Dec 20 16:03:45 EST 2012

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20110121645 99
20110156641 99
20110163717 99

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/737,803	02/17/2011	Christopher B. Austin	

CONFIRMATION NO. 2226

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

PUBLICATION NOTICE

OC000000048886139

Title:VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD

Publication No.US-2011-0175569-A1
Publication Date:07/21/2011

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

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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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
12/737,803	02/17/2011		525		20	3

CONFIRMATION NO. 2226

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

FILING RECEIPT

OC000000047118462

Date Mailed: 04/15/2011

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**

Applicant(s)

Christopher B. Austin, Grafton, WI;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/US09/54174 08/18/2009
which claims benefit of 61/189,353 08/18/2008

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 03/02/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/737,803**

Projected Publication Date: 07/21/2011

Non-Publication Request: No

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

IPR2026-00377
Tesla EX1002 Page 318

Title

VEHICULAR BATERY CHARGER, CHARGING SYSTEM, AND METHOD

Preliminary Class

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 (1-866-999-4158).

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

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Tesla EX1002 Page 319

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).

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Tesla EX1002 Page 320

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
12/737,803	Christopher B. Austin	

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

INTERNATIONAL APPLICATION NO.	
PCT/US09/54174	
I.A. FILING DATE	PRIORITY DATE
08/18/2009	08/18/2008

CONFIRMATION NO. 2226
371 ACCEPTANCE LETTER

OC000000047118463

Date Mailed: 04/15/2011

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

02/17/2011	04/07/2011
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Indication of Small Entity Status
- Copy of the International Application filed on 02/17/2011
- Copy of the International Search Report filed on 02/17/2011
- Preliminary Amendments filed on 02/17/2011
- Information Disclosure Statements filed on 02/17/2011
- Oath or Declaration filed on 02/17/2011
- U.S. Basic National Fees filed on 02/17/2011
- Priority Documents filed on 02/17/2011
- Specification filed on 02/17/2011
- Claims filed on 02/17/2011
- Abstracts filed on 02/17/2011
- Drawings filed on 02/17/2011

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Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

MARILYN J YOUNGER

Telephone: (703) 756-1436

FORM PCT/DO/EO/903 (371 Acceptance Notice)

IPR2026-00377
Tesla EX1002 Page 322

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 12/737,803

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	165		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	50		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	110		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 26 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 110 =	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 $270 ($135 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).			135			
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	460		TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(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($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
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	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
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.

IAP03Rec'd PCT 07 APR 2011

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re

Patent Application of

Christopher B. Austin

Application No. 12/737,803

Confirmation No. 2226

International Application Filing Date: August 18, 2009

International Patent Application No. PCT/US2009/054174

"VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD "

I hereby certify that this correspondence is being deposited with the US Postal Service "Express Mail Post Office to Address" service under CFR 1.10, Express Mailing Label no. EM578716199US on the date of my signature and is addressed to Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Christopher B. Austin

4/7/11
Date

RESPONSE TO NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

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

Sir:

This is in response to the Notification of Missing Requirements Under 35 U.S.C 371, which was mailed March 3, 2011 and a copy of which is attached. Enclosed is a check for $200 which comprises $135 for 12 pages over 100 and $65 for a surcharge.

Applicant claims Small Entity Status.

Respectfully submitted,

Christopher B. Austin.
935 17th Avenue
Grafton, WI 53024

04/08/2011 EEKUBAY2 00000043 12737803

01 FC:2681 135.00 OP
02 FC:2617 65.00 OP

UNITED STATES PATENT AND TRADEMARK OFFICE

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

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
12/737,803	Christopher B. Austin	

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

INTERNATIONAL APPLICATION NO.	
PCT/US09/54174	
I.A. FILING DATE	PRIORITY DATE
08/18/2009	08/18/2008

CONFIRMATION NO. 2226
371 FORMALITIES LETTER



Date Mailed: 03/03/2011

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated Office (37 CFR 1.494):

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 02/17/2011
- Copy of the International Search Report filed on 02/17/2011
- Preliminary Amendments filed on 02/17/2011
- Information Disclosure Statements filed on 02/17/2011
- Oath or Declaration filed on 02/17/2011
- U.S. Basic National Fees filed on 02/17/2011
- Priority Documents filed on 02/17/2011
- Specification filed on 02/17/2011
- Claims filed on 02/17/2011
- Abstracts filed on 02/17/2011
- Drawings filed on 02/17/2011

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

SUMMARY OF FEES DUE:

Total additional fees required for this application is **$135** for a Small Entity:

- The specification and drawings contain more than 100 pages. Applicant owes **$135** for **12** pages in excess of **100** pages for a small entity in compliance with 37 CFR 1.27.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

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Tesla EX1002 Page 325

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

MARILYN J YOUNGER

Telephone: (703) 756-1436

FORM PCT/DO/EO/905 (371 Formalities Notice)

IPR2026-00377
Tesla EX1002 Page 326

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

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
12/737,803	Christopher B. Austin	

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

INTERNATIONAL APPLICATION NO.	
PCT/US09/54174	
I.A. FILING DATE	PRIORITY DATE
08/18/2009	08/18/2008

CONFIRMATION NO. 2226

371 FORMALITIES LETTER

OC000000046303750

Date Mailed: 03/03/2011

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated Office (37 CFR 1.494):

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 02/17/2011
- Copy of the International Search Report filed on 02/17/2011
- Preliminary Amendments filed on 02/17/2011
- Information Disclosure Statements filed on 02/17/2011
- Oath or Declaration filed on 02/17/2011
- U.S. Basic National Fees filed on 02/17/2011
- Priority Documents filed on 02/17/2011
- Specification filed on 02/17/2011
- Claims filed on 02/17/2011
- Abstracts filed on 02/17/2011
- Drawings filed on 02/17/2011

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

SUMMARY OF FEES DUE:

Total additional fees required for this application is $**135** for a Small Entity:

- The specification and drawings contain more than 100 pages. Applicant owes $**135** for **12** pages in excess of **100** pages for a small entity in compliance with 37 CFR 1.27.

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Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

FORM PCT/DO/EO/905 (371 Formalities Notice)

IPR2026-00377
Tesla EX1002 Page 327

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

MARILYN J YOUNGER

Telephone: (703) 756-1436

FORM PCT/DO/EO/905 (371 Formalities Notice)

IPR2026-00377
Tesla EX1002 Page 328

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 12/737,803

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	165		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	50		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	110		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 26 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 110 =	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 $270 ($135 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).			135			
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	460		TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(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($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
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	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
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.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET Substitute for Form PTO-1360 (For use with Form PTO/SB/06)	Application Number 12737803	Filing Date
	Applicant(s) Christopher Austin	

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT			*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend		Indep	Depend	Indep	Depend	Indep	Depend
1	1		1				51		1	---	---		
2		1	---	---			52		1	---	---		
3		1	---	---			53		1	---	---		
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MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
12737803	

Applicant(s) Christopher Austin

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
101		1		1		
102		1	---	---		
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Total Indep	16		3		0	
Total Depend	136	↵	17	↵	0	↵
Total Claims	152		20		0	

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	Indep	Depend	Indep	Depend	Indep	Depend
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PTO/SB/08A
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO	Complete if Known	12/737803
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	**Application Number**	Not yet Known
	Filing Date	February 17, 2011
	First named Inventor	Christopher B. Austin
	Group Art Unit	Not yet Known
(use as many sheets as necessary)	Examiner name	Not yet Assigned
Sheet 1 of 1		

U.S. Patent Documents

Examiner Initials		U.S. Patent Document Number	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document
		6,983,186	Hobbs	11/8/2005
		5,462,439	Keith	10/31/1995
		7,243,746	Vasant	7/17/2007
		5,548,200	Nor et al.	8/20/1996
		2007/0164704	McGinley et al.	7/19/2007
		2008/0052145	Kaplan et al.	2/28/2008

FOREIGN PATENT DOCUMENTS

Examiner Initials		Country Code	Foreign Patent Document Number	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document	Translation	English Abstract

Examiner Signature		Date Considered	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer. Patent and Trademark Office, Washington, DC 0231.
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PATENT APPLICATION SERIAL NO._____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

02/18/2011 LLANDGRA 00000010 12737803

01 FC:2631	165.00 OP
02 FC:2633	110.00 OP
03 FC:2641	50.00 OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002- 489-267/69033

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PTO-1390 (Rev. 09-08)
Approved for use through 3/31/2010. OMB 0651-0021
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 12/737803	
INTERNATIONAL APPLICATION NO. PCT/US2009/054174	INTERNATIONAL FILING DATE 18 August 2009
PRIORITY DATE CLAIMED 18 August 2008	

TITLE OF INVENTION
VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

APPLICANT(S) FOR DO/EO/US
Christopher B. Austin

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☑ This is a **FIRST** submission of items concerning a submission under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected (Article 31).
5. ☑ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☑ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☑ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☑ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☑ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☑ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☑ A preliminary amendment.
14. ☑ An Application Data Sheet under 37 CFR 1.76.
15. ☐ A substitute specification.
16. ☐ A power of attorney and/or change of address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821- 1.825.
18. ☐ A second copy of the published International Application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. 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 15 minutes to complete, including gathering information, preparing, and submitting the completed 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

IPR2026-00377
Tesla EX1002 Page 334

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U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
12/737803	PCT/US2009/054174	

20. Other items or information:

The following fees have been submitted	CALCULATIONS	PTO USE ONLY
21. ☑ Basic national fee (37 CFR 1.492(a)) **$330**	$ 330	
22. ☑ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** All other situations **$220**	$ 220	
23. ☑ Search fee (37 CFR 1.492(b)) If the written opinion of the ISA/US or the International preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$100** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... **$430** All other situations **$540**	$ 100	
TOTAL OF 21, 22 and 23 =	$ 650	

☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)).
The fee is **$270** for each additional 50 sheets of paper or fraction thereof.

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round up to a whole number)	RATE	
- 100 =	/50 =		x $270	$

Surcharge of **$130.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	20 - 20 =		x $ 52	$	
Independent claims	3 - 3 =		x $220	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $390	$	
			TOTAL OF ABOVE CALCULATIONS =	$ 650	
☑ Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by ½.					
			SUBTOTAL =	$ 325	
Processing fee of **$130.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +				$	
			TOTAL NATIONAL FEE =	$ 325	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
			TOTAL FEES ENCLOSED =	$ 325	
			Amount to be refunded:	$	
			Amount to be charged	$	

IPR2026-00377
Tesla EX1002 Page 335

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12/737803

a. ☑ A check in the amount of $ 325 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees.

c. ☐ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. _____.

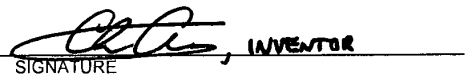
d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended paying fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

SEND ALL CORRESPONDENCE TO:

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024



SIGNATURE

Christopher B. Austin

NAME

—

REGISTRATION NUMBER

IAP03Rec'd PCT 17 FEB 2011
12/737803

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.

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PTO/SB/01A (01-09)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

12/737803

Title of Invention	VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☑ United States application or PCT international application number PCT/US2009/054174

filed on 18 August 2009

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

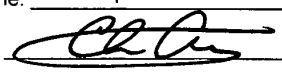
WARNING:

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.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Christopher B. Austin Date: 2/17/11

Signature:  Citizen of: United States of America

Inventor two: _____ Date: _____

Signature: _____ Citizen of: _____

☐ Additional inventors or a legal representative are being named on _____ additional form(s) attached hereto.

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 1 minute 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.**

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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:

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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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	12/737803
	Application Number	
Title of Invention	VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	

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.)

Applicant Information:

Applicant 1

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Christopher	B.	Austin	

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

City	Grafton	State/Province	WI	Country of Residence	US

Citizenship under 37 CFR 1.41(b) US

Mailing Address of Applicant:

Address 1	935 17th Avenue		
Address 2			
City	Grafton	State/Province	WI
Postal Code	53024	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.**

Name 1	Christopher B. Austin	Name 2	
Address 1	935 17th Avenue		
Address 2			
City	Grafton	State/Province	WI
Country	US	Postal Code	53024
Phone Number	414.331.0988	Fax Number	
Email Address		Add Email	Remove Email

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	
	Application Number	
Title of Invention	VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	

Application Information:

Title of the Invention	VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD		
Attorney Docket Number		**Small Entity Status Claimed** ☒	
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	22	**Suggested Figure for Publication (if any)**	22

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).
Enter either 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			

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/US2009/054174	2009-08-18
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US2009/054174	non provisional of	61/189353	2008-08-18

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	
	Application Number	
Title of Invention	VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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(a).

Remove

Application Number	Country[1]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			○ Yes ◉ No

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Assignee Information:

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

Assignee 1

If the Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information:

Address 1			
Address 2			
City		**State/Province**	
Country[1]		Postal Code	
Phone Number		Fax Number	
Email Address			

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Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature				Date (YYYY-MM-DD)	2011-02-17
First Name	Christopher	Last Name	Austin	Registration Number	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	
	Application Number	
Title of Invention	VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD	

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.**

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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 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 inspections or an issued patent.

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12/737803

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Group Art Unit Unknown

In re

Patent Application of

Christopher B. Austin

Application No. _____
U.S. National Phase Application for
PCT/US2009/054174

International Filing Date:
18 August 2009

"VEHICULAR BATTERY CHARGER,
CHARGING SYSTEM, AND METHOD"

PRELIMINARY AMENDMENT

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313

Sir:

Please enter the following Amendment:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks begin on page 9 of this paper.

Amendments to the Specification

Please replace paragraph [0001] of the present application with the following amended paragraph:

This is a 371 national-stage application of PCT/US2009/054174 filed on August 18, 2009, the entire contents of which are incorporated herein by reference. Priority is also hereby claimed to U.S. Provisional Patent Application No. 61/189,353 filed on August 18, 2008, the entire contents of which are incorporated herein by reference.

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Amendments to the Claims

Please amend the listing of claims as follows:

1. (Currently Amended) A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a second controller electrically coupled to the electrical power cord; [[and]]

at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger; and

at least one user-manipulatable control coupled to the second controller and operable by a user to enter at least one of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.

Claims 2-6. (Canceled)

7. (Original) The vehicle charger of claim 1 , wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

Claims 8-10. (Canceled).

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11. (Original) The vehicle charger of claim 1 , further comprising a display coupled to the second controller, the display displaying a level of charge of the battery.

12. (Original) The vehicle charger of claim 1 , further comprising a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller.

Claims 13-19. (Canceled).

20. (Original) The vehicle charger of claim 1 , further comprising a display displaying a total power cost of a charging session.

Claims 21-25. (Canceled).

26. (Original) The vehicle charger of claim 1 , wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

Claims 27-41. (Canceled).

42. (Original). The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

Claims 43-45. (Canceled).

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46. (Original) A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

Claim 47. (Canceled).

48. (Original) The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

Claims 49-54. (Canceled).

55. (Original) The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver.

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56. (Original) The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

Claims 57-58. (Canceled).

59. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

Claims 61-67. (Canceled).

68. (Original) The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

Claims 69-94. (Canceled).

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95. (Original) A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day;

a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user.

Claims 96-99. (Canceled).

100. (Original) The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and the receiver.

101. (Original) The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

Claims 102-103. (Canceled).

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104. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

Claims 106-112. (Canceled).

113. (Original) The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

Claims 114-152. (Canceled).

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Remarks

By this Preliminary Amendment, claim 1 is amended, and claims 2-6, 8-10, 13-19, 21-25, 27-41, 43-45, 47, 49-54, 57, 58, 61-67, 69-94, 96-99, 102, 103, 106-112, and 114-152 are canceled, leaving claims 7, 11, 12, 20, 26, 42, 46, 48, 55, 56, 59, 60, 68, 95, 100, 101, 104, 105, and 113 unchanged.

If a conference call would be useful in resolving issues arising from the filing of this communication, please contact the undersigned at the below-noted number.

Respectfully submitted,



Christopher B. Austin
Inventor

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Tesla EX1002 Page 353

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant and
(72) Inventor: **AUSTIN, Christopher, B.** [US/US]; 935 17th Avenue, Grafton, WI 53024 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

WO 2010/022059 A1

(54) **Title**: VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

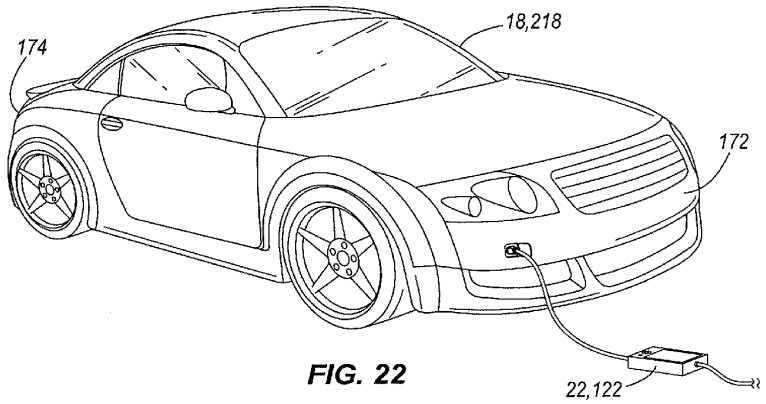


FIG. 22

(57) **Abstract**: A vehicle battery charger and a vehicle battery charging system are described and illustrated, and can include a controller enabling a user to enter a time of day at which the vehicle battery charger or system begins and/or ends charging of the vehicle battery. The vehicle battery charger can be separate from the vehicle, can be at least partially integrated into the vehicle, can include a transmitter and/or a receiver capable of communication with a controller that is remote from the vehicle and vehicle charger, and can be controlled by a user or another party (e.g., a power utility) to control battery charging based upon a time of day, cost of power, or other factors.

VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Priority is hereby claimed to U.S. Provisional Patent Application No. 61/189,353 filed on August 18, 2008, the entire contents of which are incorporated herein by reference.

BACKGROUND

[0002] n light of the ever-rising costs of energy in the global market, energy consumers of all types seek to reduce the impact such costs to the greatest extent possible. One popular manner of doing so is the use of vehicles that do not rely solely (and in some cases, at all) upon petroleum products as a source of energy. Many such vehicles have been developed that rely exclusively or in large part on batteries that must be recharged from a source of electrical power external to the vehicle. Such vehicles are referred to hereinafter simply as "electric vehicles," it being understood that this term refers to any vehicle requiring an external supply of electrical power to charge the vehicle for normal use. By way of example and without limitation, the term "electric vehicle" therefore refers to vehicles whose primary source of power is electrical batteries, as well as vehicles that have other sources of power (e.g., biofuel, fuel cells, natural gas, compressed air, and the like) in addition to or in lieu of electrical batteries, but that are designed to be supplied with electrical power from an external source to improve efficient operation of the vehicle.

[0003] Unfortunately, significant limitations exist to the widespread utilization of electric vehicles. For example, most households have a small number of appliances, devices, and systems that require a significant draw of electrical power from a power supplier. The introduction of an electrical vehicle as another daily draw of electric power for a household would place unprecedented strain on community power systems, many of which are already incapable of meeting peak demands. This problem is exacerbated by the fact that in some cases, the daily draw of electric power to charge the battery of an electric vehicle may be the highest of a household.

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[0004] Simply put, existing power infrastructure for most communities is incapable of meeting the demand that widespread use of rechargeable electric vehicles would place on the infrastructure. Until electrical power distribution infrastructure is updated to meet this demand (and even after such a time), improvements in energy distribution and utilization for charging electric vehicle batteries are welcome in the art.

SUMMARY OF THE INVENTION

[0005] In some embodiments, a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, wherein the vehicle charger comprises an electrical power cord releasably attachable to at least one of the vehicle and a source of power; a second controller electrically coupled to the electrical power cord; and at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger.

[0006] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle in the course of a charging session, wherein the vehicle charger comprises a controller; a display coupled to the controller and adapted to display a time; and a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end, the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

[0007] In some embodiments, a vehicle charger for charging a battery of a vehicle is provided, wherein the vehicle charger comprises a display mounted within the vehicle within reach of a user seated within the vehicle; a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user.

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[0008] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle, wherein the vehicle charger comprises: a controller; and a memory coupled to the controller and in which to save a time of day entered by a user; the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user; and wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery until the threshold level of battery charge is reached.

[0009] In some embodiments, a vehicle charger for charging a battery of a vehicle is provided, wherein the vehicle charger comprises a controller; a display coupled to the controller; and a memory accessible by the controller and in which to save a time of day; the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day; the controller operable to display at least two different screens upon the display, at least one of the screens displaying information regarding a charging session, and at least one of the screens displaying settings at least partially defining the manner of operation of the vehicle charger.

[0010] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, wherein the vehicle charger comprises a display; a second controller coupled to the display and operable to change a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day; and at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, wherein the second controller displays an indicator indicating a status of communication between the first and second controllers.

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[0011] In some embodiments, a vehicle charger for charging a battery of a vehicle is provided, and comprises a controller; and a display coupled to the controller; the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day; the controller operable to display on the display an amount of time remaining to complete charging of the battery.

[0012] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle, wherein the vehicle charger comprises a controller; and a display coupled to the controller; the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day; the controller operable to display on the display an amount of power consumed by the battery during the charging session.

[0013] In some embodiments, a vehicle charger for charging a battery of a vehicle is provided, and comprises a controller; and a display coupled to the controller; the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day; the controller operable to display on the display a cost of power supplied to the vehicle charger.

[0014] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle in the course of a charging session, wherein the vehicle charger comprises an electrical power cord releasably attachable to at least one of the vehicle and a source of power; a controller; a housing attached to the electrical cord; a display on the housing, coupled to the controller, and adapted to display a time; and a user-manipulatable control coupled to the controller and operable by a user to enter a time of day; the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user.

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[0015] In some embodiments, a vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger is provided, and comprises a display; a user-manipulatable control; a second controller coupled to the display and operable to change a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging; and at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller, the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger based at least in part upon the time of day entered by the user.

[0016] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle, wherein the vehicle charger comprises a controller operable to change a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day, wherein the controller transmits a signal responsive to detection of an interruption of power supply to the vehicle charger.

[0017] In some embodiments, a vehicle charger for charging a battery of a vehicle is provided, and comprises a controller; a vehicle charger battery coupled to the controller; and an electrical power cord releasably attachable to at least one of the vehicle and the vehicle charger battery to supply power from the vehicle charger battery to the battery of the vehicle, wherein the controller is operable to change a supply of electric power to the vehicle charger battery during the course of a charging session by at least one of increasing a rate of charge of the vehicle charger battery, decreasing the rate of charge of the vehicle charger battery, starting charging of the vehicle charger battery, or stopping charging of the vehicle charger battery based at least in part upon a time of day.

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[0018] Some embodiments of the present invention provide a vehicle charger for charging a battery of a vehicle, wherein the vehicle charger comprises a first core on the vehicle; a second core in a location stationary with respect to the first core, the second core providing an inductive charge to the first core in at least one position of the first core with respect to the second core; at least one sensor positioned to detect the position of the first core with respect to the second core; a display mounted within the vehicle within view of a user seated within the vehicle; and a controller coupled to the display and responsive to signals from the sensor to display at least one indicator on the display indicating a direction in which the vehicle must move for an improved positional relationship between the first and second cores.

[0019] In some embodiments, a vehicle charger for charging a battery of a vehicle is provided, and comprises a controller; a first electrical connector coupled to the battery and the controller and located on one side of the vehicle; and a second electrical connector coupled to the battery and the controller and located on a different side of the vehicle, the first and second electrical connectors both shaped and dimensioned for releasable connection to an electrical power cord supplying power to the vehicle from an external power source.

[0020] Some embodiments of the present invention provide a method of controlling charging of batteries of multiple vehicles each electrically connected to a power generation and distribution system, wherein the method comprises establishing communication with a controller associated with a battery charger of each vehicle; obtaining from each battery charger a time of day by which battery charging for the vehicle associated with the battery charger must be completed; and changing power supply to at least some of the battery chargers based at least in part upon the time of day received from the battery chargers.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is a schematic diagram of a power generation and distribution system for a community.

[0022] FIG. 2 illustrates a vehicular charging system according to an embodiment of the present invention.

[0023] FIG. 3 illustrates a vehicular charging system according to another embodiment of the present invention.

[0024] FIG. 4 illustrates a vehicular charging system according to another embodiment of the present invention.

[0025] FIG. 5 is a perspective view of a vehicle charger according to an embodiment of the present invention.

[0026] FIG. 6 is a perspective view of a portion of the vehicular charger illustrated in FIG. 5, shown in a first state.

[0027] FIG. 7 is a perspective view of the vehicular charger illustrated in FIGs. 5 and 6, showing the vehicular charger in a second state.

[0028] FIG. 8 is a perspective view of the vehicular charger illustrated in FIGs. 5-7, showing the vehicular charger in a third state.

[0029] FIG. 9 is a perspective view of the vehicular charger illustrated in FIGs. 5-8, showing the vehicular charger in a fourth state.

[0030] FIG. 10 is a perspective view of the vehicular charger illustrated in FIGs. 5-9, showing the vehicular charger in a fifth state.

[0031] FIG. 11 is a perspective view of the vehicular charger illustrated in FIGs. 5-10, showing the vehicular charger in a sixth state.

[0032] FIG. 12 is a perspective view of a portion of a vehicular charger according to another embodiment of the present invention.

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[0033] FIG. 13 illustrates a vehicle display according to an embodiment of the present invention.

[0034] FIG. 14 illustrates another vehicle display according to an embodiment of the present invention.

[0035] FIG. 15 is a schematic electrical diagram of a vehicular charging system according to an embodiment of the present invention.

[0036] FIG. 16 is a schematic electrical diagram of a vehicular charging system according to another embodiment of the present invention.

[0037] FIG. 17 is a schematic electrical diagram of a vehicular charging system according to another embodiment of the present invention.

[0038] FIG. 18 a schematic diagram of a portion of a inductive vehicular charging system according to an embodiment of the present invention.

[0039] FIG. 19 illustrates a vehicular display for the inductive vehicular charging system illustrated in FIG. 18.

[0040] FIG. 20 is a side view of a vehicle and vehicular charger according to an embodiment of the present invention.

[0041] FIG. 21 is a top view of the vehicle and vehicular charger shown in FIG. 19.

[0042] FIG. 22 is a perspective view of the vehicle and vehicular charger shown in FIGs. 19 and 20.

[0043] FIG. 23 is a perspective detail view of the vehicle and vehicular charger shown in FIGs. 19-21.

[0044] FIG. 24 is a flowchart illustrating a method of operation of a vehicular charger according to an embodiment of the present invention.

[0045] FIG. 25 is a flowchart illustrating a method of operation of a vehicular charger according to another embodiment of the present invention.

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[0046] FIG. 26 is a flowchart illustrating a method of operation of a vehicular charger according to another embodiment of the present invention.

[0047] FIG. 27 is a flowchart illustrating a method of operation of a vehicular charger according to another embodiment of the present invention.

[0048] FIG. 28 is a flowchart illustrating a method of operation of a vehicular charging system according to an embodiment of the present invention.

[0049] FIG. 29 illustrates power draw from a power grid over a period of time, as controlled in part by a vehicular power charging system according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0050] Before any embodiments of the present invention are explained in detail, it is to be understood that the present invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the accompanying drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description, and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Unless specified or limited otherwise, the terms "mounted," "connected," "supported," and "coupled" and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings. Further, "connected" and "coupled" are not restricted to physical or mechanical connections or couplings.

[0051] A power generation and distribution system in which vehicle chargers and vehicle charging systems according to the present invention can be used is illustrated schematically in FIG. 1, and is indicated generally at 10. The system 10 includes one or more sources of power 12 that supply a community, such as one or more power plants generating electric power from natural gas, coal, water flow, nuclear power, geo-thermal power, wind, solar power, other power sources, and any combination thereof. Any number of sources of power 12 can supply the electricity needs of the community, and can be located within the

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community and/or located distant from the community. For example, electric power can be generated in one or more power plants located in or nearby the community, whereas additional electric power can be supplied from other more distant power plants as needed in times of peak demand.

[0052] Electric power is distributed from the sources of power 12 in any conventional manner, such as by a number of power lines 14 running from the sources of power 12 to various locations in the community. Electric power can be further distributed within the community by additional power lines 14 and power distribution infrastructure. Such power lines and power distribution infrastructure (in their various forms) are known to those skilled in the art, and are not therefore described further herein.

[0053] Electric power is transmitted over the power lines 14 to a number of different locations 16 in the community, each of which draws and uses the electrical power for various purposes. One or more electric vehicles 18, 618, 1018 are at some of these locations, and draw an amount of electric power for purposes of charging one or more batteries 20, 620, 1020 (see FIGs. 2-4) of each electric vehicle 18, 618, 1018. Each electric vehicle 18, 618, 1018 in the community is releasably connected to the vehicular charging system 10. In the illustrated embodiment of FIGs. 2 and 3, each electric vehicle 18, 618 is releasably electrically and mechanically connected by a respective cord 22, 744 as will be described in greater detail below. In other embodiments (e.g., FIG. 4), one or more of the electric vehicles 1018 are releasably electrically connected to the vehicular charging system 10, but are not mechanically connected thereto. In such cases, the electric vehicles 1018 can be electrically connected by use of induction charging as described in greater detail below.

[0054] A vehicle charging cord 22 according to an embodiment of the present invention is illustrated in FIG. 5, and is shown in use in FIG. 2. The illustrated vehicle charging cord 22 has a first end 24 adapted to releasably connect to an electrical outlet (not shown) of a business, residence, or other building or facility, and a second end 26 adapted to releasably connect to the electric vehicle 18. In this regard, the first end 24 can have, for example, a standard U.S. two-prong or three-prong male electrical connector (i.e., grounded or ungrounded) intended for connection to a 120V AC supply of electric current, a U.S. Type B electrical connector intended for connection to a 220V AC supply of electric current, any electrical connector suitable for a 240V AC supply of electrical current, a Japanese Type B electrical connector meeting JA1-15 electrical standards, a British Type G electrical

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connector meeting British BS 1363 electrical standards, a European Type F electrical connector meeting CENELEC electrical standards, a French Type E electrical connector meeting French electrical standards, a Chinese Type I electrical connector meeting Chinese electrical standards, or a Type D or M electrical connector meeting Indian electrical standards. Any other releasable electrical connector suitable for connection to an electrical outlet of a building or facility, or for connection to a power cord, power device, or other power interface with the electrical system of the building or facility can be used as desired. In this regard, although the first end 24 of the vehicle charging cord 22 shown in FIG. 5 has a U.S. Type B plug, it will be appreciated that the first end 24 can have any number and arrangement of blades, pins, and apertures for releasable mating engagement with an electrical connector of a power cord, power device, or other power interface as just described.

[0055] The second end 26 of the vehicle charging cord 22 can have any suitable plug for releasable connection with a mating electrical connector of the vehicle. In this regard, the second end 26 of the vehicle charging cord 22 can have any number of blades and/or pins for mating with associated apertures of the mating electrical connector of the vehicle, and can also or instead have any number of apertures for mating with associated blades and/or pins of the mating electrical connector of the vehicle. The second end 26 can be connected directly to an electrical connector of a vehicle, or to a power cord, power device, or other power interface with the electrical power system of a vehicle.

[0056] The vehicle charging cord 22 can be any gauge suitable for carrying electric current to charge the vehicle 18 and for also meeting country and local electrical codes. Also, the vehicle charging cord 22 illustrated in FIG. 5 is insulated with flexible plastic or other suitable material.

[0057] The vehicle charging cord 22 illustrated in FIGs. 2 and 5 also has a housing 28 intermediate the ends 24, 26 of the cord 22. In other embodiments, the housing 28 can be located at or define an end of the cord 22, in which case the housing 28 can carry any of the electrical connectors described above with regard to ends 24, 26 of the vehicle charging cord 22.

[0058] The illustrated housing 28 has a substantially parallelepiped shape. Depending at least in part upon the shape and size of the electronics within the housing (described below) for performing any desired electrical transformer function, and the shape and size of the

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electrical elements used for the control features described below, the housing 28 can be larger or smaller than that shown in FIG. 5, and can have any other shape desired, (e.g., a cube shape, a spherical, elliptical, or other rotund shape, an irregular shape, and the like).

[0059] With reference now to FIGs. 5-11, and also with reference to FIG. 15 (which illustrates a vehicular charging system utilizing the vehicular charger of FIGs. 2, 5-11, a number of user-manipulatable controls 30 and a display 32 are provided on the housing 28. The illustrated housing 28 also contains electrical components for transforming power supplied thereto (indicated generally at 136), and control circuitry for performing the vehicle battery charging management functions described in greater detail below. The display 32 shown in FIGs. 5-11 and 15 is an LCD display 32, although any other type of display can be used as desired. The user-manipulatable controls 30 include a power button 34, a number of navigation buttons 36, and a select button 38 (see FIGs. 6-11). The power button 34 can be pressed by a user to turn the vehicle charging cord 22 on and off, thereby enabling and disabling the vehicle charging cord 22 to charge one or more batteries 20 of a vehicle 18 connected thereto. The navigation buttons 36 can be pressed by a user to navigate through one or more screens upon the display 32 (described in greater detail below), whereas the select button 38 can be pressed by a user to select one or more options on the screen(s).

[0060] In the illustrated embodiment, four navigation buttons 36 (up, down, left, and right) are positioned around the select button 38, all of which are adjacent the power button 34. However, in other embodiments, the navigation buttons 36, select button 38, and power button 34 can be in any other arrangement on the housing 28. Also, it will be appreciated that the user-manipulatable controls 30 can be buttons as shown in FIGs. 5-11, but can instead or also be any other type of user-manipulatable control. For example, any of the user-manipulatable controls 30 can be dome or tact switch, heat-sensitive, or other types of buttons, can be knobs or dials, and the like. Also, fewer or more user-manipulatable controls 30 can be used in other embodiments, such as for vehicle charging cords 22 not having a power button 34 (i.e., automatically powered upon connection to a power source), vehicle charging cords 22 having more or fewer navigation buttons (depending in some embodiments upon the arrangement of options on screens 32 shown on the display 32), and the like.

[0061] Although a display 32 in conjunction with a number of button-type user-manipulatable controls 34, 36, 40 is employed in the embodiment of FIGs. 2, 5-11 and 15, in other embodiments, the display 32 and any number of the button-type user-manipulatable

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controls 34, 36, 40 can be replaced by a touch screen (not shown). The touch screen can enable a user to display options, navigate between two or more screens, and select options by inputting commands directly into the display 32, and in some embodiments can simplify control of the vehicle charging cord 22.

[0062] With reference now to FIG. 15, in some embodiments, the vehicle charging cord 22 has a controller 44 located within the housing 28 and at least partially controlling operations of the vehicle charging cord 22. The controller 44 in the illustrated embodiment of FIGs. 2, 5-11 and 15 is a programmable processor of any suitable type, but in some embodiments can take other forms such as non-programmable processor, a system of discrete logic elements, and any combination thereof. The illustrated vehicle charging cord 22 also has a transceiver 46 coupled to the controller 44, enabling the controller 44 to communicate with another controller. The other controller can be one or more processors of a personal computer, phone, PDA, or other processor-based device associated with a user of the vehicle charging cord 22, one or more processors of a server or other computer associated with a power utility providing power to the vehicle charging cord 22, and the like). In the illustrated embodiment of FIGs. 2, 5-11 and 15, the other controller is a remote computer of a power utility 48, and is indicated at 50. The controller 50 of the power utility 48 is coupled to a power utility transceiver 52 to enable the power utility 48 to communicate with the controller 44 of the vehicle charging cord 22.

[0063] The transceiver 46 of the vehicle charging cord 22 and the transceiver 52 for the computer of the power utility 48 can each take any suitable form. However, it will be appreciated that the transceiver 52 for the computer of the power utility 48 can be selected to enable the computer of the power utility 48 to communicate with multiple vehicle charging cord controllers 44 of the same or different users. Also, the transceiver 46 of the vehicle charging cord 22 and/or the transceiver 52 for the computer of the power utility 48 can be replaced by a separate transmitter and a separate receiver enabling two-way communication between the controller 50 of the power utility 48 and the controller 44 of the vehicle charging cord 22. Such communication can be via the power lines 14 (see FIG. 1) between the computer of the power utility 48 and the locations 16 at which the vehicle charging cord 22 is used. In this regard, reference herein and in the appended claims to a "receiver" and a "transmitter" is intended to encompass transceivers as well as separate receivers and transceivers.

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[0064] Any power line communication (PLC) system or combination of PLC systems adapted for carrying data over power lines 14 can be used for communication between the controllers 44, 50 described above, such as distribution line carrier (DLC) PLC systems, broadband over lines carrier (BLC) systems, low-speed narrow-band communication systems (proposed and used in Demand Side Management systems), and the like. Communication between the controller 50 of the power utility 48 and the controller 44 of the vehicle charging cord 22 can be through any number of substations between the power utility 48 and the location 16 at which the vehicle charging cord 22 is used. Also, depending at least in part upon the PLC system(s) used, such communication can be through any number of repeaters as is well known to those skilled in the art of PLC systems.

[0065] The controller 50 of the power utility 48 (with which the controller 44 of the vehicle charging cord 22 communicates) can be located anywhere between the location 16 of the user and the sources of power 12. For example, the controller 50 of the power utility 48 can be located at a facility where power is generated, at an office of the power utility 48, at any of a number of substations between the source of power 12 and the location 16 of the user, and the like.

[0066] By connecting the first end 24 of the vehicle charging cord 22 to an electrical outlet of a building or facility (or to a power cord, power device, or other power interface with the electrical system of the building or facility), communication can be established over the vehicle charging cord 22, the electrical system of the home, building, or other facility (e.g., through wiring and one or more circuit breakers thereof), and low and high-voltage power lines to the power utility 48 and the controller 50 of the power utility 48 described above. In some embodiments, this communication can be established automatically upon plugging in the first end 24 of the vehicle charging cord 22, whereas in other embodiments, this communication is established when the vehicle charging cord 22 is turned on or when a user enters an appropriate command to establish this communication (described in greater detail below), or in any other suitable manner. Communication between processors established automatically upon their connection are well known to those skilled in the art, and are not therefore described further herein.

[0067] As discussed above, communication between the controller 44 of the vehicle charging cord 22 and the controller 50 of the power utility 48 can be over power lines, wiring, or other conductors. However, it will be appreciated that communication along any

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portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22. By way of example only, the vehicle charging cord 22 can have a wireless processor and associated antenna, receiver, and transmitter enabling wireless communication with a wireless service provider, and ultimately to the controller 50 of the power utility 48. Like the PLC communication described above, wireless communication between the controller 50 of the power utility 48 and the vehicle charging cord 22 can be established automatically upon plugging in the first end 24 of the vehicle charging cord 22, when the vehicle charging cord 22 is turned on, or when a user enters an appropriate command to establish this communication (described in greater detail below).

[0068] In some embodiments, the controller 44 of the vehicle charging cord 22 communicates with a user's computer rather than, or in addition to, communicating with the controller 50 of the power utility 48. This communication can be any combination of wired or wireless communication. For example, a residence-based, office-based, or other facility-based PLC system can be used to communicate between the controller 44 of the charging cord 22 and a user's computer (via the electrical system of the residence, office, or other facility). In other embodiments, the vehicle charging cord 22 can have a wireless processor adapted for communication with a user's computer. Such communication can be through any suitable wireless personal area network (WPAN) (using, for example, ZigBee®, Bluetooth®, or any other WPAN wireless technology), wireless local area network (WLAN), and the like. Like the PLC communication described above, communication between the controller 50 of the power utility 48 and the user's computer can be established automatically upon plugging in the first end 24 of the vehicle charging cord 22, when the vehicle charging cord 22 is turned on, or when a user enters an appropriate command to establish this communication (described in greater detail below).

[0069] Upon connection with a user's computer (wireless or otherwise), a user can control the vehicle charging cord 22 in any of the same manners as a power utility 48 described in greater detail below. Alternatively or in addition, communication between the controller 44 of the vehicle charging cord 22 and the controller of 50 of the power utility 48 can be established through the user's computer. Specifically, wired or wireless

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communication between the controller 44 of the vehicle charging cord 22 and the user's computer can be used in conjunction with a connection between the user's computer and the controller 50 of the power utility 48 to enable communication between the controller 44 of the vehicle charging cord 22 and the controller 50 of the power utility 48. Such communication can thereby enable the power utility 48 to control the vehicle charging cord 22 (in any of the manners described below) via the user's computer.

[0070] With reference now to FIGs. 6-11, the illustrated vehicle charging cord 22 has a first screen 40 providing information regarding the vehicle charging cord 22, a battery connected thereto, and the status of charging operations of the vehicle charging cord 22. In the illustrated embodiment of FIGs. 2, 5-11 and 15, the screen 40 has a vehicle charging cord status indicator 42, which displays the status of charging operations. The status indicator 42 can indicate whether the vehicle charging cord 22 is charging a battery, the type of charging operations being performed by the vehicle charging cord 22, and/or whether an error in charging the battery has been detected.

[0071] In the state of the vehicle charging cord 22 shown in FIGs. 6, 10, and 11, the vehicle charging cord 22 is not charging a battery connected thereto, nor is the vehicle charging cord 22 programmed or otherwise controlled to charge a battery (described in greater detail below). Accordingly, the status indicator 42 displays "OFF". In the state of the vehicle charging cord 22 shown in FIG. 7, the vehicle charging cord 22 is in the process of charging a vehicle battery in "manual" mode (i.e., not based upon a time of day). Therefore, the status indicator 42 displays "MANUAL CHARGE IN PROCESS" in FIG. 7. In the state of the vehicle charging cord 22 shown in FIG. 8, the vehicle charging cord 22 is in the process of charging a battery based upon one or more instructions that can include a time of day to begin charging the battery and/or a time of day to stop battery charging (discussed in greater detail below). Accordingly, the status indicator 42 displays "PROGRAMMED CHARGE IN PROCESS" in FIG. 8. Finally, in the state of the vehicle charging cord 22 shown in FIG. 9, an error has been detected by the vehicle charging cord 22 in the process of attempting to charge the battery. Therefore, the status indicator 42 display "ERROR – BATTERY FAULT" in FIG. 9. In some embodiments, the vehicle charging cord 22 can have appropriate circuitry to detect a variety of charging problems, including without limitation a damaged battery, a damaged vehicle charging cord 22, a disconnection between the vehicle charging cord 22 and a source of power used to charge the vehicle battery, and/or

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a disconnection between the vehicle charging cord 22 and the battery to be charged. A large number of conventional circuits capable of detecting such problems exist, and are not therefore described further herein. Such circuits fall within the spirit and scope of the present invention.

[0072] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a communication status indicator 54. The communication status indicator 54 indicates whether communication exists between the controller 44 of the vehicle charging cord 22 and a computer (e.g., a computer of the power utility 48, the user's computer, a mobile phone, PDA, or other processor-based device as described above, and the like). For example, in the "OFF" state of the vehicle charging cord 22 illustrated in FIG. 6, no communication exists between the controller 44 of the vehicle charging cord 22 and a computer, so the communication status indicator 54 displays an appropriate indicator. In the other states of the vehicular charging cord 22 illustrated in FIGs. 7-11, including the states of FIGs. 10 and 11 where the vehicle charging cord 22 is in an "OFF" state but is not set to charge a battery, communication has been established and maintained between the controller 44 and a computer, so the communication status indicator 54 displays an indicator showing this status.

[0073] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a power connection status indicator 56. The power connection status indicator 56 indicates whether an electrical connection exists between the vehicle charging cord 22 and a source of power (e.g., an electrical system of a house, office, facility, or other location) to charge a battery. When the first end 24 of the illustrated vehicle charging cord 22 is unplugged or is connected to an electrical system not providing power to the vehicle charging cord 22, the power connection status indicator 56 displays such an indicator (see, for example, FIG. 6). Otherwise, if a proper power connection is made, the connection status indicator 56 displays an appropriate indicator showing that such a connection has been made (see, for example, FIGs. 7-11).

[0074] A clock 58 is also displayed on the first screen 40 shown in FIGs. 6-9. Any form of clock can be displayed as desired, preferably indicating whether the displayed time is "A.M." or "P.M.". In some embodiments, time on the clock 58 is maintained by the controller 44 of the vehicle charging cord 22, and can be maintained even if no power is supplied to the vehicle charging cord 22 (e.g., when the vehicle charging cord 22 is

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unplugged) by a battery of the vehicle charging cord 22. Such a battery (not shown) can be connected to the controller 44 of the vehicle charging cord 22, can be located within the housing 28, and in some embodiments can be removed and replaced by a user as necessary via a door or other battery cover (also not shown). In these and other embodiments, the time displayed upon the clock 58 can be retrieved and displayed by the controller 44 from a computer upon establishment of communication with the computer in any of the manners described above.

[0075] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a battery charge level indicator 60. Using any battery diagnostic circuitry desired, the controller 44 of the vehicle charging cord 22 can detect the level of charge of a battery 20 to which the vehicle charging cord 22 is connected (e.g., by the plug on the second end 26 of the vehicle charging cord 22 described above). The battery charge level indicator 60 illustrated in FIGs. 6-9 is a bar chart displaying charges ranging from 0% to 100%, and also displaying the percentage of full charge of a vehicle battery 20 to which the vehicle charging cord 22 is connected (e.g., 31% in FIG. 6). However, other types of battery charge level indicators 60 can be used in other embodiments.

[0076] For example, the battery charge level indicator 60 can be simply a number (e.g., the percentage of full charge of the battery 20, the exact charge level of the battery in amp-hours or in another unit of measurement, another number representative of the amount of charge of the battery 20 but not necessarily in units conventionally used to indicate battery charge, and the like). As another example, the battery charge level indicator 60 can also or instead include any other chart or visual representation, such as a pie chart, an escalating series of bars having different lengths, a symbol having different colors and/or brightness levels representing different battery charge levels, a gauge with a needle or other pointer, text in any language indicating the level of battery charge (e.g., "empty, very low, low, high, full"), and the like. The battery charge level indicator 60 can comprise any graphics, text, or combination of graphics and text to convey the level of charge of the battery 20 to a user, and can be any size desired on the first screen 40. The controller 44 of the vehicular charging cord 22 can monitor the charge level of the battery 20 being charged, and can update the battery charge level indicator 60 continuously or on a periodic basis.

[0077] In some embodiments, the first screen 40 of the vehicular charging cord 22 also displays the voltage and/or amperage used to charge a battery 20 connected thereto. These

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voltage and/or amperage indicators are included in the embodiment of the vehicle charging cord 22 shown in FIGs. 2, 5-11 and 15, and are given reference numbers 62 and 64, respectively.

[0078] As also shown in FIGs. 6-9, the first screen 40 of the vehicle charging cord 22 can include other information regarding the status of a battery charging session performed by the vehicular charging cord 22, including the amount of time estimated to completely charge the battery 20 (in minutes, minutes and hours, or in any other format), the estimated or actual amount of power already consumed during the present charging session (in kWh or in any other unit of measurement), the actual or estimated cost of charging the connected battery 20 per hour or other unit time, and/or the total actual or estimated cost of the current charging session to the present time. Each of these examples of information is displayed on the first screen 40 shown in FIGs. 6-9, and is indicated with reference numbers 66, 68, 70, and 72, respectively.

[0079] The charge time remaining indicator 66 and the power used indicator 68 can be calculated by the controller 44 in any of a number of manners well known to those in the art of battery charging and electrical power metering technology. In this regard, it will be appreciated that the charge time remaining can be calculated taking into account the non-linear rate of charging for many batteries 20, wherein the rate of battery charge at different levels of battery charge changes. Formulas for such estimates are well known to those skilled in the art of battery charging, and are not therefore described further herein. The charge cost per hour indicator 70 can be retrieved and displayed by the controller 44 from a computer upon establishment of communication with the computer in any of the manners described above, or can be manually entered into the vehicle charging cord 22 by a user using the user-manipulatable controls 30 and an appropriate data entry cell or menu on the display 32 (not shown). In those embodiments in which the charge cost per hour is retrieved from another computer as described above, the controller 44 can retrieve a cost per kWh figure directly from the power utility 48 (e.g., from the controller 50 of a computer of the power utility 48), from the user's computer in which is stored a cost per kWh figure entered there or retrieved by the user's computer, and the like, and can multiply that figure by an estimated kWh level at which the vehicle charging cord 22 will charge the battery 20 to display the charge cost per hour 70 for the current battery charging session. The total cost to the present time for a

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charging session 72 can be calculated by the controller 44 simply by multiplying the values of indicators 68 and 70 together.

[0080] In some embodiments, any or all of the indicators 66, 68, 70, and 72 can be updated periodically during a charging session, such as every second, minute, or other time interval. Any or all of the indicators 66, 68, 70, 72 can be continually updated by receiving streaming data from the controller 50 of the power utility 48 or from the user's computer. For example, the charge time remaining indicator 66 can be updated by the controller 44 every second or minute based upon battery charge calculations made at the beginning of the charging session or made periodically during the charging session. As another example, the power used indicator can be updated by the controller 44 every second, minute, or in greater periods of time based upon the actual or estimated power delivered via the vehicle charging cord 22. As yet another example, the charge cost per hour indicator 70 can be updated every second, minute or other time period based upon cost information retrieved by the controller 44 from the controller 50 of the power utility 48 or the user's computer, and/or can be updated immediately upon receiving streaming or batch-loaded power cost information from the controller 50 of the power utility 48 or the user's computer.

[0081] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a battery charge selector 74 by which a user can select the manner in which the vehicle charging cord 22 will charge a vehicle battery 20. By pressing the navigation buttons 36 and then the select button 38 described above, a user can highlight a desired manner in which the vehicle charging cord 22 will charge a vehicle battery 20 connected thereto. The battery charge selector options illustrated in FIGs. 6-9 include "OFF", "PROGRAMMED CHARGE", AND "MANUAL CHARGE", any of which can be highlighted and selected by a user as just described. Although a radio button format of the battery charge selector 74 is illustrated in the embodiment of FIGs. 2, 5-11 and 15, the battery charge selector 74 can have any other form desired, including without limitation a drop-down or pop-up menu, and the like. Upon selecting the desired charge state as just described, the vehicle charging cord 22 can immediately begin a charging session by beginning to supply current to the battery 20 to which the vehicle charging cord 22 is connected (e.g., by closing a switch 92 coupled to the controller 44 as described in greater detail below), or can begin such a session after a user then presses the power button 34. For example, if the power button 34 is selected after the "MANUAL CHARGE" button has been selected, the controller 44 can

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causes the switch 92 to close without delay in order to begin charging the vehicle battery 20, whereas if the power button 34 is selected after the "PROGRAMMED CHARGE" button has been selected, the controller 44 can cause the switch 92 to close only after one or more conditions have been met as will be described in greater detail below. In any case, once a user commands and enables the vehicle charging cord 22 to begin charging immediately or to begin charging at a later time based upon a set of instructions as described elsewhere herein, a vehicle charging session begins.

[0082] The operational status of the vehicle charging cord 22 can be displayed by the vehicle charging cord 22 in a number of different manners and locations. For example, the vehicle charging cord status indicator 42 described above can be provided. Alternatively or in addition, one or more graphics (e.g., symbols, colors, and the like) providing the same general status indicators (e.g., off, charging in process, error) can be displayed elsewhere on the housing 28, such as through a translucent or transparent portion of the housing 28, through a lens located on the housing 28, and the like. In this regard, one or more graphics can be printed on the interior and/or exterior of the housing 28, can be invisible or substantially not visible to a user when not illuminated, and can be illuminated by one or more lamps, LEDs or other light sources within the housing 28 when such graphics are to be displayed. By way of example only, the controller 44 can display a battery charging symbol such as that shown in FIGs. 7 and 8 in a first charge status display area 76A when a charging session is in process, or when the vehicle charging cord 22 is in the process of charging a battery 20 (as described in greater detail below, the battery 20 may not be actively charging the battery 20 at one or more times during a charging session). As another example, the controller 44 can display an error symbol such as that shown in FIG. 9 in the same or a different charge status display area 76B when any of the battery charging errors described above have been detected. Still other battery charging symbols indicating any other information regarding the status of the vehicle charging cord 22 and its operation can be displayed anywhere on the housing as a supplement to or in addition to the information shown on the display 32 described above. In some embodiments, one or more status display areas 76 as just described can even replace the display 32.

[0083] With continued reference to the illustrated embodiment of FIGs. 2, 5-11 and 15, in some embodiments, the controller 44 of the vehicle charging cord 22 can display two or more different screens upon the display 32. This control enables a user to view substantially

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more information than that available from other types of displays and from other types of controls and indicators on the housing 28. By way of example only, two such alternative screens 40A, 40B are illustrated in FIGs. 10 and 11, respectively, and can be accessed in a number of different manners. In some embodiments, each screen 40, 40A, 40B is accessed by selecting a navigation button, such as by using navigation button 36 in the illustrated embodiment to highlight a desired navigation button on the screen 40, 40A, 40B. In other embodiments, one or more navigation buttons 36 on the housing 28 are provided to move between screens 40, 40A, 40B, such as forward and back buttons, a single button to scroll though two or more screens 40, 40A, 40B, and the like. Although three different screens 40, 40A, 40B can be shown upon the display 32 in the illustrated embodiment of FIGs. 2, 5-11 and 15, any other number of displays (e.g., 1, 2, 4, or more) can be shown upon the display 32, and can include any number and arrangement of the indicators, selectors, and other information described herein. In still other embodiments, a single screen 40 is provided, only a portion of which is visible on the display 32 at any given time. In such cases, other portions of the screen 40 can be viewed by scrolling in any desired direction using one or more navigation buttons 36 or other user-manipulatable controls on the housing 28.

[0084] In the illustrated embodiment of FIGs. 2, 5-11 and 15, the first screen 40 has two navigation buttons 78, 80, each of which causes the controller to display a different screen 40A, 40B when selected by a user in the manner described above. When a first "PROGRAM A CHARGE" navigation button 78 is selected by a user, the controller 44 replaces the first screen 40 with a second screen 40A shown in FIG. 10. This second screen 40A enables a user to change the manner in which the vehicle charging cord 22 will operate to charge one or more batteries 20 connected thereto. The second screen 40A also has navigation buttons 82, 84 that can be selected by a user to return to the first screen 40, whether by making one or more changes to operation of the vehicle charging cord 22 (by selecting the "GO" navigation button 84), or by making no changes to operation of the vehicle charging cord 22 (by selecting the "CANCEL" navigation button 84). In the illustrated embodiment, selection of either navigation button 82, 84 on the second screen 40A will return the user to the first screen 40.

[0085] A valuable feature of the vehicle charging cord 22 of FIGs. 2, 5-11 and 15 is the ability of a user to at least partially control when the vehicle charging cord 22 will begin to charge one or more batteries 20 connected thereto. In many geographic locations, times of

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day, and times of the year, the ability of power utilities 48 to supply the full power demand of users is limited or is inadequate. Although power utilities can often generate or otherwise obtain additional power at peak periods, such power often comes at a higher price to the power utility 48. Regardless of whether a higher price is paid by the utility, higher power prices are often charged to consumers of the power utility 22 during peak periods. In many cases, power utilities 48 encourage their customers to consume power at non-peak periods, such as a nighttime, and often give significant discounts to those who consume power during such periods. The vehicle charging cord 22 of FIGs. 2, 5-11 and 15 enables the user to take advantage of such cost savings by controlling when vehicle battery charging will occur. Even in those cases where savings to the power consumer are not provided, the vehicle charging cord 22 can be used to reduce power draw upon power utilities 48 at peak times and/or to better manage power consumption.

[0086] With reference to FIG. 10, the second screen 40A (entitled the "Programmed Charge" screen in FIG. 10) can show any amount of the information shown on the first screen 40 described above, such as the vehicle charging cord status indicator 42, the communication status indicator 54, the power connection status indicator 56, and the clock 58. The second screen 40A enables a user to select a time at which the vehicle charging cord 22 will begin charging a battery 20 connected thereto. For this purpose, the second screen 40A has a button 86 that can be selected (e.g., by user manipulation of the navigation and select buttons 36, 38 as described above) to set the vehicle charging cord 22 to begin charging at a desired time of day. This time of day can be changed and set by one or more time change buttons 88, such as by using the navigation buttons 36 to highlight one of the time change buttons 88 and by using the select button 38 to change the charge start time 90 displayed on the second screen 40A. Any other manner of changing and selecting a desired time can be used as desired, including without limitation drop down or pull-up menus displaying various charge start times that can be selected.

[0087] Once a charge start time has been selected by a user as just described, the user can select the navigation button 82 described above to return to the first screen 40, and can command the vehicle charging cord 22 to begin a charging session by pressing the power button 34. By doing so, the controller 44 of the vehicle charging cord 22 will compare the start time 90 entered by the user to the current time of day (e.g., displayed by the clock 58 as described above), and will begin charging the battery 20 at the entered charge start time 90.

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With reference to FIG. 15, the vehicle charging cord 22 can have a relay or other electrical switch 92 coupled to the controller 44 and operable by the controller 40 to close at the charge start time 90. Once the charge start time 90 has been reached, the controller 40 can automatically close the switch 92, thereby supplying a current to the battery 20 for charging the battery 20. The switch 92 can remain closed until the controller 40 detects that the battery 20 is fully or sufficiently charged, until an error in charging is detected (as described above), or in some embodiments until a charge stop time or other triggering event occurs. When any such condition is reached, the switch 92 can open, thereby stopping current flow to the battery 20 and stopping the battery charging process. The vehicle charging cord 22 can be provided with any battery charge circuitry suitable for charging the battery 20. Such battery charge circuitry is well know, and can include one or more voltmeters and/or amp meters for this purpose.

[0088] For example, the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 includes an amp meter 94 and a volt meter 96 electrically coupled to a power line 98 supplying power to the battery 20. The controller 44 can utilize information from the amp meter 94 and/or volt meter 96 to determine whether the battery 20 is fully charged, and to automatically stop charging the battery 20 (e.g., by opening the switch 92) when the battery 20 is fully charged.

[0089] Accordingly, the vehicle charging cord 22 can be programmed to begin charging a battery 20 connected thereto at any time of day desired by a user. A user can therefore select an off-peak power time, and in some applications when the cost of power is reduced.

[0090] It will be appreciated that the time selected by a user to begin charging the battery 20 may not be the most optimal time for a power utility 48 to supply power for charging the battery 20. For example, in an emergency or during an unexpected surge of power demand, an otherwise off-peak time to begin charging the battery 20 may not be desirable for the power utility 20. As another example, widespread use of the vehicle charging cord 22 may result in surges of power demand at particular off-peak times, such as at midnight, 1 a.m., 2 a.m., or other charge start times that may be commonly selected by users in programming the vehicle charging cord 22 as described above. Another valuable feature of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 can help to reduce or eliminate these problems. With reference again to FIG. 10, the second screen 40A has another button 100 that can be selected (e.g., by user manipulation of the navigation and select buttons 36, 38 as

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described above) to set the vehicle charging cord 22 to complete charging by a desired time of day. This time of day can be changed and set by one or more time change buttons 102, such as by using the navigation buttons 36 to highlight one of the time change buttons 102 and by using the select button 38 to change the charge completion time 104 displayed on the second screen 40A. Any other manner of changing and selecting a desired time can be used as desired, including without limitation drop down or pull-up menus displaying various charge start times that can be selected.

[0091] Once a charge start time has been selected by a user as just described, the user can select the navigation button 82 described above to return to the first screen 40, and can command the vehicle charging cord 22 to begin a charging session by pressing the power button 34. In such cases, the controller 44 receives the charge completion time 90 and can delay the start time at which battery charging will commence based upon one or more factors (described below).

[0092] In some embodiments, the controller 44 automatically retrieves power information from a memory 106 coupled to the controller 44. This power information can include the cost of power per unit time, one or more pre-set times, and the like, and can be saved in the memory 106 by the controller 44. The controller 44 can receive the power information from the transceiver 46 of the vehicle charging cord 22, which can receive the power information in communication with the controller 50 and transceiver 52 of the power utility 48 and/or in communication with the user's computer. This communication can occur in any of the manners described above regarding the communication between the controllers 44, 50 and/or between the controller 44 and the user's computer. In this regard, the information can be originally produced by the power utility 48, or can be produced by a user entering the information into the user's computer for transfer to the controller 44 and memory 106 of the vehicle charging cord 22.

[0093] The controller 44 can delay the time at which battery charging will begin based upon the power information just described, whether stored in the memory 106 of the vehicle charging cord 22 or retrieved from the power utility 48 without being stored in the memory 106. In some embodiments, the battery charging start determined by the controller 44 can be based upon a threshold cost of power reached over a period of time. This cost of power can be received periodically by the controller 44 from the power utility 48, such as by the controller 44 of the vehicle charging cord 22 polling the controller 50 of the power utility 48,

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or by the controller 50 of the power utility 48 regularly sending or streaming updated cost of power information to the controller 44 of the vehicle charging cord 22. Upon reaching a desired cost of power (e.g., $0.50/hr., $0.45/hr., $0.40/hr.), the controller 44 of the vehicle charging cord 44 can automatically cause the switch 92 to close, thereby charging the vehicle battery 20. This threshold cost of power can be input by a user into the vehicle charging cord 22 in any of the manners described above in connection with other information entry, such as by another data entry field similar to that of the desired charge start time 90 or the desired charge completion time 104.

[0094] In some embodiments, the controller 44 can also automatically cause the switch 92 to open if a desired cost of power threshold is reached, thereby interrupting battery charging. In such cases, battery charging can resume in the same manner as it began when the cost of power lowers as detected by the controller 44 of the vehicle charging cord 22. Any number of interruptions and resumptions in charging the vehicle battery 20 can take place in this manner.

[0095] In some embodiments, the controller 44 detects a command from the user to begin a charging session, and through communication with the controller 50 of the power utility 48 (whether initiated by the controller 44 of the vehicle charging cord 22 or initiated by the controller 50 of the power utility 48 by periodic polling or in any other manner), provides a signal to the controller 50 of the power utility 48 that a charging session has been requested. Upon receiving this signal, the controller 50 of the power utility 48 can request or otherwise receive the charge completion time 104 from the controller 44 of the vehicle charging cord 22. In some embodiments, additional information regarding the charging session can also be received, such as the level of charge of the battery 20 connected to the vehicle charging cord 22, and/or the estimated charge time remaining (discussed above in connection with the charge time remaining indicator 66). Still other information can be received by the controller 50 of the power utility 48, such as the capacity of the battery 20, the battery type, the manufacturer of the battery 20, the model or other identification information of the battery 20, and/or the battery age.

[0096] Any or all of this information can be retrieved by or transmitted to the controller 44 of the vehicle charging cord 44 by communication with a controller 108 of the battery 20 (i.e., for batteries 20 having an integrated circuit or other controller adapted for communication with another controller, otherwise known as "smart batteries") or vehicle.

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For example, the battery capacity, type, manufacturer, model or other identification information, and/or age can be stored in a memory (not shown) of the battery 20 coupled to and accessible by a controller 108 of the battery 20. This information can be stored in the memory of the battery 20 by the manufacturer, supplier, and/or servicer of the battery 20, or in some embodiments by a user. As another example, any or all of this information can be stored in a memory (not shown) of the vehicle 18 coupled to and accessible by a controller 108 of the vehicle 18. This information can be stored in the memory of the vehicle 18 by the manufacturer, supplier, and/or servicer of the vehicle 18, or in some embodiments by a user. For example, upon installation of a battery into the vehicle 18, the installer can access the controller 108 of the vehicle 18 in a conventional manner to record the battery capacity, type, manufacturer, model or other identification information, and/or age in a memory associated with the vehicle 18. Any of this information can be transmitted to or retrieved by the controller 44 of the vehicle charging cord 22 automatically upon connection to the vehicle 18 or at any other time, and in some embodiments can be stored in the memory 106 of the vehicle charging cord 22. In some embodiments, any of this information can then be retrieved from the memory 106 of the vehicle charging cord 22 and/or from the memory of the vehicle 18 for transmission to the controller 50 of the power utility 48 or for determining when to begin charging a battery 20 based upon any of the embodiments described herein.

[0097] Based upon the battery information obtained by the power utility 48 as described above, the power utility 48 can determine an desirable time to begin charging the battery 20 connected to the vehicle charging cord 22. This time can be based upon a number of factors that are specific to the requested charging session, such as the charge time completion for the requested charging session, as well as other factors that are independent of the requested charging session, such as the current and anticipated power draw by other customers of the power utility 48, and/or the current and anticipated cost of power to the power utility 48. Accordingly, based upon the battery information obtained by the power utility 48, the power utility 48 can control when the vehicle charging cord 22 starts to charge the battery 20 connected thereto. This control can occur, for example, by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 at a desired start time to trigger closure of the switch 92, or by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 to close the switch 92 at a particular future time (which time can be stored in the memory 106 of the vehicle charging cord 22 or can begin a timer counting to that particular time of day), or

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in other manners. In this manner, the power utility 48 can maintain a degree of control over power draw while still following an instruction by the user to complete a vehicle charging session by a desired time.

[0098] As just described, in some embodiments the power utility 48 can control when the vehicle charging cord 22 begins charging a battery 20 connected thereto. Alternatively or in addition, in some embodiments the power utility 48 can interrupt charging of a vehicle battery 20 in the event that it is desirable to delay the remainder of the charging process, such as during a surge of demand occurring while a battery 20 is being charged, in an emergency, and the like. This interruption can occur, for example, by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 at a desired interruption time to trigger the switch 92 to open, or by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 to open the switch 92 at a particular future time (which time can be stored in the memory 106 of the vehicle charging cord 22 or can begin a timer counting to that particular time of day), or in other manners. The power utility 48 can resume charging the vehicle battery 20 in the same manner as described above in connection with beginning to charge the vehicle battery 20. Any number of interruptions and resumptions in charging the vehicle battery 20 can take place based upon the desires and needs of the power utility 48 and the power draw upon the power utility 48.

[0099] Although it is desirable in some applications to delay the time at which charging of the vehicle battery 20 will begin based upon any of the embodiments described herein, it is also desirable in many cases to insure that a minimum level of battery power is immediately available to the user. This minimum level of battery power can be needed, for example, in case of emergency, or in the event that the user unexpectedly needs use of the vehicle 18. In such cases, the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 has another valuable feature. With particular reference to FIG. 10, the second screen 40A of the illustrated vehicle charging cord 22 has a button 110 that can be selected (e.g., by user manipulation of the navigation and select buttons 36, 38 as described above) to set the vehicle charging cord 22 to immediately begin charging the battery 20 until a minimum threshold level of battery charge has been reached regardless of whether a programmed charge has also been selected as described above. This minimum threshold level of battery charge can be changed and set by one or more charge level buttons 112, such as by using the navigation

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buttons 36 to highlight one of the charge level buttons 112 and by using the select button 38 to change the minimum threshold level of battery charge 114 displayed on the second screen 40A. Any other manner of changing and selecting a desired minimum level of battery charge can be used as desired, including without limitation drop down or pull-up menus displaying various levels of battery charge that can be selected.

[00100] When the button 110 is selected (and in some embodiments, after the user selects the navigation button 82 described above to return to the first screen 40, and after the user commands the vehicle charging cord 22 to begin a charging session by pressing the power button 34), the controller 44 determines whether the charge level of the vehicle battery 20 connected thereto is below the threshold input by the user. The battery charge level can be determined as described above. If the battery charge level is below the threshold input by the user, or in some cases at or below the threshold input by the user, the controller 44 of the vehicle charging cord 22 automatically causes the switch 92 to close, thereby charging the vehicle battery 20 without delay. If the user has also requested a programmed charge as described above, the vehicle charging cord 22 continues to charge the vehicle battery 20 until the minimum threshold level of battery charge 114 has been reached. At this time, the vehicle charging cord 22 resumes operation in programmed mode. For example, if the charge start time 90 has already passed or if the current cost of power is below the desired cost of power as described above, the controller 44 can continue to charge the vehicle battery 20, and can do so without interruption following battery charging to the minimum threshold level of battery charge as just described. As another example, if the power utility 48 had determined that the vehicle battery 20 should be charged (e.g., based at least in part upon a charge completion time 104 entered by a user as also described above), the controller 44 can continue to charge the vehicle battery 20, and can do so without interruption following battery charging to the minimum threshold level of battery charge as just described.

[00101] Of course, if the vehicle charging cord 22 is operating in a manual charge mode (e.g., not based upon a time of day as selected using buttons 86 and 100), the vehicle charging cord 22 can begin to charge the vehicle battery 20 immediately after the user presses the power button 34, regardless of the degree to which the battery charge has been depleted.

[00102] In some embodiments, user control over additional functions and features of the vehicle charging cord 22 is enabled by further controls and menus. Additional controls and menus can be shown on the display 32 in either or both of the screens 40, 40A described

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above, or in any number of additional screens. By way of example only, the vehicle charging cord 22 of the embodiment illustrated in FIGs. 2, 5-11 and 15 has a third screen 40B shown in FIG. 11. This third screen 40B can be a utilities screen accessed by a user when the "UTILITIES" navigation button 80 is selected in a manner as described above. The third screen 40B also has navigation buttons 116, 118 that can be selected by a user to return to the first screen 40, whether by making one or more changes to operation of the vehicle charging cord 22 (by selecting the "GO" navigation button 116), or by making no changes to operation of the vehicle charging cord 22 (by selecting the "CANCEL" navigation button 118). In the illustrated embodiment, selection of either navigation button 116, 118 on the third screen 40B will return the user to the first screen 40.

[00103] With continued reference to FIG. 11, the third screen 40B can show any amount of the information shown on the first screen 40 described above, such as the vehicle charging cord status indicator 42, the communication status indicator 54, the power connection status indicator 56, and the clock 58. The third screen 40B can include a battery charge rate selector 120 enabling a user to change the amperage at which the vehicle charging cord 22 charges a battery 20 connected to the vehicle charging cord 22. This amperage can be changed and set by one or more amperage level buttons 122, such as by using the navigation buttons 36 to highlight one of the amperage level buttons 122 and by using the select button 38 to change the amperage of the vehicle charging cord 22 displayed on the third screen 40B. Any other manner of changing and selecting a charging amperage can be used as desired, including without limitation drop down or pull-up menus displaying various charging amperages that can be selected. Although not shown in FIG. 11, in other embodiments, a similar selector can be used to also or instead change the voltage at which the vehicle charging cord 22 charges a battery 20 connected to the vehicle charging cord 22.

[00104] Additional features that can be used in any of the vehicle charging cord embodiments described and/or illustrated herein relate to communication settings of the vehicle charging cord 22. For example, the third screen 40B of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 includes a selector 124 that can be selected by a user to enable and disable Bluetooth® wireless communication with another controller, such as the processor of a user's computer. In other embodiments, the same or different selector can be used to enable and disable other types of wireless and wired communication with another controller. The third screen 40B of the illustrated embodiment also has a selector 126 that

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can be selected by a user to enable and disable wireless and/or wired communication with a power utility 48.

[00105] In some embodiments, the controller 44 of the vehicle charging cord 22 can send a communication to the user in the event that one or more different events associated with a vehicle charging session occur. By way of example only, by using conventional power detection circuitry, the controller 44 can detect when a supply of power to the vehicle charging cord 22 has been interrupted, such as in a power failure in the electrical system of the user, at the power utility, or anywhere in between. Identifying and communicating this status to a user can be very important to the user, enabling the user to find another source of electrical power to charge the user's vehicle 18, or at least enabling the user to make appropriate plans based upon the existing level of charge in the vehicle battery 20. As another example, and by using conventional battery diagnostic circuitry, the controller 44 can detect when the battery 20 connected thereto is fully charged or has reached any other level of charge (e.g., a minimum battery charge level as described above). Still other events that can be detected and communicated to the user include a battery fault condition, a problem with the vehicle charging cord 22, and the like.

[00106] Upon detection of any of the events just described, the controller 44 of the vehicle charging cord 22 can send a communication to the user providing notice of the event. For example, the third screen 40B of the vehicle charging cord 22 shown in FIG. 11 includes a selector 128 that can be selected by a user to enable and disable the controller 44 automatically sending a communication indicating that power supply to the vehicle charging cord 22 has been interrupted. As another example, the third screen 40B of the vehicle charging cord 22 shown in FIG. 11 includes a selector 130 that can be selected by a user to enable and disable the controller 44 automatically sending a communication indicating that the battery 20 to which the vehicle charging cord 22 is connected is fully charged.

[00107] The controller 44 of the vehicle charging cord 22 can communicate any of the events described above in a number of different manners. For example, the vehicle charging cord 22 can have a speaker or other sound emitting device (not shown) coupled to the controller 44 and capable of emitting an auditory alarm when any of the above-described events have occurred. The audible alarm can be emitted once upon the occurrence of the event, or can be emitted upon the occurrence of the event and at periodic times (e.g., every 5 minutes, every hour, and the like) after the occurrence of the event. As another example, the

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controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50. Such a signal can automatically trigger a visual or auditory alarm or other notice via the user's computer and/or the controller 50 of the power utility 48, such as by automatically generating a text message or e-mail from the controller 50 of the power utility 48 to a computer, phone, PDA, or other device of the user, by automatically generating a text message or e-mail from the user's computer to a phone, PDA, or other device of the user, by displaying an alert on the user's computer, and the like. Another mode of communication to the user include an automatically generated telephone call from the power utility 48 (triggered by and/or under control of the controller 50) or the user's computer to a phone of the user, followed by an automatically generated voice message communicating the event and played by phone to the user when the phone is answered. Still other modes of alerting the user to any of the events described above are possible, and fall within the spirit and scope of the present invention.

[00108] In the illustrated embodiment of FIGs. 2, 5-11 and 15, the controller 44 of the vehicle charging cord 22 responds to detection of power interruption or completion of battery charge by either causing an e-mail to be sent to the user and/or by generating an auditory alarm from the vehicle charging cord 22 based upon whether respective selectors 132, 134 for such modes of communication are selected on the third screen 40B illustrated in FIG. 11. In other embodiments, other modes of communication can be similarly enabled and disabled by selection of other selectors.

[00109] FIG. 12 illustrates another embodiment of a vehicle charging cord according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging cord described above in connection with FIGs. 2, 5-11 and 15. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 5-11 and 15. Reference should be made to the description above in connection with FIGs. 2, 5-11 and 15 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging cord illustrated in FIG. 12 and described below. Structure and features of the embodiment shown

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in FIG. 12 that correspond to structure and features of the embodiment of FIGs. 2, 5-11 and 15 are designated hereinafter in the 200 and 300 series of reference numbers.

[00110] The embodiment of the vehicle charging cord 222 shown in FIG. 12 provides an example of how the various indicators, selectors, and user-manipulatable controls can take different forms and be located in different positions and arrangements on the housing 228, and how the vehicle charging cord 222 can have any sub-combination of the features and elements described above (e.g., any sub-combination of the various indicators, selectors, and user-manipulatable controls described above). The illustrated vehicular charging cord 222 does not have an LCD display as shown in the embodiment of FIGs. 2, 5-11 and 15, and instead has a number of LED displays and indicators. For example, the illustrated vehicular charging cord 222 utilizes an LED display for the battery charge level indicator 260, clock 258, charge time remaining indicator 266, power used indicator 268, charge cost per hour indicator 270, total cost indicator 272, and charge start time/charge completion time indicator 290, 304 (both of which are combined into a common indicator as shown). As another example, the illustrated vehicular charging cord 222 utilizes individual LED lights for the vehicle charging cord status indicator 242 and the communication status indicator 254. The use of LED displays and LED lights can reduce manufacturing costs of the vehicle charging cord 222, and in some embodiments can provide a design of the vehicle charging cord 222 less susceptible to damage compared to the use of LCD and other displays.

[00111] As described above in connection with the illustrated embodiment of FIGs. 2, 5-11 and 15, the battery charge level indicator 260 and clock 258 can display information in any form desired. For example, the battery charge level indicator 260 shown in FIG. 12 is a numerical percentage of full charge, but can take any of the other forms described above in connection with the battery charge level indicator 60 of the embodiment of FIGs. 2, 5-11 and 15.

[00112] In contrast to the selectors 74 on the first screen 40 in the embodiment of FIGs. 2, 5-11 and 15, the selectors 274 in the illustrated embodiment of FIG. 12 are individual buttons of any conventional type, including any of the button types described above in connection with the power, navigation, and select buttons 34, 36, 38 of the embodiment of FIGs. 2, 5-11 and 15. By pressing any of the four buttons 274, a user can start a manual charge, start a programmed charge of the type described above in connection with the charge start time 90 illustrated in FIG. 10 (i.e., start charging at a time entered by the user), start a programmed

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charge of the type described above in connection with the charge completion time 104 illustrated in FIG. 10 (i.e., start charging based upon power utility control and complete charging by a time entered by the user), and stop the vehicle charging cord 222 from charging a battery 20 connected thereto.

[00113] Also, in contrast to the time change buttons 88, 102 on the second screen 40A in the embodiment of FIGs. 2, 5-11 and 15, the time change buttons 288, 302 in the illustrated embodiment of FIG. 12 are mechanical buttons of any type, including any of the button types described above in connection with the power, navigation, and select buttons 34, 36, 38 of the embodiment of FIGs. 2, 5-11 and 15. By pressing on the buttons 288, 302 to the left of the charge start time/charge completion time indicator 290, 304, the hour of the time displayed by the charge start time/charge completion time indicator 290, 304 can be adjusted, whereas by pressing on the buttons 288, 302 to the right of the charge start time/charge completion time indicator 290, 304, the minutes of the time displayed by the charge start time/charge completion time indicator 290, 304 can be adjusted. In other embodiments, any other number, position, and type of time change buttons can be used to adjust the time on the charge start time/charge completion time indicator 290, 304. Following entry of a desired time, a user can press any of the first three selectors 274 (followed in some embodiments by pressing the power button 234) to begin a charging session.

[00114] Although LEDs are used in the illustrated embodiment of FIG. 12 for various indicators and selectors 258, 260, 242, 254, 266, 268, 270, 272, 290, 304, any other type of light-emitting device can instead be used as desired.

[00115] The various embodiments of the vehicle charging cords 22, 222 described above and illustrated in FIGs. 2, 5-12 and 15 can provide significant advantages relating to the portability of the vehicle charging cords 22, 222. By virtue of the fact that the opposite ends 24, 26 of the vehicle charging cords 22, 222 are releasably connected to an electrical system providing a source of electrical power and to the battery 20 of a vehicle, respectively, and by virtue of the fact that the other components of the vehicle charging cord cords 22, 222 are contained within a housing to define a single integral unit, the vehicle charging cords 22, 222 are portable, can be readily moved from vehicle to vehicle, can thereby be used to charge any number of different vehicles, and can be moved into and out of (and can be transported by) vehicles with ease. Also, portable charging cords 22, 222 of the type described above and illustrated in FIGs. 2, 5-12 and 15 can be purchased by a user and can be releasably

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connected to the battery 20 of a vehicle 18, thereby eliminating the need to service the vehicle 18 or to the electrical system at which the vehicle will be charged. This can be particularly useful in cases where the ability to charge the battery 20 of the vehicle 18 in different locations only having standard electrical outlets (and otherwise not being specially adapted to charge electric vehicles) is important or desirable.

[00116] In other embodiments, either end 24, 26 of the charging cord 22, 222 can be permanently secured to the electrical system of the house, building, or other facility and/or to the vehicle 18, 218, respectively. For example, one end 24 of the charging cord 22, 222 can be permanently secured to the electrical system of the house, building, or other facility (i.e., not intended or adapted for removal by a user, such as by being wired directly into a junction box or circuit breaker of the electrical system of the house, building, or other facility). In such cases, the charging cord 22, 222 can be wound upon and stored in a floor standing, wall-mounted, or ceiling-mounted reel (not shown), such as those disclosed in U.S. Patent No. 6,439,360, the entire disclosure of which is incorporated herein by reference. The reel can be spring-loaded to enable the vehicle charging cord 22, 222 to be easily wound upon the reel for storage, or can be manually turned for this purpose. In such embodiments, the majority, all, or almost all of the length of the charging cord 22, 222 can be defined between the housing 28, 228 and the end 226 of the charging cord 22, 222 intended for connection to the electrical system of the facility. In this manner, the majority or almost all of the vehicle charging cord 22, 222 can be conveniently stored. Such vehicle charging cords provide a significant benefit to users desiring to charge two or more vehicles 18, 218 at the same facility using the same vehicle charging cord 22, 222, such as for charging one vehicle 18, 218 during the day and for charging another vehicle 18, 218 at night using the same vehicle charging cord 22, 222. The use of one vehicle charging cord 22, 222 for two or more vehicles 18, 218 can provide significant cost savings to the user(s) of the vehicles 18, 218.

[00117] As another example, one end 26 of the charging cord 22, 222 can be permanently secured to the vehicle 18, 218 (i.e., not intended or adapted for removal by a user, such as by being permanently connected to one or more wiring harnesses of the vehicle, or by being connected to an electrical junction box or fuse box of the vehicle 18, 218). In such cases, the charging cord 22, 222 can also be wound upon and stored on a reel (not shown) carried by the vehicle 18, 218, such as the reels disclosed in U.S. Patent No. 6,439,360 and incorporated by reference above. The reel can be mounted directly to the frame of the vehicle 18, 218, an

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interior surface of a body part of the vehicle 18, 218, to a bracket or other fixture (e.g., radiator mounting bracket, alternator or battery mounting bracket, and the like) of the vehicle 18, 218, to the front or rear bumper of the vehicle 18, 218, or to any other location providing suitable strength to carry the reel and vehicle charging cord 18, 218. As described above, the reel can be spring-loaded to enable the vehicle charging cord 22, 222 to be easily wound upon the reel for storage on the vehicle, or can be manually turned for this purpose. In such embodiments, the majority, all, or almost all of the length of the charging cord 22, 222 can be defined between the housing 28, 228 and the end 224 of the charging cord 22, 222 intended for connection to the vehicle 18, 218. In this manner, the majority or almost all of the vehicle charging cord 22, 222 can be conveniently stored on the vehicle. The vehicle-mounted vehicle charging cord 22, 222 provides a significant benefit for users needing to charge their vehicle battery 20, 220 in multiple locations, as the vehicle charging cord 22, 222 is conveniently carried by the vehicle 18, 218 from destination to destination.

[00118] Although reel-based vehicle charging cords as just described are described in connection with vehicle charging cords 22, 222 not intended for release by a user from both the vehicle 18, 218 and the electrical system of the facility, it should be noted that the other portable vehicle charging cord embodiments described and/or illustrated herein (i.e., those intended for user release at both ends) can also include a spring-loaded or non-spring-loaded reel as just described. In this manner, such vehicle charging cords 22, 222 can be quickly and conveniently placed in a relatively portable and compact state.

[00119] FIGs. 13, 14, and 16 illustrate an embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging cord described above in connection with FIGs. 2, 5-12 and 15. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 5-12 and 15. Reference should be made to the description above in connection with FIGs. 2, 5-12 and 15 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIGs. 13, 14, and 16 and described below. Structure and features of the embodiment shown in FIGs. 13, 14, and 16 that correspond to structure and features of the embodiment of FIGs. 2, 5-12 and 15 are designated hereinafter in the 400 and 500 series of reference numbers.

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[00120] Despite the significant advantages provided by the portable vehicle charging cords 22, 222 described above in connection with FIGs. 2, 5-12 and 15, other significant advantages are realized by incorporating the elements and features of the vehicle charging cords 22, 222 into a vehicle 18. With reference to FIGs. 13, 14, and 16, the illustrated vehicle charging system uses much of the same elements and features described above in connection with the various embodiments of the vehicle charging cords 22, 222. In this regard, FIG. 13 illustrates a portion of the dashboard of a vehicle 18, and includes a battery charge level indicator 460 integrated into the same part of the vehicle dashboard as an oil temperature indicator 538. Also integrated into the same portion of the dashboard, by way of example only, is a vehicle charging status indicator 442. The vehicle charging status indicator 442 shown in FIG. 13 can be similar to the charge status display area 76 described above in connection with the vehicle charging cord 22 of FIGs. 2, 5-11 and 15. Accordingly, one or more lights can be used to illuminate the words "MANUAL CHARGING IN PROCESS" when the vehicle battery charging system is in a manual charging mode as described above, whereas one or more other lights can be used to illuminate the words "PROGRAMMED CHARGE IN PROCESS" when the vehicle battery charging system is in a programmed charging mode as also described above. Any other manner of displaying the vehicle charging status indicator 442 can be used as desired, including without limitation an LED or LCD display, one or more lamps adjacent printed graphics, and the like.

[00121] With continued reference to the illustrated embodiment of FIGs. 13, 14, and 16, the illustrated vehicle charging system can include a display 432 located in the console of the vehicle 18. As used herein, the term "console" refers to any portion of the interior of a vehicle (i.e., in the interior passenger cabin of the vehicle) having one or more manual or electronic controls for controlling operation of a vehicle 18 and/or one or more indicators showing the status of vehicle operation. For example, the console of a vehicle 18 can include a dashboard having a speedometer, odometer, RPM gauge, oil temperature gauge, and the like, a navigation screen with associated indicators and/or controls, HVAC indicators and controls, an entertainment center (e.g., radio, DVD or other video system, CD, MP3 or other audio system, and the like) with associated indicators and controls, environmental temperature indicators, travel direction indicators, and the like. The console can be located immediately in front of the driver, to either side of the driver, in central forward area of the vehicle cabin, in an area between the driver's seat and an adjacent passenger seat, in an interior location on the roof or otherwise at a higher elevation than a horizontal line of sight

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of the user, and the like. Also, the console of the vehicle can extend to and be positioned in any combination of these interior vehicle locations, such as a single console including the dashboard and central area between the driver and passenger seats.

[00122] In some embodiments, the selectors and indicators (including any displays) of the vehicle charging system are located in their own dedicated console, whereas in other embodiments, the console carrying such features also carries other vehicle indicators and controls. Also, the selectors and indicators (including any displays) of the vehicle charging system can be located in two or more consoles, if desired, such as one or more indicators located in the dashboard console of the vehicle 18 and the remainder located in another console located between the driver and passenger at the front of the passenger compartment. Any combination of selectors and indicators located in any combination of vehicle consoles is possible, and falls within the spirit and scope of the present invention.

[00123] The display 432 shown in FIG. 14 is a touch screen display 432, and includes many of the same indicators and selectors used in the vehicle charging cord embodiments described above in connection with FIGs. 2, 5-11 and 15. In particular, the display 432 includes a charge time remaining indicator 466, power used indicator 468, charge cost per hour indicator 470, and total cost indicator 472 like those of the vehicle charging cords 22, 222 described and illustrated above. Also, the illustrated display 432 includes another vehicle charging status indicator 442 that can be used in addition to or in place of that shown in FIG. 13, and a communication status indicator 454 and power connection status indicator 456 similar to those described above in connection with the illustrated embodiment of FIGs. 2, 5-11 and 15. Although a clock can also be included on the display 432, a clock is not included in the display 432 of FIG. 14 in lieu of another clock of the vehicle 18 located elsewhere on the dashboard or console of the vehicle 18. This other clock can be connected to the same controller 444 (see FIG. 16) as the rest of the vehicle charging system, thereby providing the controller 444 with the time of day information needed to begin programmed charging operations as described above.

[00124] The display 432 illustrated in FIG. 14 can display multiple screens 440 to be shown upon the display 432, thereby enabling a significantly greater amount of battery and battery charging information to be shown on the display, and/or enabling a greater degree of control over the vehicle charging system. Like the vehicle charging cords 22, 222 described above, navigation between screens 440 on the display 432 is enabled by navigation buttons

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on the screens. For example, the screen 440 shown in FIG. 14 includes two navigation buttons 478, 480 like those of the illustrated embodiment of FIGs. 2, 5-11 and 15 described above. By pressing one of the navigation buttons 478 (entitled "PROGRAMMED CHARGE SETUP"), the screen 440 is replaced by a charge programming screen (not shown) having any or all of the indicators and selectors 42, 54, 56, 58, 82, 84, 86, 88, 90, 100, 102, 104, 110, 112, and/or 114 described above in connection with the second screen 40A in FIG. 10. These indicators and selectors can have the same or any other arrangement upon the programming screen. By pressing the other navigation button 480 (entitled "UTILITIES"), the screen 440 is replaced by a utilities screen (also not shown) having any or all of the indicators and selectors 42, 54, 56, 58, 116, 118, 120, 122, 124, 126, 128, 130, 132, and/or 134 described above in connection with the third screen 40B in FIG. 11. These indicators and selectors can have the same or any other arrangement upon the utilities screen.

[00125] To begin or stop a manual or programmed charging session, the embodiment of the present invention illustrated in FIGs. 13, 14, and 16 can include a single power button that in some embodiments can change text to indicate whether a selection can be made by a user to start or stop a charging session (e.g., changing from "START CHARGE" to "STOP CHARGE" once a user selects "START CHARGE", or changing from "STOP CHARGE" to "START CHARGE" once the user selects "STOP CHARGE"). In other embodiments, such as that shown in FIGs. 13, 14, and 16, the screen 440 can include separate buttons 434A, 434B to start or stop a charging session, such as to start a manual charge if none of the selectors for a programmed charge have been selected on a programming screen, or to start a programmed charge of any type described herein.

[00126] Although the in-console display 432 illustrated in FIG. 14 is a touch screen display 432, the display 432 can be any other type of display, such as the other types of displays described and illustrated herein. For example, the touch screen display 432 can be replaced by a display such as that shown in FIGs. 5-11 or FIG. 12, in which cases the vehicle charging system can include navigation buttons (e.g., adjacent the display 432) enabling a user to navigate through a screen and to select any selectors upon the display 432. As another example, the touch screen display 432 can be replaced by any combination of buttons, switches, dials, or other user-manipulatable controls; LEDs and other lights; and displays (e.g., see FIG. 12).

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[00127] A schematic diagram of the vehicle charging system in which an in-console display 432 is utilized and/or in which the in-console vehicle charging selectors and indicators are otherwise utilized is shown in FIG. 16. Like the embodiments of FIGs. 2, 5-12 and 15 described above, the system illustrated in FIG. 16 is releasably coupled to a source of power 412 operated and controlled by a power utility 448 having a transceiver 452 and controller 444 (e.g., a computer) that can communicate via a PLC system with the controller 444 of the vehicle charging system. In the illustrated embodiment of FIG. 16, however, the display 432 and other controls and indicators are located in one or more in-cabin consoles of the vehicle 418. Therefore, a power cord 540 having ends 424, 426 described above in connection with the embodiments of FIGs. 2, 5-12 and 15 (but without the housing and other components carried in or on the housing) can be used to releasably connect the battery 420 of the vehicle 418 with the electrical system of the facility used to charge the battery 420 as also described above. As with the earlier-described embodiments, the power cord 540 can be releasably coupled to the vehicle 418, and in other embodiments can instead be stored on-board the vehicle 418 when not in use (e.g., by a cord reel mounted on the vehicle as described above). Also as with the earlier-described embodiments, the power cord 540 can also or instead be releasably coupled to the electrical system of the house, office, or other facility to enable the power cord 540 to be more readily and easily moved within and removed from the facility, or can be permanently connected to the electrical system.

[00128] With continued reference to FIG. 16, the illustrated vehicle charging system also includes a transceiver 446 for communication between the controller 444 on board the vehicle 418 and the transceiver 452 and controller 440 of the power utility 448, a power transformer 536, an amp meter 494, a volt meter 496, a switch 492, and a memory 506 performing the same functions described above in conjunction with the embodiments of FIGs. 2, 5-12, and 15. It should be noted that the controller 444 of the vehicle charging system can be a dedicated controller (e.g., a processor or set of discrete logic elements) separate from the other controllers of the vehicle (e.g., those used to control vehicle startup, vehicle access and security, and engine operation, smart battery controllers, and the like), or can be the same as such other controller(s). Accordingly, the electronics of the vehicle charging system according to some embodiments of the present invention can be fully or partially integrated into one or more other controllers of the vehicle, or can be separate therefrom. In either case, the controller 444 can be located within a housing (not shown), and can be connected via suitable wiring harnesses or other wired or wireless electrical

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connections to an electrical connector on the vehicle (adapted for releasable mating connection to an external power cord as described above) or to a power cord carried by the vehicle as also described above. Similarly, the memory 506, transceiver 446, and clock can be dedicated solely for operation of the vehicle charging system as described in earlier embodiments, or can instead be shared by other systems of the vehicle 418.

[00129] The vehicle charging system shown in FIG. 16 can function in the same manners described above in connection with the embodiments of FIGs. 2, 5-12, and 15, it being understood that communications, power control, programming, and other features of the vehicle charging system are performed on-board the vehicle 418 rather than in a vehicle charging cord as shown in FIGs. 2, 5-12, and 15. Accordingly, power supply and communications in the embodiment of FIG. 16 can include power supply and communications over one or more suitable power cords, wiring harnesses, and the like of the vehicle performing the same functions (including PLC and power transmission functions) as the flexible power cords on both sides of the housings 28, 228 illustrated in FIGs. 2 and 5-12.

[00130] FIG. 3 illustrates another embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging cord described above in connection with FIGs. 2, 5-12 and 15. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 5-12 and 15. Reference should be made to the description above in connection with FIGs. 2, 5-12 and 15 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIG. 3 and described below. Structure and features of the embodiment shown in FIG. 3 that correspond to structure and features of the embodiment of FIGs. 2, 5-12 and 15 are designated hereinafter in the 600 and 700 series of reference numbers.

[00131] The vehicle charging system illustrated in FIG. 3 operates in substantially the same manner as that of FIGs. 2, 5-12 and 15. However, in the illustrated embodiment of FIG. 3, the vehicle charging system is embodied in a cabinet 742. The cabinet 742 performs functions similar to the housings 28, 228 described and illustrated herein, such as to house the controller, transformer, and other electronics of the vehicle charging system. In some embodiments, the cabinet 742 can be wall-mounted and/or floor-mounted (such as that shown in FIG. 3).

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[00132] The cabinet 742 of the vehicle charging system can include a display 732 having any of the features and performing any of the functions described above in connection with the displays 32 of the embodiments shown in FIGs. 2, 5-11, 14, and 15. The display 732 can be a touch screen display or any other type of display as described herein, and can be accompanied by any number and type of user manipulatable controls (e.g., navigation buttons) as also described herein. Any combination of selectors and indicators (including displays) described and/or illustrated herein can be provided on the cabinet to perform the vehicle charging functions also described herein.

[00133] In some embodiments, the cabinet 742 is provided with a power cord 744 terminating in a plug 624 that can be releasably connected to a vehicle 618 (and to the battery 620 thereof). The plug 624 can take any of the forms described above in connection with the embodiments of FIGs. 2, 5-12, and 15. In some embodiments, the power cord 744 can be stored on a reel (not shown) in or adjacent the cabinet 742. The reel can take any of the forms described above in connection with other embodiments of the present invention. Although the cabinet 742 can provide a convenient location for storage of the power cord 744, the power cord 744 can instead be permanently or releasably coupled to the vehicle 618 for storage on the vehicle 618 when the power cord 744 is not in use. For example, the power cord 744 can be stored upon a reel of the vehicle 618 as described in greater detail above. In those embodiments in which the power cord 744 is intended to be stored and carried by the vehicle 618, the power cord 744 can have an opposite end terminating in a plug (such as any of the plugs described above in connection with plug 26 shown in FIG. 5). The cabinet 742 can be provided with any number of electrical connectors for releasable mating engagement with the plug (and for any number of other plugs on power cords 744 extending to other vehicles 618).

[00134] FIG. 17 illustrates another embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging system described above in connection with FIGs. 2, 3, and 5-16. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 3, and 5-16. Reference should be made to the description above in connection with FIGs. 2, 3, and 5-16 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system

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illustrated in FIG. 17 and described below. Structure and features of the embodiment shown in FIG. 17 that correspond to structure and features of the embodiments of FIGs. 2, 3, and 5-16 are designated hereinafter in the 800 and 900 series of reference numbers.

[00135] Like the embodiment of FIGs. 2, 3, and 5-16, the vehicle charging system of FIG. 17 also includes a transceiver 846 for communication between a controller 844 and the transceiver 852 and controller 840 of the power utility 848, a power transformer 836, an amp meter 894, a volt meter 896, a switch 892, and a memory 906 performing the same functions described above in conjunction with the embodiments of FIGs. 2, 5-12, and 15. A clock 858, display 832, and associated user-manipulatable controls as described above (or other types and combinations of selectors and indicators, with or without displays) are also included for providing information to the user and for receiving instructions from the user in any of the manners also described above.

[00136] The vehicle charging system of FIG. 17 includes a battery 946 that can be charged in any of the same manual or programmed manners described above in connection with the embodiments of FIGs. 2, 3, and 5-16. The battery 946 is separate from the battery 920 of the vehicle 918, and can have any size sufficient for at least partially charging the battery 920 of the vehicle 918 when connected thereto. Rather than or in addition to charging a battery 920 of the vehicle 918 as described herein in connection with other embodiments of the present invention, the vehicle charging system of FIG. 17 operates to charge the battery 946 that remains at the house, building, or other facility at which vehicle charging takes place. The battery 946 therefore functions as a reservoir of power that can collect and store a charge for later transfer to batteries 946 of one or more vehicles 918. Accordingly, although the battery 946 can have any size suitable for charging a battery 920 of a vehicle 918, in some embodiments the battery 946 has a capacity capable of fully charging the battery 920 of at least one vehicle 918 when the battery 920 of the vehicle 918 has no charge or substantially no charge.

[00137] The battery 946 can be located anywhere in a house, building, or other facility where vehicle battery charging is desired, and in some embodiments is located an a garage in which the vehicle is stored. For example, the battery 946 can be stored in a cabinet also housing the rest of the vehicle charging system (e.g., in a lower portion of the cabinet 742 illustrated in FIG. 3). In some embodiments, the battery 946 can be sufficiently oversized (in voltage, current, or capacity) for completely charging a drained vehicle battery 920 connected

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thereto so that improved or optimized battery charging conditions can be achieved. The battery 946 can also be oversized to carry sufficient charge for charging two or more fully or substantially discharged vehicle batteries 920. Also, in some embodiments, the vehicle charging system can have one or more power converters (e.g., DC to DC converters) to increase the output voltage of the battery 946 sufficiently for charging the vehicle battery 920.

[00138] With continued reference to the illustrated embodiment of FIG. 17, the vehicle charging system can include an additional relay or other electrical switch 948 coupled to the controller 844. The switch 948 can enable a user to begin charging the battery 920 of a vehicle 918 connected to the vehicle charging system only when desired. Accordingly, the controller 844 can send a signal to close the switch 948 upon receiving a command from a user (e.g., via a user-manipulatable control having any of the forms described herein) to begin charging the battery 920 of a vehicle 918 connected thereto. Like the other embodiments described and illustrated herein, the switch 948 can be controlled by a user and/or can be controlled by a power utility 948 via the transceivers 846, 852 and controllers 840, 844.

[00139] By virtue of the battery 946 in the embodiment of FIG. 17, control over a community's power draw needed for charging vehicles 918 is greatly increased. Rather than wait until a vehicle 918 is connected to the electrical system of a house, building, or other facility in order to supply power to charge the battery 920 of the vehicle 918, the user or power utility 848 can be free to supply vehicle battery charging power at any convenient time. For example, if the power utility 848 has a period of relatively low daytime demand that is unexpected (such as a drop in power draw during an otherwise peak or high demand time), the power utility 848 can begin charging the battery 946 regardless of whether the vehicle 918 is in another location. This flexibility can enable the power utility 848 to independently send relatively low-cost battery charging power – and/or for the user to independently draw relatively low-cost battery charging power - at times of power surplus regardless of the location of the vehicle 918 to be charged.

[00140] In some embodiments, the vehicle charging system of FIG. 17 can also operate in a manner similar to the embodiments of FIGs. 2, 3, and 5-16, whereby a user can connect the battery 920 of the vehicle 918 for charging, and the battery 920 can be charged in any manual or programmed mode by closure of the switches 892, 948 under control of the controller 844. Such charging can take place without draining the battery 946 described above (such as by a

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suitable electrical bypass around the battery 946), or can be supplemented by any amount of charge existing in the battery 946. In this regard, if the cost for charging or partially charging the battery 946 of the vehicle charging system is higher than the calculated cost of charging the battery 920 of the vehicle 918 at the desired charging start time (both figures being available to the controller 844 as described above, and being storable in and retrievable from the memory 906 as desired), the controller 844 can control the switches 892, 948 to charge the vehicle battery 920 using the charge from the system battery 946 first. If the opposite is true, the controller 844 can control the switches 892, 948 to charge the vehicle battery 920 using power directly from the power utility 848 without draining the system battery 946. These operating conditions can be continually monitored by the controller 844, which in some embodiments can automatically react to changing power supply costs while charging is in process by changing the source of charging current (i.e., system battery 946 or power utility 848).

[00141] The vehicle charging system of FIG. 17 is illustrated in the form of a portable vehicle charging cord, such as the embodiments of FIGs. 2, 5-12, and 15. However, the features of the vehicle charging system of FIG. 17 can be incorporated into any of the vehicle charging system embodiments described and/or illustrated herein, including those illustrated in FIGs. 3, 13, 14, 16, and FIGs. 4, 18, and 19 (described below).

[00142] FIGs. 4, 18, and 19 illustrate another embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging systems described above in connection with FIGs. 2, 3, and 5-17. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 3, and 5-17. Reference should be made to the description above in connection with FIGs. 2, 3, and 5-17 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIGs. 4, 18, and 19 and described below. Structure and features of the embodiment shown in FIGs. 4, 18, and 19 that correspond to structure and features of the embodiments of FIGs. 2, 3, and 5-17 are designated hereinafter in the 1000 and 1100 series of reference numbers.

[00143] The vehicle charging system illustrated in FIGs. 4, 18, and 19 has the same components and features as described above in connection with the on-board vehicle

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charging system of FIGs. 13, 14, and 16, but is further adapted for charging the battery 1020 of the vehicle 1018 by induction charging. Accordingly, the vehicle charging system illustrated in FIGs. 4, 18, and 19 has a touch screen display 1032 having a charge time remaining indicator 1066, power used indicator 1068, charge cost per hour indicator 1070, and total cost indicator 1072 as described in greater detail in the embodiments above. Also, the illustrated display 1032 includes a vehicle charging status indicator 1042 (not shown in FIG. 19, but in the text banner at the top of the illustrated display 1032 in FIG. 19 when docking is not in process), a communication status indicator 1054, and a power connection status indicator 1056 as described in greater detail in the embodiments above.

[00144] The display 1032 illustrated in FIG. 19 can display multiple screens 1040 to be shown upon the display 1032, thereby enabling a significantly greater amount of battery and battery charging information to be shown on the display, and/or enabling a greater degree of control over the vehicle charging system. Navigation between screens 1040 on the display 1032 is enabled by navigation buttons on the screens 1040. For example, the screen 1040 shown in FIG. 19 includes two navigation buttons 1078, 1080 for navigation to programming and utility screens as described in greater detail in the embodiments above. Also, the screen 1040 has separate buttons 1034A, 1034B to start or stop a charging session.

[00145] Although the in-console display 1032 illustrated in FIG. 19 is a touch screen display 1032, the display 1032 can be any other type of display, such as the other types of displays described and illustrated herein. For example, the touch screen display 1032 can be replaced by a display such as that shown in FIGs. 5-11 or FIG. 12, in which cases the vehicle charging system can include navigation buttons (e.g., adjacent the display 1032) enabling a user to navigate through a screen and to select any selectors upon the display 1032. As another example, the touch screen display 1032 can be replaced by any combination of buttons, switches, dials, or other user-manipulatable controls; LEDs and other lights; and displays (e.g., see FIG. 12).

[00146] With reference now to FIG. 4, the vehicle charging system of FIGs. 4, 18, and 19 utilizes a conventional battery induction charging system in order to charge the battery 1020 of the vehicle 1018, and includes a charging pad 1150 having a power supply core (not shown) energized to supply power via induction to a power receiving core of the vehicle (shown schematically at 1152 in FIG. 18). By way of example only, an inductive vehicular battery charger system that can be used is disclosed in U.S. Patent No. 6,525,510, the entire

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contents of which are incorporated herein by reference. The power supply core of the charging pad 1150 is electrically connected to and receives power from a vehicular charger that is the same as that described above in connection with the embodiment of FIG. 3. In particular, the core of the charging pad 1150 is electrically connected to the electrical system of the house, building, or other facility at which charging is to take place via a below-ground or above-ground power line 1144 extending to a cabinet 1142 having any of the selectors and indicators (including display(s)) described above in connection with FIG. 3. In this regard, any of the alternative vehicle charger features and structures also described above in connection with the embodiment of FIG. 3 can also be applied in the inductive vehicular charging system of FIGs. 4, 18, and 19.

[00147] As is well known to those in the art of inductive battery charging, proper alignment between the power supply core and the power receiving core of the battery charger is important for efficient battery charging. In the illustrated embodiment of FIGs. 4, 18, and 19, this alignment can be achieved by user operation of the vehicle 1018. In particular, one or more sensors 1154 can be provided on the vehicle 1018 and can be positioned to detect the presence and proximity of the vehicle charging pad 1150 and core thereof. The sensors 1154 can be inductive sensors adapted to detect the presence of metallic elements 1156 in the vehicle charging pad 1150 or having known positions with respect to the vehicle charging pad 1150 and core. Alternatively, the sensors 1154 can be Hall Effect sensors adapted to detect the magnetic field of magnets or electromagnets having known positions on or with respect to the vehicle charging pad 1150 and core. In other embodiments, the sensors 1154 can be RFID sensors adapted to detect the position of one or more RFID transmitters having known positions on or with respect to the vehicle charging pad 1150 and core. Still other types of sensors 1154 can instead be used, including without limitation optical sensors, eddy current sensors, and ultrasonic sensors for use in conjunction with optical, eddy current, and ultrasonic sensing and position systems, all of which operate on principles well-known to those skilled in the art. By detecting the distance between the sensor(s) 1154 on the vehicle 1018 and one or more reference points on the charging pad 1150 (or having known positions with respect to the charging pad 1150), the position of the sensor(s) 1154 with respect to the charging pad 1150 can be identified via triangulation. Triangulation systems operating to detect the relative position of objects based upon any of these technologies are well-known to those skilled in the art, and are not therefore described further herein.

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[00148] In other embodiments, the locations of the sensors 1154 and the elements 1156 (e.g., metallic elements 1156, magnets or electromagnets, RFID transmitters, and the like, as described above) detected by the sensors 1154 can be reversed, whereby one or more of the sensors 1154 can be located on the charging pad 1150 or located at known positions with respect to the charging pad 1150 for detecting one or more elements 1156 (e.g., metallic elements 1156, magnets or electromagnets, RFID transmitters, and the like, as described above) of the vehicle 1018.

[00149] The controller (not shown) of the inductive vehicle charging system illustrated in FIGs. 4, 18, and 19 receives signals from the sensor(s) 1154 described above, and based upon a conventional triangulation algorithm as described above, determines the direction in which the vehicle 1018 must move for desired alignment of the vehicle 1018 (and power receiving core connected to the battery 1020 of the vehicle 1018) with respect to the charging pad 1150 and core thereof. Upon making this determination, the controller can display directional instructions to the user. In the illustrated embodiment of FIGs. 4, 18, and 19, directional indicators 1160 are displayed on the same touch screen display 1032 described above, along with a text line 1162 noting the direction the vehicle 1018 should move for proper charging alignment. In other embodiments, this information can be provided on another display (e.g., on a display located in a console of the vehicle 1018), or can be located on another type of display (not necessarily a touch screen). Also, in some embodiments, this information can be presented without a display 1032, such as by illumination of one or more LEDs or other lights to illuminate an arrow or other symbol, text, or any combination of symbols and text providing directional instructions to the user.

[00150] By way of example only, the touch screen display 1032 illustrated in FIG. 19 presents text 1162 indicating the direction in which the user should move the vehicle 1018 for proper charging alignment, presents arrow symbols 1160 in any combination (e.g., forward, rearward, left, right) around a graphical depiction of the vehicle 1164, and also displays a graphical depiction of the front wheels 1166 turned in the direction needed for proper charging alignment. Any combination of these and other alignment symbols and text instructions 1168 can be displayed to the user to indicate how the vehicle 1018 should be moved for proper charging alignment. Such symbols and/or text 1168 can be updated continuously or periodically as the position of the sensors 1154 and vehicle 1018 change with respect to the charging pad 1150 and core thereof, until alignment within a predetermined

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acceptable error calculated by the controller is achieved. In some embodiments, the control(s) selected to begin a charging session (e.g., the "START CHARGE" selector 1034A on the touch screen display 1032 of the illustrated embodiment) are disabled until such alignment is achieved.

[00151] By utilizing the sensors 1154, sensed elements 1156, and alignment indicators 1168 as just described, proper alignment of the vehicle 1018 with respect to the charging pad 1150 can be conveniently and quickly achieved without requiring the user to leave the vehicle 1018. Also, a charging session can be started without the need to plug in the vehicle 1018.

[00152] Although the induction-based vehicle charging system described above in connection with FIGs. 4, 18, and 19 is presented in the context of an on-board vehicle charging system (i.e., where the display 1032, and other indicators and selectors are located in one or more consoles of the vehicle 1032, it should be noted that the vehicle alignment features described above can be used in connection with any of the other vehicle charging systems herein.

[00153] Another feature of the present invention regards the location at which a cord-based vehicle charging system is attached to the vehicle. As described above, some vehicle charging systems according to the present invention utilize a cord 22, 222, 540, 744, 944 that is releasably or permanently attached to the vehicle 18, 218, 418, 618, 818. It will be appreciated that such a tethered connection can present the danger of a user accidentally moving the vehicle 18, 218, 418, 618, 818 before disconnecting the cord 22, 222, 540, 744, 944 from the vehicle 18, 218, 418, 618, 818. Depending upon the position and orientation of the electrical connector of the vehicle 18, 218, 418, 618, 818 to which the cord 22, 222, 540, 744, 944 is connected, and the manner in which the opposite end of the cord 22, 222, 540, 744, 944 is attached to the electrical system of the house, building, or other facility, such movement can create significant damage to the vehicle 18, 218, 418, 618, 818, cord 22, 222, 540, 744, 944, and/or the electrical system of the house, building, or other facility. In some embodiments of the present invention, this damage can be mitigated or avoided by virtue of the position of the electrical connector of the vehicle 18, 218, 418, 618, 818.

[00154] With reference now to FIGs. 20-23, another embodiment of the present invention is illustrated, and is presented in the context of the vehicle charging cords 22, 122 in the embodiments of FIGs. 2, 5-12, and 15 by way of example only. In this regard, the features

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described below in connection with FIGs. 20-23 can be utilized in conjunction with any of the vehicle charging systems disclosed herein in which a power cord 22, 222, 540, 744, 944 is attached to a vehicle 18, 218, 418, 618, 818 for purposes of charging the battery 20, 222, 422, 622, 822 of the vehicle 18, 218, 418, 618, 818.

[00155] As shown in FIGs. 20-22, the plug 26 of the vehicle charging cord 22, 222 releasably connects to the electrical connector 170 of the vehicle 18, 218. In the illustrated embodiment of FIGs. 20-22, the electrical connector 170 of the vehicle is located in a front surface 172 of the vehicle 18, 218. Accordingly, in the event a user moves the vehicle 18, 218 in a rearward direction without disconnecting the vehicle charging cord 22, 222, the opportunity for the plug 26 of the vehicle charging cord 22, 222 to automatically disconnect by virtue of rearward movement of the vehicle 18, 218 is significantly increased. Of course, a significant factor in the amount of shear and tension force exerted upon the plug 26, vehicle charging cord 22, 222, and electrical connector 170 prior to this disconnection is the location of the other end of the vehicle charging cord 22, 222. In those embodiments where the other end (e.g., plug 24) of the vehicle charging cord 22, 222 is connected to the electrical system of a house, building, or other facility substantially in front of the vehicle 18, 218, this force can be significantly less than the disconnection force needed in those embodiments in which the other end of the vehicle charging cord 22 is connected at a location laterally disposed from the vehicle 18, 218. However, for those applications in which the vehicle 18, 218 must be backed up to exit the vehicle charging area, this location of the electrical connector 170 can significantly reduce the amount of disconnection force compared to locations of the electrical connector 170 located on a side or rear of the vehicle 18, 210.

[00156] Although not illustrated, in some embodiments, the electrical connector 170 of the vehicle 18, 218 is located in a rear surface 174 of the vehicle 18, 218. Accordingly, in the event a user moves the vehicle 18, 218 in a forward direction without disconnecting the vehicle charging cord 22, 222, the opportunity for the plug 26 of the vehicle charging cord 22, 222 to automatically disconnect by virtue of forward movement of the vehicle 18, 218 is significantly increased. As described above, a significant factor in the amount of shear and tension force exerted upon the plug 26, vehicle charging cord 22, 222, and electrical connector 170 prior to this disconnection is the location of the other end of the vehicle charging cord 22, 222. In those embodiments where the other end (e.g., plug 24) of the vehicle charging cord 22, 222 is connected to the electrical system of a house, building, or

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other facility substantially behind the vehicle 18, 218, this force can be significantly less than the disconnection force needed in those embodiments in which the other end of the vehicle charging cord 22 is connected at a location laterally disposed from the vehicle 18, 218. However, for those applications in which the vehicle 18, 218 must be moved forward to exit the vehicle charging area, this location of the electrical connector 170 can significantly reduce the amount of disconnection force compared to locations of the electrical connector 170 located on a side or front of the vehicle 18, 218.

[00157] In some embodiments, a clearance or light interference fit is provided between the plug 24 of the vehicle charging cord 22, 222 and the electrical connector 170 (located in a front or rear surface 172, 174 of the vehicle 18, 218 as described above), thereby providing a reduced amount of force needed to disconnect the plug 24 from the electrical connector 170. In some embodiments, a force needed for disconnection of the plug 24 from the electrical connector 170 is no greater than about 20 pounds (measured in a direction parallel to motion of the plug 24 with respect to the electrical connector 170 during connection) to avoid or reduce damage to the vehicle charging cord 22, 222, electrical connector 170, and vehicle 18, 218. In other embodiments, this force is no greater than about 10 pounds to avoid or reduce damage to the vehicle charging cord 22, 222, electrical connector 170, and vehicle 18, 218. In still other embodiments, this force is no greater than about 5 pounds to avoid or reduce damage to the vehicle charging cord 22, 222, electrical connector 170, and vehicle 18, 218.

[00158] As indicated above, the angle at which the force of disconnection is applied upon the electrical connector 170 and plug 24 can have a significant impact upon the shear and tension forces experienced by the electrical connector 170 and plug 24 when the vehicle 18, 218 is moved without unplugging the vehicle charging cord 22, 222. To reduce or mitigate these forces, the orientation of the electrical connector 170 with respect to the vehicle 18, 218 is selected to fall within a range of angles measured from a forward direction of the vehicle 18, 218. In particular, in some embodiments, the electrical connector 170 is oriented so that an angle 176 (see FIG. 21) between the forward direction of the vehicle 18, 218 (defined by proper alignment of the vehicle under normal operating conditions) and the direction of motion of the plug 24 with respect to the electrical connector 170 during connection is no greater than about 50 degrees. In other embodiments, this angle 176 is no greater than about 40 degrees to reduce or mitigate the disconnection force. In still other embodiments, this angle 176 is no greater than about 30 degrees to reduce or mitigate the disconnection force.

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In combination with the maximum disconnection forces according to some embodiments as described above, these orientation angles 176 of the electrical connector 170 can help to ensure damage-free disconnection of the vehicle charging cord 22, 222 from the electrical connector 170 of the vehicle 18, 218 regardless of whether the electrical connector 170 is located in the front or rear surface 172, 174 of the vehicle 18, 218 as described above.

[00159] In some embodiments, the vehicle 18, 218 is provided with two or more electrical connectors 170 in different locations (e.g., different sides) on the exterior of the vehicle 18, 218, any of which can be connected to a vehicle charging cord 22, 222 to charge the battery 20, 220 of the vehicle 18, 218. For example, one electrical connector 170 can be located in a front surface 172 of the vehicle 18, 218, and another electrical connector 170 can be located in a rear surface 172 of the vehicle 18, 218. Both such electrical connectors 170 can be connected to the battery 20, 220 and controller 44, 244 of the vehicle 18, 218 by suitable power wiring (e.g., wiring harnesses) extending along the vehicle 18, 218. In such embodiments, a user can choose to connect the vehicle charging cord 22, 222 to the electrical connector 170 closest to the location at which the vehicle charging cord 22, 222 is connected to the electrical system of the house, building, or other charging facility, or can connect the vehicle charging cord 22, 222 to the electrical connector 170 oriented at the smallest angle with respect to such a location upon accidental movement of the vehicle 18, 218. This ability to choose between two or more electrical charging connectors 170 can present significant convenience to the user while helping to prevent damage to the vehicle charging cord 22, 222 and vehicle 18, 118 upon accidental movement of the vehicle 18, 118 while still plugged in.

[00160] The illustrated embodiment of FIGs. 20-23 is presented with reference to a vehicle charging cord 22, 222 intended for releasable connection at an electrical connector 170 of the vehicle 18, 218. However, it should be noted that the same principles of disconnect force, disconnect angle, and cord-to-vehicle interface location apply regardless of whether the vehicle charging cord 22, 222 is intended to be disconnected at the vehicle 18, 218. In this regard, some embodiments of the present invention provide a vehicle charging cord 22, 222 that is not intended for disconnection from the vehicle 18, 218 (as presented above in connection with earlier-described embodiments). However, in such embodiments, the vehicle charging cord 22, 222 and/or the electrical wiring of the vehicle 18, 218 can be provided with an electrical connector that can automatically disconnect upon experiencing a threshold force. Any electrical connector located in the wiring of the vehicle 18, 218 or in

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the cord extending therefrom to a source of electrical power can be used. For example, in embodiments in which a power cord extending from the vehicle 18, 218 can be retracted onto a reel located on the vehicle 18, 218 as described above, the power cord can have a releasable electrical connection at a point along the length of the cord. As another example, the power cord can be provided with a releasable electrical connector located at the housing 28, 228 or cabinet 742, 1142 of the vehicle charging system. In any such case, the power cord can automatically disconnect upon experiencing a threshold force such as those described above, thereby preventing damage (or further damage) to the vehicle 18, 218 or the electrical system of the house, building, or other charging facility. Such disconnection can be frangible, meaning that the cord and/or connector is at least partially destroyed upon disconnection, or can be re-connectable by a user or service technician.

[00161] In some embodiments, the electrical connector 170 is located in a surface of the vehicle 18, 218 that is recessed with respect to adjacent (e.g., surrounding) exterior body surfaces of the vehicle 18, 218. This feature can help to reduce exposure of the electrical connector 170 to the environment around the vehicle 18, 218. In these and other embodiments, the electrical connector 170 is located behind a door 178 that can either slide or pivot with respect to the electrical connector 170 in order to reveal the electrical connector 170 for connection and charging. The door 178 can also help to reduce exposure of the electrical connector 170 to the environment around the vehicle 18, 218. In some embodiments, the door 178 can be opened manually by a user pushing, pulling, and/or rotating the door 178. However, in other embodiments, the door 178 can be at least partially opened remotely by a cable, solenoid and associated power wiring, mechanical linkage, and other elements connected to a user-manipulatable control in the vehicle 18, 218. Any mechanism used to open a fuel door for a gasoline or diesel-powered vehicle can be used for this purpose, and falls within the spirit and scope of the present invention.

[00162] As described in greater detail above, the controller 44, 244 of the vehicle charging cords 22, 222 can communicate with a controller 108 of the vehicle 18, 218, such as by PLC-based communication. As an alternative or in addition to such communication, the vehicle charging cord 22, 222 (and all other vehicle charging cords described and/or illustrated herein) can enable such communication by dedicated wiring in the same cord 22, 222. An example of such a cord 22, 222 is illustrated in FIGs. 20-23, and with particular reference to FIG. 23. In this embodiment, the plug 26 of the vehicle charging cord 26 has two

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communication pins 180 in addition to power and ground blades 182. The communication pins 180 are electrically coupled to wires or other electrical lines extend along the cord 22, 222, and can extend into and establish electrical communication with sockets 184 of the electrical connector 170. By this connection, communication along the cord 22, 222 on one or more electrical lines separate from power and ground lines of the cord 22, 222 can be established. It will be appreciated that such communication lines can be appropriately shielded for better performance, in some embodiments. Also, any number of such communication lines and associated pins 180 can be provided on the cord 22, 222. Furthermore, although pins 180 are illustrated in the embodiment of FIGs. 20-23, any other type of electrical connector (e.g., sockets adapted for connection to pins on the electrical connector 170) can instead be used. Such communication lines can also be used on the opposite end of the cord 22, 222 for communication between the controller 44, 244 and a controller 50, 250 of a power utility 48, 248, and can be used in any of the cord-based vehicle charging system embodiments disclosed herein.

[00163] Operation of a vehicle charging system according to an embodiment of the present invention to perform a manual charging session will now be described with reference to FIG. 24. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 24 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 24, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32. Next, the controller 44 can receive charge time and other settings 15 entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 17).

[00164] Following a command to start a manual battery charging session (at 19) based upon a start time selected by a user (such as by the user selecting selector 86 in the second screen 40A shown in FIG. 10 and entering a charge start time in selector 90), the controller

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44 can continue to compare the time of the clock 58 with the charge start time entered by the user (at 21) until the start time is reached by the clock 58. Until the start time is reached, the controller continues to delay 23 charging of the battery 20 connected thereto. Once the start time is reached, the controller 44 closes the electrical switch 92 at 25, and begins charging the battery 20. Next, using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 27. If a determination is made that the battery 20 is not fully charged at 29, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 31. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 33.

[00165] Operation of a vehicle charging system according to another embodiment of the present invention to perform a programmed charging session will now be described with reference to FIG. 25. In this embodiment, additional features are provided compared to the charging session described above in connection with FIG. 24. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 25 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 25, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32.

[00166] Next, at 35, the controller 44 can employ the battery diagnostic circuitry described above to detect one or more properties of the battery 20 connected to the vehicle charging cord 22, such as the charge level of the battery 20, the voltage of the battery 20, the condition of the battery 20 (e.g., whether the battery 20 is faulty), and the like, and can display (at 37) any or all of this information to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15. The controller 44 can also establish communication with the controller 108 of the vehicle 18 at 39, and can retrieve information regarding the battery 20 (e.g., battery make, model, age, and the like) at 41 via the controller 108 of the vehicle 18 or directly from a memory of the vehicle 18.

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[00167] At step 43, the controller 44 can receive charge time and other settings entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 45). The controller 44 can also display the charge time remaining 66 at 47. Following a command to start a programmed battery charging session (at 49) based upon a start time selected by a user (such as by the user selecting selector 86 in the second screen 40A shown in FIG. 10 and entering a charge start time in selector 90), the controller 44 can continue to compare the time of the clock 58 with the charge start time entered by the user (at 51) until the start time is reached by the clock 58. Until the start time is reached, the controller continues to delay 53 charging of the battery 20 connected thereto. Once the start time is reached, the controller 44 closes the electrical switch 92 at 55 to begin charging the battery 20.

[00168] Next, at 57, the controller 44 compares the time of the clock 58 with an end time setting that can be entered into the vehicle charging cord 22 according to some alternative embodiments of the present invention. If the end time has been reached, the controller 44 ends the charging session by opening the electrical switch 92 at 65. Otherwise, if the end time setting has not yet been reached, battery charging continues, and using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 59. If a determination is made that the battery 20 is not fully charged at 61, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 63. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 65.

[00169] Operation of a vehicle charging system according to another embodiment of the present invention to perform a programmed charging session will now be described with reference to FIG. 26. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 26 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 26, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can

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retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32.

[00170] Next, at 35, the controller 44 can employ the battery diagnostic circuitry described above to detect one or more properties of the battery 20 connected to the vehicle charging cord 22, such as the charge level of the battery 20, the voltage of the battery 20, the condition of the battery 20 (e.g., whether the battery 20 is faulty), and the like, and can display (at 37) any or all of this information to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15. The controller 44 can also establish communication with the controller 108 of the vehicle 18 at 39, and can retrieve information regarding the battery 20 (e.g., battery make, model, age, and the like) at 41 via the controller 108 of the vehicle 18 or directly from a memory of the vehicle 18.

[00171] At step 43, the controller 44 can receive charge time and other settings entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 45). Following a command to start a programmed battery charging session (at 49) based upon a battery charging end time selected by a user (such as by the user selecting selector 100 in the second screen 40A shown in FIG. 10 and entering a charge end time in selector 104), the controller 44 can establish communication with the power utility 48 at 67, and can transmit (or enable the power utility 48 to retrieve) the charge time settings, any other settings, and the battery property information to the power utility 48 at 69.

[00172] Next, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can calculate the power required to fully charge the battery 20 based at least in part upon the level of charge of the battery 20 at 71. The controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can then calculate the amount of time needed to fully charge the battery 20 based upon the power required to do so, and can thereby estimate the time of day at which charging can begin based at least in part upon the battery charging end time and the estimated duration of time necessary to fully charge the battery 20 (at 73).

[00173] At step 75, the controller 44 can continue to compare the time of the clock 58 with the charge start determined as described above until the start time is reached by the clock 58. Until the start time is reached, the controller continues to delay 77 charging of the battery 20

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connected thereto. Once the start time is reached, the controller 44 closes the electrical switch 92 at 79 to begin charging the battery 20.

[00174] Next, at 81, the controller 44 compares the time of the clock 58 with an end time setting that can be entered into the vehicle charging cord 22 according to some alternative embodiments of the present invention. If the end time has been reached, the controller 44 ends the charging session by opening the electrical switch 92 at 83. Otherwise, if the end time setting has not yet been reached, battery charging continues, and using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 85. If a determination is made that the battery 20 is not fully charged at 87, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 89. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 83.

[00175] Operation of a vehicle charging system according to another embodiment of the present invention to perform a programmed charging session will now be described with reference to FIG. 27. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 27 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 27, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32.

[00176] Next, at 35, the controller 44 can employ the battery diagnostic circuitry described above to detect one or more properties of the battery 20 connected to the vehicle charging cord 22, such as the charge level of the battery 20, the voltage of the battery 20, the condition of the battery 20 (e.g., whether the battery 20 is faulty), and the like, and can display (at 37) any or all of this information to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15. With this information, the controller 44 can determine whether the battery 20 is defective or otherwise has a fault at 91, and can communicate a battery fault message to the user in any of the manners also described above

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in connection with the embodiment of FIGs. 2, 5-11, and 15 if a fault exists (at 93). The controller 44 can also establish communication with the controller 108 of the vehicle 18 at 95, and can retrieve information regarding the battery 20 (e.g., battery make, model, age, and the like) at 97 via the controller 108 of the vehicle 18 or directly from a memory of the vehicle 18.

[00177] At step 99, the controller 44 can receive charge time and other settings entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 101). Following a command to start a programmed battery charging session (at 103) based upon a battery charging end time selected by a user (such as by the user selecting selector 100 in the second screen 40A shown in FIG. 10 and entering a charge end time in selector 104), the controller 44 can establish communication with the power utility 48 at 105, and can transmit (or enable the power utility 48 to retrieve) the charge time settings, any other settings, and the battery property information to the power utility 48 at 107.

[00178] Next, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can calculate the power required to fully charge the battery 20 based at least in part upon the level of charge of the battery 20 at 109. The controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can then calculate the amount of time needed to fully charge the battery 20 based upon the power required to do so, and can thereby estimate the latest time of day at which charging can begin based at least in part upon the battery charging end time and the estimated duration of time necessary to fully charge the battery 20 (at 111). Also, at 113, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can set an acceptable threshold cost of power (e.g., per unit time) at or below which battery charging will begin. In some embodiments, this threshold cost of power is entered by a user into the vehicle charging cord 22 in any of the manners of user interface described herein, or can be set by the power utility 48 based upon the desired maximum power cost determined by the power utility 48.

[00179] At step 115, the controller 44 can compare the time of the clock 58 with the latest estimated charge time, and at step 117 can compare the current cost of power (e.g., per unit time) with the threshold cost of power determined at step 113. If the latest estimated charge start time has been reached or if the threshold cost of power has been reached, the controller

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44 closes the electrical switch 92 at 119 to begin charging the battery 20. Otherwise, the controller 44 continues to delay 121 charging of the battery 20 connected thereto.

[00180] Next, at 123, the controller 44 can check or otherwise determine whether communication has been lost with the controller 50 of the power utility 48. If communication has been lost, the controller 44 can send a communication fault message to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15 (at 125). Otherwise, the controller 44 can check or otherwise determine whether the supply of power to the vehicle charging cord 22 has been interrupted at 127. If the supply of power has been interrupted, the controller 44 can send a power interrupt fault message to the user in any of the manners also described above in connection with the embodiment of FIGs. 2, 5-11, and 15 (at 129).

[00181] On a continuing basis as the battery 20 is being charged, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can monitor the cost of power supplied to the battery 20, and can compare this cost with the threshold cost of power described above (at 131). If the cost of power supplied to the battery 20 exceeds the threshold cost of power, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can interrupt charging of the battery at 133, such as by opening the electrical switch 92 of the vehicle charging cord 92. Otherwise, using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 135. If a determination is made that the battery 20 is not fully charged at 137, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 139. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 141.

[00182] Four examples of vehicle charging operation according to embodiments of the present invention are described above in connection with FIGs. 24-27. It should be noted any sub-combination of the steps described in connection with FIGs. 24-27 can be performed in other embodiments. Also, although the steps of the various processes presented above are described as occurring in a particular order, a number of the steps of each process can occur in different orders without departing from the spirit and scope of the present invention. Furthermore, steps and combinations of steps described in combination with one or more of the embodiments of FIGs. 24-27 can be employed in the processes of the other embodiments of FIGs. 24-27. For example, the battery fault check and notification steps 91, 93, the

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communication fault and notification steps 123, 125, and/or the power interruption fault check and notification steps 127, 129 in the process illustrated in FIG. 27 can be utilized in any of the other embodiments disclosed herein, including those of FIGs. 24-26.

[00183] Also, in the various processes described and illustrated herein, the controller 44 is described as performing a number of functions. Based upon the ability of those vehicle charging systems herein to communicate with a processor of a power utility, any of these functions can instead or also be performed by the processor of the power utility communicating and controlling the vehicle charging cords 22 or systems.

[00184] As described above, the use of any of the vehicle charging systems described and/or illustrated herein can provide significant control to a user in determining the conditions under which vehicle battery charging will occur. This control can result in cost savings to the user without impacting the user's daily routine. However, other benefits accrue to power utilities providing power to users of these vehicle charging systems. By at least partially controlling the time at which battery charging will occur and/or by having the ability to interrupt and re-start battery charging by a large number of users in a community, the power utility can better distribute power usage over a period of time, thereby providing significant cost savings to the power utility.

[00185] An example of how a power utility can control multiple vehicle charging systems according to the present invention is illustrated in FIGs. 28 and 29. By way of example only, operation will be described in connection with users employing vehicle charging cords 22, 222 such as those illustrated in FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIGs. 28 and 29 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein.

[00186] With reference first to FIG. 28, the controller 50 of the power utility 48 (which can be defined by one or more servers and associated computer equipment) can communicate with the vehicle charging cords 22, 222 of multiple users, and can continuously or periodically update a queue or other list of on-line users who have requested a battery charge session as described above (at 143).

[00187] In some embodiments, the controller 50 sorts the on-line users based upon one or more factors, such as the charge time end setting (i.e., earlier charge time end settings having

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priority), the estimated charge time needed for fully charging each battery 20 (i.e., longer charge times having priority), the time at which the battery charge session was requested, and the like. By way of example only, the controller 50 in the process of FIG. 28 checks at 145 whether any of the batteries 20 that are on-line have a very low charge, such as a charge below a minimum level set by the user at selector 112 on the second screen 40B shown in FIG. 10, or a charge below a minimum level set by the power utility 48. As another example, the controller 50 in the process of FIG. 28 checks at 149 whether the estimated time to fully charge any battery 20 is equal to or greater than the time available for battery charging (i.e., to the battery charge completion time entered by the user at selector 100 on the second screen 40B shown in FIG. 10). If the controller 50 determines that a battery 20 has a very low charge or will require a charging duration equal to or greater than the charging time available, the controller 50 can flag or otherwise indicate that the vehicle charging cord 22, 222 has priority over other vehicle charging cords 22, 222 (at 147 and 151, respectively).

[00188] The controller 50 can also remove a priority designation from any on-line vehicle charging cord 22, 222 no longer meeting this criteria (at 153), such as on-line charging cords 22, 222 that have been supplied with power based upon the fact that their respective batteries 20 had a very low charge, but that now have supplied their batteries 20 with a sufficient minimum threshold charge. At step 155, the queue of on-line vehicle charging cords 22, 222 can be re-ordered based upon the determination of which vehicle charging cords 22, 222 are flagged as having priority (described above), and upon any of the other factors also described above.

[00189] Next, the controller 50 at 157 can determine whether the total power draw from the community or the total power draw of all vehicle charging cords 22, 222 exceeds a threshold maximum level of power draw. This maximum level of power draw can be set by a power utility 48 based upon a threshold level of power cost to the power utility 48, the maximum output of power that can be supplied by the power utility 48 to the community, an amount of power budgeted by the power utility 48 for charging vehicle batteries via the vehicle charging cords 22, 222, other factors, and any combination thereof. If the total power draw does not exceed the maximum level of power draw set by the power utility 48, and if the queue of vehicle charging cords 22, 222 awaiting charging is empty (at 159), the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143. Otherwise, the controller 50 of the power utility 48

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can send signals at 161 to one or more vehicle charging cords 22, 222 to begin charging their respective batteries 20 by closing their electrical switches 92. Such signals can be sent to any vehicle charging cords 22, 222 flagged with priority, and then to any other vehicle charging cords 22, 222. In either case, such signals are sent to vehicle charging cords 22, 222 in the order presented in the vehicle charging queue (ordered as described above). Following this step, the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143.

[00190] If the total power draw described above exceeds the maximum level of power draw set by the power utility 48 as determined by the processor at step 157, and if any vehicle charging cords 22, 222 are not flagged as having priority (check by the processor 50 made at step 163) as described above, the controller 50 can send signals to one or more vehicle charging cords 22, 222 not flagged as having priority to at least temporarily stop charging the batteries 20 connected thereto (e.g., by opening the electrical switches 92 of such vehicle charging cords 22, 222) at step 165. In some embodiments, such signals can be sent by the power utility in batches, such as signals sent to two or more of such vehicle charging cords 22, 222 at a given time or under a common command. Following this step, the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143. Otherwise, if the processor 50 determines that all vehicle charging cords 22, 222 are flagged as having priority at 163, the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143.

[00191] In light of the fact that the vehicle charging cord management process illustrated in FIG. 28 can be performed on a continual basis, it will be appreciated that the steps described above in connection with FIG. 28 can be carried out in a number of different orders without departing from the spirit and scope of the present invention.

[00192] With reference now to FIG. 29, an example application of the vehicle charging cord management process of FIG. 28 is provided. FIG. 29 illustrates the total power draw (in kW) of a community upon a power utility 48 over a 24-hour period of time. As shown in FIG. 29, the maximum preferred power draw of the power utility 48 described above in connection with FIG. 28 is 200 kW. As also shown in FIG. 29, the power draw of the community varies significantly over the 24-hour period, peaking around 3pm and falling to a lowest level between 2am and 3am. Any number of factors can define this power draw over

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the 24-hour period, including without limitation the number of users using air conditioning or electrical heating units during the day and the times at which such units are operated by the users, the times at which any large manufacturing operations begin and end operations, and the like. For example, the second peak shown in FIG. 29 can be the result of one or more manufacturing plants in a community drawing significant power during a second shift.

[00193] Based upon the amount of power drawn from the power utility 29 as shown in FIG. 29, the power utility 48 can control and operate a number of vehicle charging systems according to the present invention based upon non-peak time periods and upon other factors as described above (charge time end settings, estimated charge times needed to fully charge batteries 20, times at which battery charge sessions were requested, and the like). For example, a first group of users requesting charge sessions at 2pm (point 167 in FIG. 29) can have priority over other groups of users requesting charge sessions at 4pm and 6pm (points 169 and 171), respectively. Accordingly, once the controller 50 of the power utility 48 determines that the power draw by the community has fallen below the preferred maximum level of power draw (e.g., step 157 in FIG. 28; point 173 in FIG. 29), the controller 50 can send signals to the vehicle charging systems of the first group of users to begin battery charging. Taking this additional power draw into account, the controller 50 of the power utility 48 can later determine that the power draw by the community has fallen further (point 175 in FIG. 29), and that the vehicle charging systems of the second user group can be turned on. However, if the total power draw by the community rises again, such as based upon a large draw from a manufacturing facility operating a second shift, the controller 50 of the power utility 48 can temporarily turn off the vehicle charging systems of the second user group and then the first user group in series (points 177 and 179, respectively), and can turn on the vehicle charging systems of the first and second user groups in series once the total power draw by the community falls again (points 181 and 183, respectively).

[00194] Although the third user group requested charging sessions much earlier as described above, the total power draw by the community remained too high to permit the controller 50 of the power utility 48 to turn on the vehicle charging systems of the third user group until 11pm. At this point (185 in Fig. 29), the total power draw taking into account the first and second groups of users falls sufficiently to permit the controller 50 to turn on the vehicle charging systems of the third user group while still remaining below the preferred maximum power draw described above. The batteries corresponding to the first, second, and

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third groups of users illustrated in FIG. 29 become fully charged at different times, and cause battery charging to stop at points 187, 189, and 191, respectively.

[00195] Application of a vehicle charging system management process (using vehicle charging systems of the present invention) is shown by way of example in FIG. 29. It will be appreciated that a similar process can be implemented for any other power draw profile of a community, and that any number of charging initiations, interruptions, and re-initiations can occur for any number of users or groups of users throughout the course of a 24-hour period based at least in part upon the needs of the users and any preferred maximum level of power draw determined by the power utility.

[00196] The embodiments described above and illustrated in the figures are presented by way of example only and are not intended as a limitation upon the concepts and principles of the present invention. As such, it will be appreciated by one having ordinary skill in the art that various changes in the elements and their configuration and arrangement are possible without departing from the spirit and scope of the present invention. For example, the vehicle charging systems described above and illustrated in connection with the embodiments of FIGs. 2, 5-11 and 15; FIG. 3; FIGs. 4, 18, and 19; FIG. 12; FIGs. 13, 14, and 16; FIG. 17; FIGs. 20-23; FIG. 24, FIG. 25, FIG. 26, FIG. 27, and FIGs 28 and 29 each have a number of features, elements, and/or steps. Although these features, elements, and steps are described and illustrated in connection with each embodiment, it should be noted that any sub-combination of such features, elements, and steps can be utilized in other embodiments of the present invention. The particular combination of features, elements, and steps in each illustrated embodiment is presented by way of example only, and does not indicate or imply that embodiments of the present invention must have all such features, elements, and steps.

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I claim:

1. A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a second controller electrically coupled to the electrical power cord; and

at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller,

the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger.

2. The vehicle charger of claim 1, wherein the electrical power cord is releasably attachable to the vehicle and the source of power.

3. The vehicle charger of claim 1, further comprising a housing in which the second controller is located, the housing coupled to and at least partially located between opposite ends of the electrical power cord.

4. The vehicle charger of claim 3, wherein the housing at least partially defines one of the opposite ends of the electrical power cord.

5. The vehicle charger of claim 1, wherein the second controller is adapted for communication with the first controller over the electrical power cord.

6. The vehicle charger of claim 1, wherein the second controller is adapted for wireless communication with the first controller via the at least one of the transmitter and receiver.

7. The vehicle charger of claim 1, wherein the second controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power.

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8. The vehicle charger of claim 1, wherein the second controller is adapted for communication with a computer receiving electric power information from the Internet.

9. The vehicle charger of claim 8, wherein the second controller is adapted for wireless communication with the computer via the at least one of the transmitter and receiver.

10. The vehicle charger of claim 1, wherein the vehicle charger has a first charging state in which the vehicle charger is not charging the battery, and a second charging state in which the vehicle charger is charging the battery.

11. The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying a level of charge of the battery.

12. The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the second controller.

13. The vehicle charger of claim 12, wherein the amount of time is an amount of time that is estimated by the second controller or received by the second controller.

14. The vehicle charger of claim 13, wherein the amount of time is updated on the display by the second controller during a charge session.

15. The vehicle charger of claim 1, further comprising a display coupled to the second controller, the display displaying an amount of power consumed by the battery during a vehicle charging session.

16. The vehicle charger of claim 15, wherein the amount of power consumed by the battery is an amount of power that is estimated by the second controller or is received by the second controller.

17. The vehicle charger of claim 16, wherein the amount of power consumed is updated on the display by the second controller during the charging session.

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18. The vehicle charger of claim 1, further comprising a display displaying a cost of power to the battery per unit time.

19. The vehicle charger of claim 18, wherein the cost of power to the battery is received from the second controller by the first controller.

20. The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.

21. The vehicle charger of claim 20, wherein the total power cost is updated on the display by the second controller during a charging session.

22. The vehicle charger of claim 1, wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a threshold cost of power to the battery.

23. The vehicle charger of claim 22, wherein the threshold cost of power is received by the second controller from a user of the vehicle charger.

24. The vehicle charger of claim 23, wherein the threshold cost of power is input to the vehicle charger via a user-manipulatable control of the vehicle charger.

25. The vehicle charger of claim 22, wherein the second controller automatically changes the charging state of the vehicle charger by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging.

26. The vehicle charger of claim 1, wherein the second controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

27. The vehicle charger of claim 26, wherein the time of day is received by the second controller from a user of the vehicle charger.

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28. The vehicle charger of claim 27, wherein the time of day is input to the vehicle charger via a user-manipulatable control of the vehicle charger.

29. The vehicle charger of claim 26, wherein the second controller automatically changes the charging state of the vehicle charger by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging.

30. The vehicle charger of claim 1, wherein the vehicle charger comprises at least one transmitter coupled to the second controller, and wherein the second controller is adapted to transmit at least one electrical signal representative of a level of charge of the vehicle battery via the at least one transmitter.

31. The vehicle charger of claim 1, wherein the vehicle charger comprises at least one transmitter coupled to the second controller, and wherein the second controller is adapted to transmit at least one electrical signal representative of an estimated amount of battery charge time via the at least one transmitter.

32. The vehicle charger of claim 1, wherein the vehicle charger comprises at least one transmitter coupled to the second controller, and wherein the second controller is adapted to transmit at least one electrical signal representative of a characteristic of the battery via the at least one transmitter.

33. The vehicle charger of claim 1, further comprising at least one user-manipulatable control to change at least one of the charging voltage and the charging amperage of the vehicle charger.

34. The vehicle charger of claim 1, further comprising a reel upon which the electrical power cord is retractable.

35. The vehicle charger of claim 34, wherein the reel is located on the vehicle.

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36. The vehicle charger of claim 1, further comprising a display coupled to the second controller to display at least two different screens upon the display, at least one of the screens displaying information regarding a charging session, and at least one of the screens displaying settings at least partially defining the manner of operation of the vehicle charger.

37. The vehicle charger of claim 36, wherein at least one of the screens includes a user-manipulatable control enabling a user to navigate to another screen.

38. The vehicle charger of claim 1, further comprising a display coupled to the second controller to display information regarding a charging session, wherein the display is an LCD display or a LED display.

39. The vehicle charger of claim 1, further comprising a touch screen display coupled to the second controller to receive vehicle charge setting commands from a user and to display information regarding a charging session.

40. The vehicle charger of claim 1, wherein the controller is adapted to communicate with the first controller by power line communication.

41. The vehicle charger of claim 1, wherein the electrical power cord comprises both power transmission and communication lines electrically connected to the second controller.

42. The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the second controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

43. The vehicle charger of claim 42, wherein the battery of the vehicle charger supplies power to charge the battery of the vehicle based at least in part upon the at least one signal from the first controller.

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44. The vehicle charger of claim 1, wherein the at least one signal comprises data representative of a cost of electrical power.

45. The vehicle charger of claim 1, wherein the at least one signal comprises at least one of data representative of a time of day and a signal to start or stop charging the battery of the vehicle.

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46. A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

a controller;

a display coupled to the controller and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end,

the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

47. The vehicle charger of claim 46, further comprising an electric power cord releasably attachable to at least one of the vehicle and a source of power to supply electric power to the battery during the charging session.

48. The vehicle charger of claim 46, wherein the display is mounted in a console within the vehicle.

49. The vehicle charger of claim 47, wherein the display is mounted in a dashboard of the vehicle.

50. The vehicle charger of claim 48, wherein the user-manipulatable control is within reach of the user while the user is seated within the vehicle.

51. The vehicle charger of claim 47, wherein the electrical power cord is releasably attachable to the vehicle and the source of power.

52. The vehicle charger of claim 47, further comprising a housing in which the controller is located, the housing coupled to and at least partially located between opposite ends of the electrical power cord.

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53. The vehicle charger of claim 52, wherein the housing at least partially defines one of the opposite ends of the electrical power cord.

54. The vehicle charger of claim 47, wherein the controller is adapted for communication over the power cord with another controller remote from the vehicle and the vehicle charger.

55. The vehicle charger of claim 46, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and receiver.

56. The vehicle charger of claim 46, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

57. The vehicle charger of claim 46, wherein the controller is adapted for communication with a computer receiving electric power information from the Internet.

58. The vehicle charger of claim 57, further comprising at least one of a transmitter and receiver, wherein the controller is adapted for wireless communication with the computer via the at least one of the transmitter and receiver.

59. The vehicle charger of claim 46, wherein the controller is also adapted to display a level of charge of the battery on the display.

60. The vehicle charger of claim 46, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

61. The vehicle charger of claim 60, wherein the amount of time is an amount of time that is estimated by the controller or received by the controller.

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62. The vehicle charger of claim 61, wherein the amount of time is updated on the display by the controller during the charging session.

63. The vehicle charger of claim 46, wherein the controller is also adapted to display on the display an amount of power consumed by the battery during the charging session.

64. The vehicle charger of claim 63, wherein the amount of power consumed by the battery is an amount of power that is estimated by the controller or is received by the controller.

65. The vehicle charger of claim 64, wherein the amount of power consumed is updated on the display by the controller during the charging session.

66. The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a cost of power to the battery per unit time.

67. The vehicle charger of claim 66, wherein the cost of power to the battery is received from the controller by the another controller remote from the vehicle charger and vehicle.

68. The vehicle charger of claim 46, wherein the controller is also adapted to display on the display a total power cost of the charging session.

69. The vehicle charger of claim 68, wherein the total power cost is updated on the display by the controller during the charging session.

70. The vehicle charger of claim 46, wherein the controller automatically changes the supply of electric power to the battery based at least in part upon a threshold cost of power to the battery.

71. The vehicle charger of claim 70, wherein the threshold cost of power is received by the controller from a user of the vehicle charger.

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72. The vehicle charger of claim 71, wherein the threshold cost of power is input to the vehicle charger via at least one of the user-manipulatable control or another user-manipulatable control of the vehicle charger.

73. The vehicle charger of claim 46, wherein the controller automatically changes the charging state of the vehicle charger based at least in part upon another time of day at which charging of the battery will begin.

74. The vehicle charger of claim 73, wherein the time of day at which charging of the battery will begin is received by the controller from a user of the vehicle charger.

75. The vehicle charger of claim 46, wherein the time of day is input to the vehicle charger via at least one of the user-manipulatable control or another user-manipulatable control of the vehicle charger.

76. The vehicle charger of claim 46, wherein the vehicle charger comprises at least one transmitter coupled to the controller, and wherein the controller is adapted to transmit at least one electrical signal representative of a level of charge of the vehicle battery via the at least one transmitter.

77. The vehicle charger of claim 46, wherein the vehicle charger comprises at least one transmitter coupled to the controller, and wherein the controller is adapted to transmit at least one electrical signal representative of an estimated amount of battery charge time via the at least one transmitter.

78. The vehicle charger of claim 46, wherein the vehicle charger comprises at least one transmitter coupled to the controller, and wherein the controller is adapted to transmit at least one electrical signal representative of a characteristic of the battery via the at least one transmitter.

79. The vehicle charger of claim 46, further comprising at least one user-manipulatable control to change at least one of the charging voltage and the charging amperage of the vehicle charger.

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80. The vehicle charger of claim 47, further comprising a reel upon which the electrical power cord is retractable.

81. The vehicle charger of claim 80, wherein the reel is located on the vehicle.

82. The vehicle charger of claim 46, wherein the controller selectively displays at least two different screens upon the display, at least one of the screens displaying information regarding the charging session, and at least one of the screens displaying settings at least partially defining a manner of operation of the vehicle charger.

83. The vehicle charger of claim 82, wherein at least one of the screens includes a user-manipulatable control enabling a user to navigate to another screen.

84. The vehicle charger of claim 46, wherein the display is an LCD display or a LED display.

85. The vehicle charger of claim 46, wherein the display is a touch screen display, and wherein the controller receives vehicle charge setting commands from the user and displays information regarding the charging session upon the display.

86. The vehicle charger of claim 46, wherein the controller is adapted to communicate with another controller remote from the vehicle charger and the vehicle by power line communication.

87. The vehicle charger of claim 47, wherein the electrical power cord comprises both power transmission and communication lines electrically connected to the controller.

88. The vehicle charger of claim 46, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the controller and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

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89. The vehicle charger of claim 88, wherein the battery of the vehicle charger supplies power to charge the battery of the vehicle based at least in part upon the at least one signal from a controller remote from the vehicle charger and the vehicle.

90. The vehicle charger of claim 46, wherein the controller of the vehicle charger is responsive to at least one signal from a controller remote from the vehicle charger and the vehicle by changing the supply of electric power to the battery, and wherein the at least one signal comprises data representative of a cost of electrical power.

91. The vehicle charger of claim 46, wherein the controller of the vehicle charger is responsive to at least one signal from a controller remote from the vehicle charger and the vehicle by changing the supply of electric power to the battery, and wherein the at least one signal comprises data representative of a time of day.

92. The vehicle charger of claim 46, wherein the controller of the vehicle charger is responsive to at least one signal from a controller remote from the vehicle charger and the vehicle by changing the supply of electric power to the battery, and wherein the at least one signal comprises a signal to start or stop charging the battery of the vehicle.

93. The vehicle charger of claim 46, wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery until the threshold level of battery charge is reached.

94. The vehicle charger of claim 46, wherein the controller transmits a signal to another controller remote from the vehicle charger in the event of power loss to the vehicle charger.

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95. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a display mounted within the vehicle within reach of a user seated within the vehicle;

a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day;

a controller coupled to the display and to the battery,

the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user.

96. The vehicle charger of claim 95, wherein the display is mounted in a console within the vehicle.

97. The vehicle charger of claim 96, wherein the display is mounted in a dashboard of the vehicle.

98. The vehicle charger of claim 95, further comprising an electric power cord releasably attachable to at least one of the vehicle and a source of power to supply electric power to the battery during the charging session.

99. The vehicle charger of claim 98, wherein the controller is adapted for communication over the power cord with another controller remote from the vehicle and the vehicle charger.

100. The vehicle charger of claim 95, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with another controller remote from the vehicle and the vehicle charger via the at least one of the transmitter and the receiver.

101. The vehicle charger of claim 95, wherein the controller is adapted for automatic establishment of communication with another controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.

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102. The vehicle charger of claim 95, wherein the controller is adapted for communication with a computer receiving electric power information from the Internet.

103. The vehicle charger of claim 102, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the computer via the at least one of the transmitter and the receiver.

104. The vehicle charger of claim 95, wherein the controller is adapted to display a level of charge of the battery on the display.

105. The vehicle charger of claim 95, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.

106. The vehicle charger of claim 105, wherein the amount of time is an amount of time that is estimated by the controller or received by the controller.

107. The vehicle charger of claim 106, wherein the amount of time is updated on the display by the controller during the charging session.

108. The vehicle charger of claim 95, wherein the controller is adapted to display on the display an amount of power consumed by the battery during the charging session.

109. The vehicle charger of claim 108, wherein the amount of power consumed by the battery is an amount of power that is estimated by the controller or is received by the controller.

110. The vehicle charger of claim 109, wherein the amount of power consumed is updated on the display by the controller during the charging session.

111. The vehicle charger of claim 95, wherein the controller is adapted to display on the display a cost of power to the battery per unit time.

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112. The vehicle charger of claim 111, wherein the cost of power to the battery is received from the controller by the another controller remote from the vehicle charger and vehicle.

113. The vehicle charger of claim 95, wherein the controller is adapted to display on the display a total power cost of the charging session.

114. The vehicle charger of claim 113, wherein the total power cost is updated on the display by the controller during the charging session.

115. The vehicle charger of claim 95, wherein the controller automatically changes the supply of electric power to the battery based at least in part upon a threshold cost of power to the battery.

116. The vehicle charger of claim 115, wherein the threshold cost of power is received by the controller from a user of the vehicle charger.

117. The vehicle charger of claim 116, wherein the threshold cost of power is input to the vehicle charger via at least one of the user-manipulatable control or another user-manipulatable control of the vehicle charger.

118. The vehicle charger of claim 95, wherein the controller automatically changes the charging state of the vehicle charger based at least in part upon another time of day at which charging of the battery will begin.

119. The vehicle charger of claim 118, wherein the time of day at which charging of the battery will begin is received by the controller from a user of the vehicle charger.

120. The vehicle charger of claim 95, wherein the time of day is input to the vehicle charger via at least one of the user-manipulatable control or another user-manipulatable control of the vehicle charger.

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121. The vehicle charger of claim 95, wherein the vehicle charger comprises at least one transmitter coupled to the controller, and wherein the controller is adapted to transmit at least one electrical signal representative of a level of charge of the vehicle battery via the at least one transmitter.

122. The vehicle charger of claim 95, wherein the vehicle charger comprises at least one transmitter coupled to the controller, and wherein the controller is adapted to transmit at least one electrical signal representative of an estimated amount of battery charge time via the at least one transmitter.

123. The vehicle charger of claim 95, wherein the vehicle charger comprises at least one transmitter coupled to the controller, and wherein the controller is adapted to transmit at least one electrical signal representative of a characteristic of the battery via the at least one transmitter.

124. The vehicle charger of claim 95, further comprising at least one user-manipulatable control to change at least one of the charging voltage and the charging amperage of the vehicle charger.

125. The vehicle charger of claim 98, further comprising a reel upon which the electrical power cord is retractable.

126. The vehicle charger of claim 125, wherein the reel is located on the vehicle.

127. The vehicle charger of claim 95, wherein the controller selectively displays at least two different screens upon the display, at least one of the screens displaying information regarding the charging session, and at least one of the screens displaying settings at least partially defining a manner of operation of the vehicle charger.

128. The vehicle charger of claim 127, wherein at least one of the screens includes a user-manipulatable control enabling a user to navigate to another screen.

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129. The vehicle charger of claim 95, wherein the display is an LCD display or a LED display.

130. The vehicle charger of claim 95, wherein the display is a touch screen display, and wherein the controller receives vehicle charge setting commands from the user and displays information regarding the charging session upon the display.

131. The vehicle charger of claim 95, wherein the controller is adapted to communicate with another controller remote from the vehicle charger and the vehicle by power line communication.

132. The vehicle charger of claim 98, wherein the electrical power cord comprises both power transmission and communication lines electrically connected to the controller.

133. The vehicle charger of claim 95, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the controller and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.

134. The vehicle charger of claim 133, wherein the battery of the vehicle charger supplies power to charge the battery of the vehicle based at least in part upon at least one signal from a controller remote from the vehicle charger and the vehicle.

135. The vehicle charger of claim 95, wherein the controller of the vehicle charger is responsive to at least one signal from a controller remote from the vehicle charger and the vehicle by changing the supply of electric power to the battery, and wherein the at least one signal comprises data representative of a cost of electrical power.

136. The vehicle charger of claim 95, wherein the controller of the vehicle charger is responsive to at least one signal from a controller remote from the vehicle charger and the vehicle by changing the supply of electric power to the battery, and wherein the at least one signal comprises data representative of a time of day.

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137. The vehicle charger of claim 95, wherein the controller of the vehicle charger is responsive to at least one signal from a controller remote from the vehicle charger and the vehicle by changing the supply of electric power to the battery, and wherein the at least one signal comprises a signal to start or stop charging the battery of the vehicle.

138. The vehicle charger of claim 95, wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery until the threshold level of battery charge is reached.

139. The vehicle charger of claim 95, wherein the controller transmits a signal to another controller remote from the vehicle charger in the event of power loss to the vehicle charger.

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140. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller; and

a memory coupled to the controller and in which to save a time of day entered by a user;

the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user; and

wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery until the threshold level of battery charge is reached.

141. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller;

a display coupled to the controller; and

a memory accessible by the controller and in which to save a time of day; and

the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day;

the controller operable to display at least two different screens upon the display, at least one of the screens displaying information regarding a charging session, and at least one of the screens displaying settings at least partially defining the manner of operation of the vehicle charger.

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142. A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

a display;

a second controller coupled to the display and operable to change a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day; and

at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller,

wherein the second controller displays an indicator indicating a status of communication between the first and second controllers.

143. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller; and

a display coupled to the controller;

the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day;

the controller operable to display on the display an amount of time remaining to complete charging of the battery.

144. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller; and

a display coupled to the controller;

the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day;

the controller operable to display on the display an amount of power consumed by the battery during the charging session.

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145. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller; and

a display coupled to the controller;

the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day;

the controller operable to display on the display a cost of power supplied to the vehicle charger.

146. A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger comprising:

an electrical power cord releasably attachable to at least one of the vehicle and a source of power;

a controller;

a housing attached to the electrical cord;

a display on the housing, coupled to the controller, and adapted to display a time; and

a user-manipulatable control coupled to the controller and operable by a user to enter a time of day;

the controller changing the supply of electric power to the vehicle battery during the course of the charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon the time of day entered by the user.

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147. A vehicle charger for charging a battery of a vehicle and adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger comprising:

a display;

a user-manipulatable control;

a second controller coupled to the display and operable to change a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging; and

at least one of a transmitter and a receiver coupled to the second controller and adapted for communication with the first controller,

the second controller responsive to at least one signal from the first controller by changing a charging state of the vehicle charger based at least in part upon the time of day entered by the user.

148. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller operable to change a supply of electric power to charge the battery during the course of a charging session by at least one of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, or stopping battery charging based at least in part upon a time of day,

wherein the controller transmits a signal responsive to detection of an interruption of power supply to the vehicle charger.

149. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller;

a vehicle charger battery coupled to the controller; and

an electrical power cord releasably attachable to at least one of the vehicle and the vehicle charger battery to supply power from the vehicle charger battery to the battery of the vehicle,

wherein the controller is operable to change a supply of electric power to the vehicle charger battery during the course of a charging session by at least one of increasing a rate of charge of the vehicle charger battery, decreasing the rate of charge of the vehicle charger

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battery, starting charging of the vehicle charger battery, or stopping charging of the vehicle charger battery based at least in part upon a time of day.

150. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a first core on the vehicle;

a second core in a location stationary with respect to the first core, the second core providing an inductive charge to the first core in at least one position of the first core with respect to the second core;

at least one sensor positioned to detect the position of the first core with respect to the second core;

a display mounted within the vehicle within view of a user seated within the vehicle; and

a controller coupled to the display and responsive to signals from the sensor to display at least one indicator on the display indicating a direction in which the vehicle must move for an improved positional relationship between the first and second cores.

151. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

a controller;

a first electrical connector coupled to the battery and the controller and located on one side of the vehicle; and

a second electrical connector coupled to the battery and the controller and located on a different side of the vehicle,

the first and second electrical connectors both shaped and dimensioned for releasable connection to an electrical power cord supplying power to the vehicle from an external power source.

152. A method of controlling charging of batteries of multiple vehicles each electrically connected to a power generation and distribution system, the method comprising:

establishing communication with a controller associated with a battery charger of each vehicle;

obtaining from each battery charger a time of day by which battery charging for the vehicle associated with the battery charger must be completed; and

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changing power supply to at least some of the battery chargers based at least in part upon the time of day received from the battery chargers.

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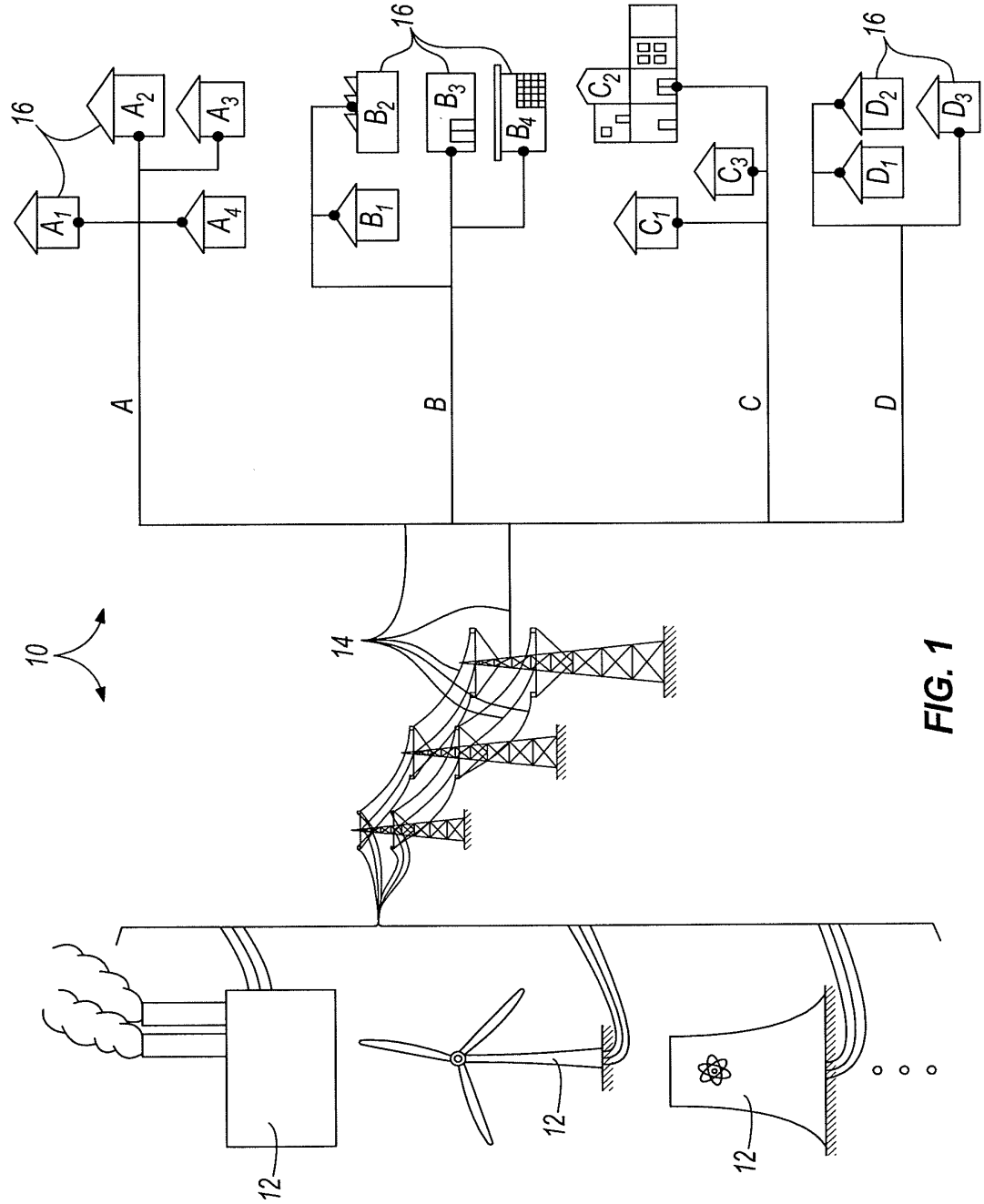


FIG. 1

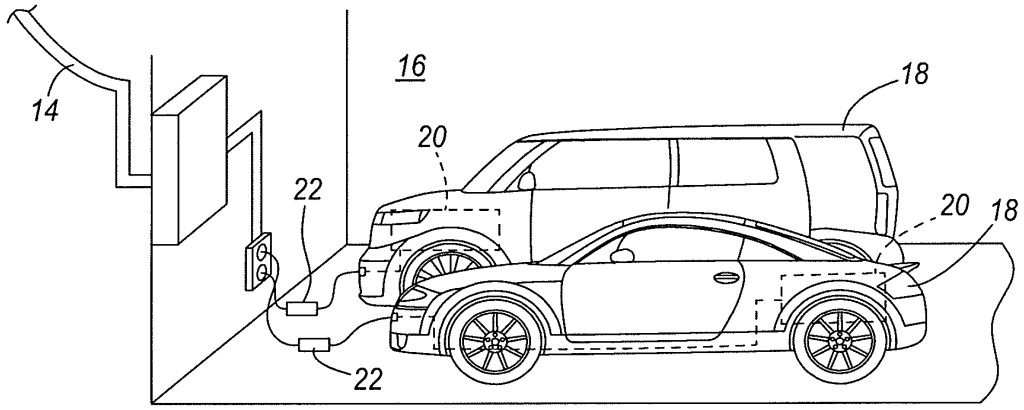


FIG. 2

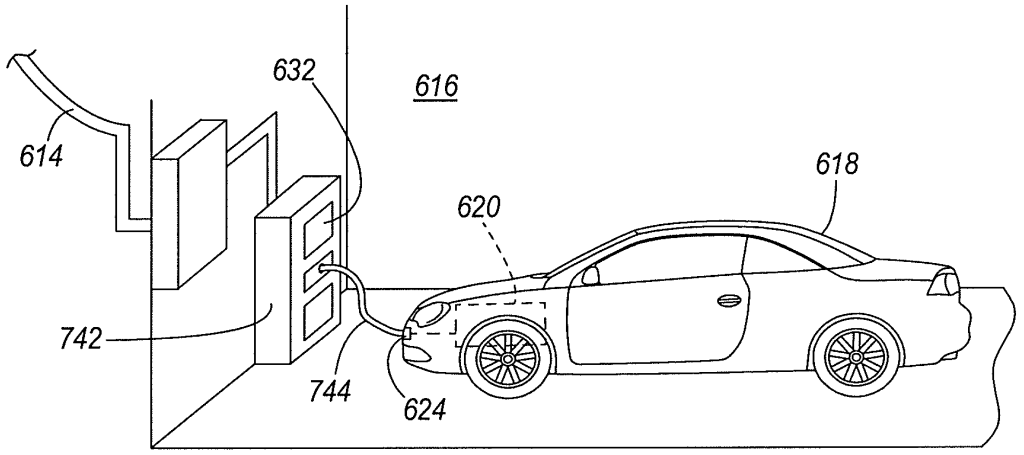


FIG. 3

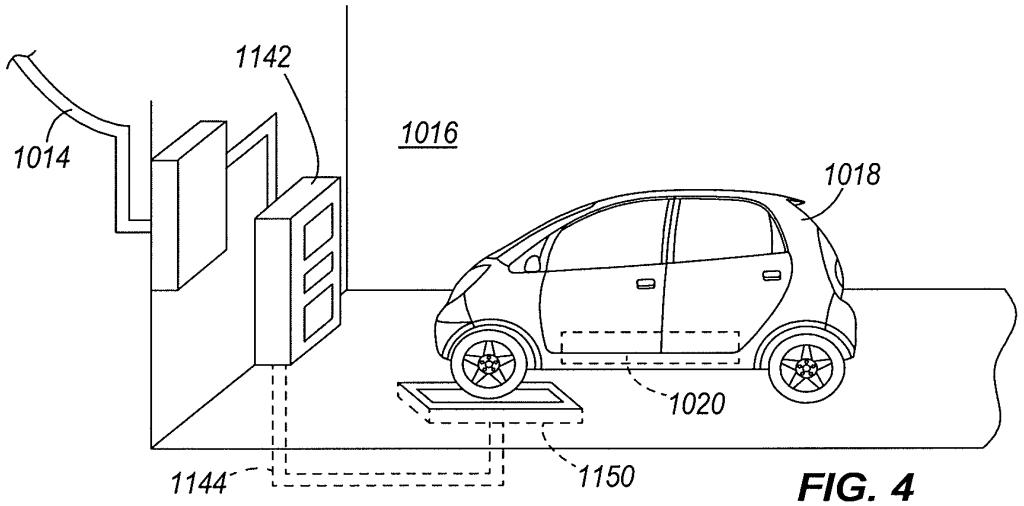


FIG. 4

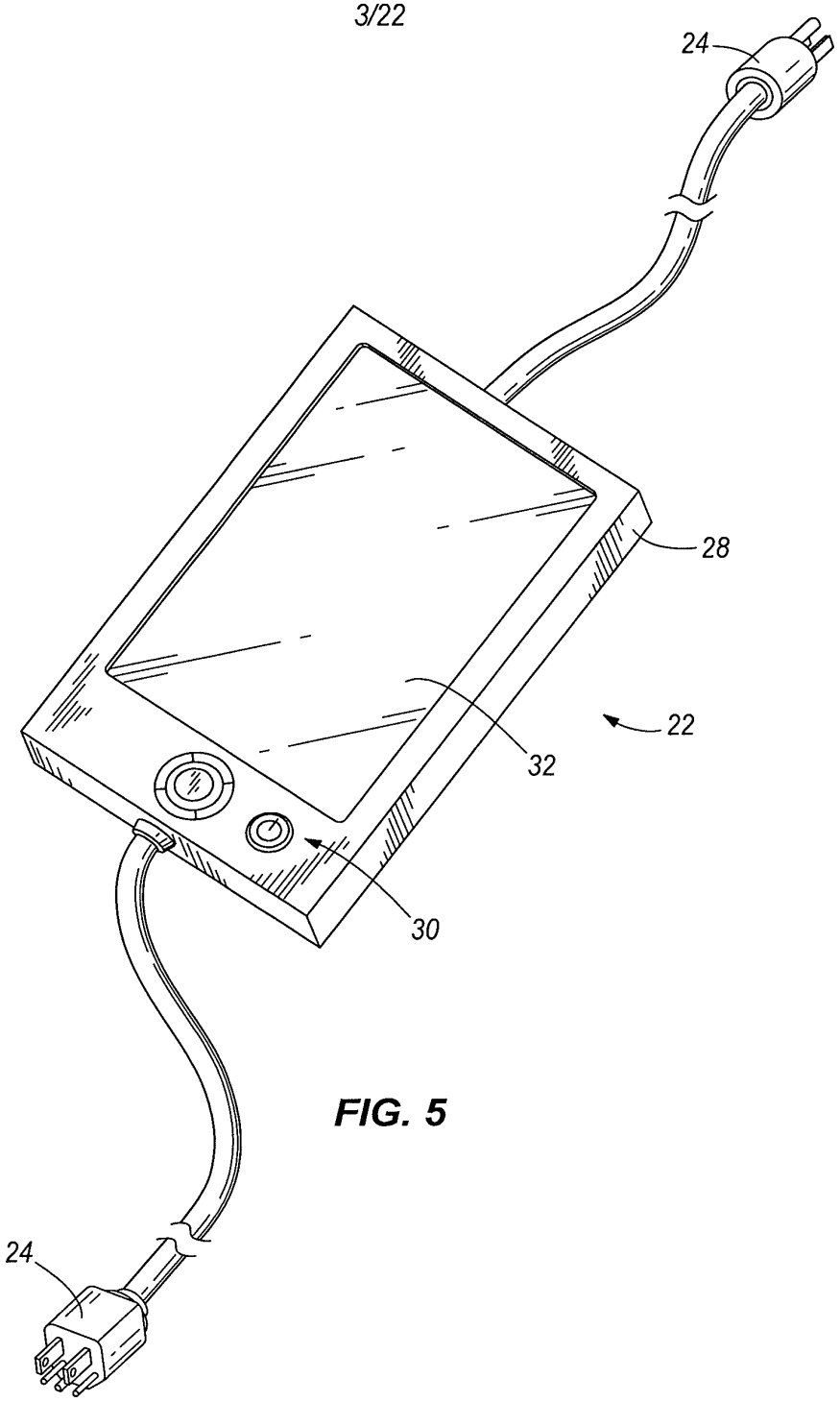


FIG. 5

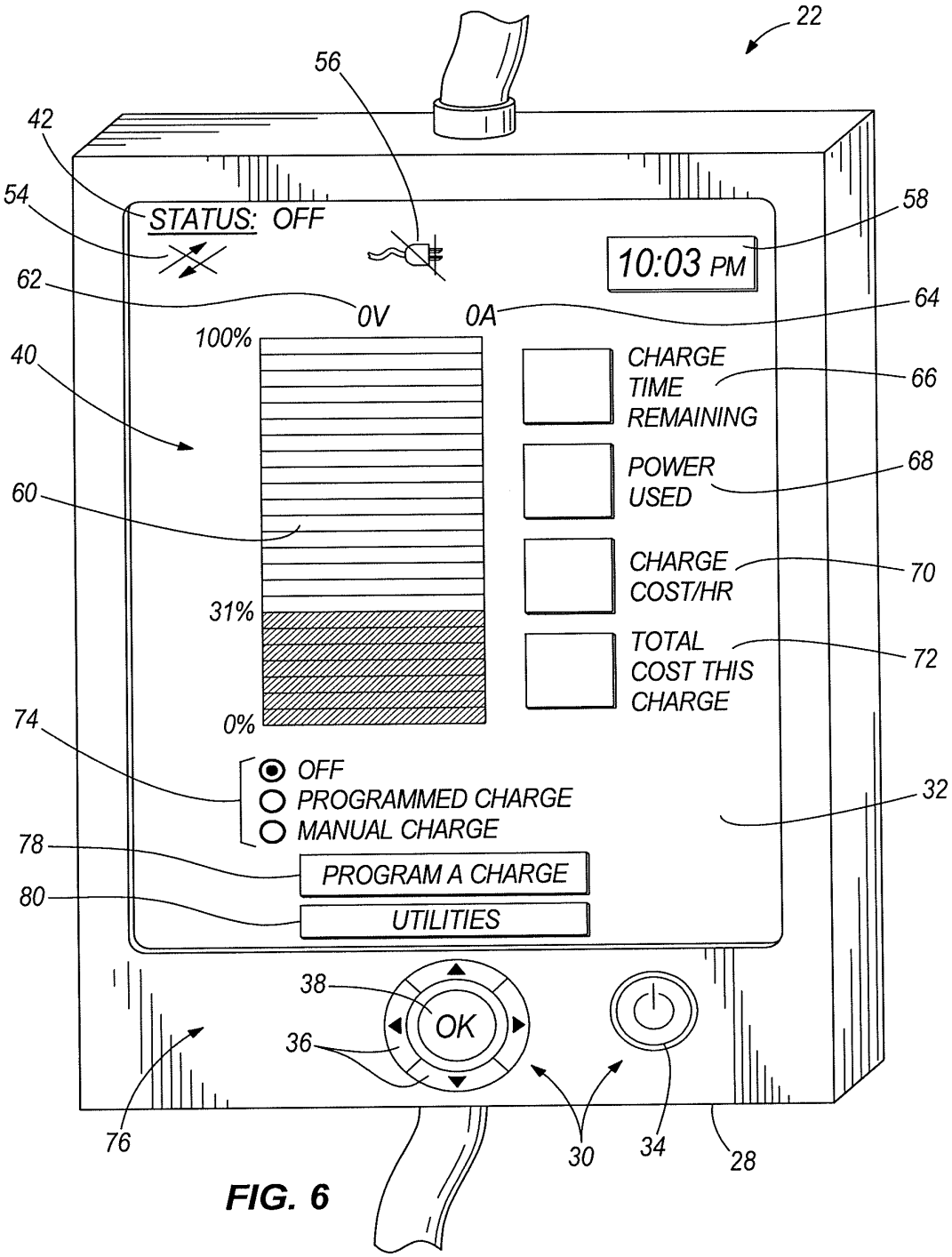

22
56
42
54
STATUS: OFF
58
10:03 PM
62
0V
0A
64
100%
40
CHARGE TIME REMAINING
66
POWER USED
68
60
CHARGE COST/HR
70
31%
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
78
PROGRAM A CHARGE
80
UTILITIES
38
OK
36
76
30
34
28

FIG. 6

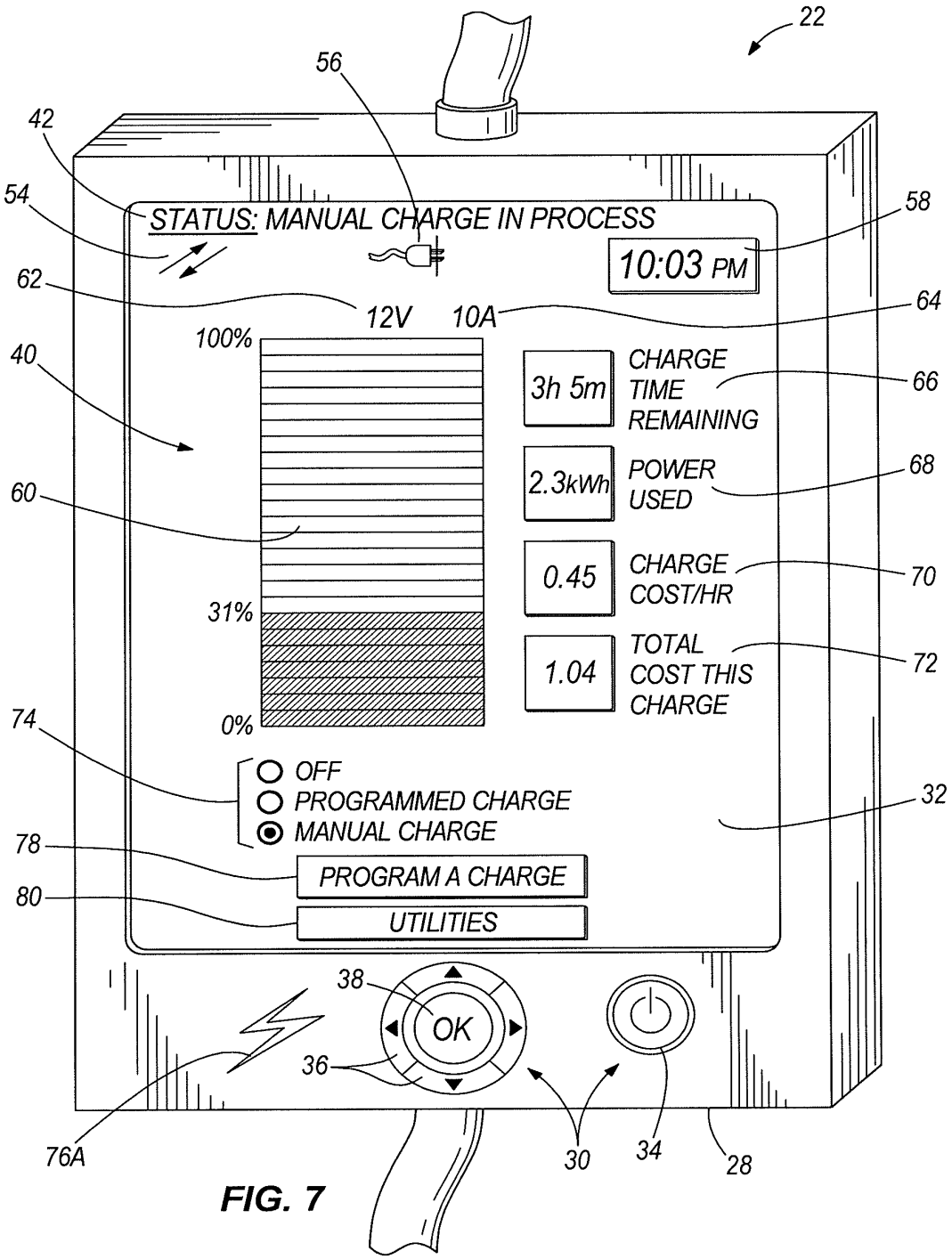

22
56
42
54
STATUS: MANUAL CHARGE IN PROCESS
58
10:03 PM
62
12V
10A
64
100%
40
3h 5m
CHARGE TIME REMAINING
66
2.3kWh
POWER USED
68
60
0.45
CHARGE COST/HR
70
31%
1.04
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
78
PROGRAM A CHARGE
80
UTILITIES
38
OK
36
76A
30
34
28

FIG. 7

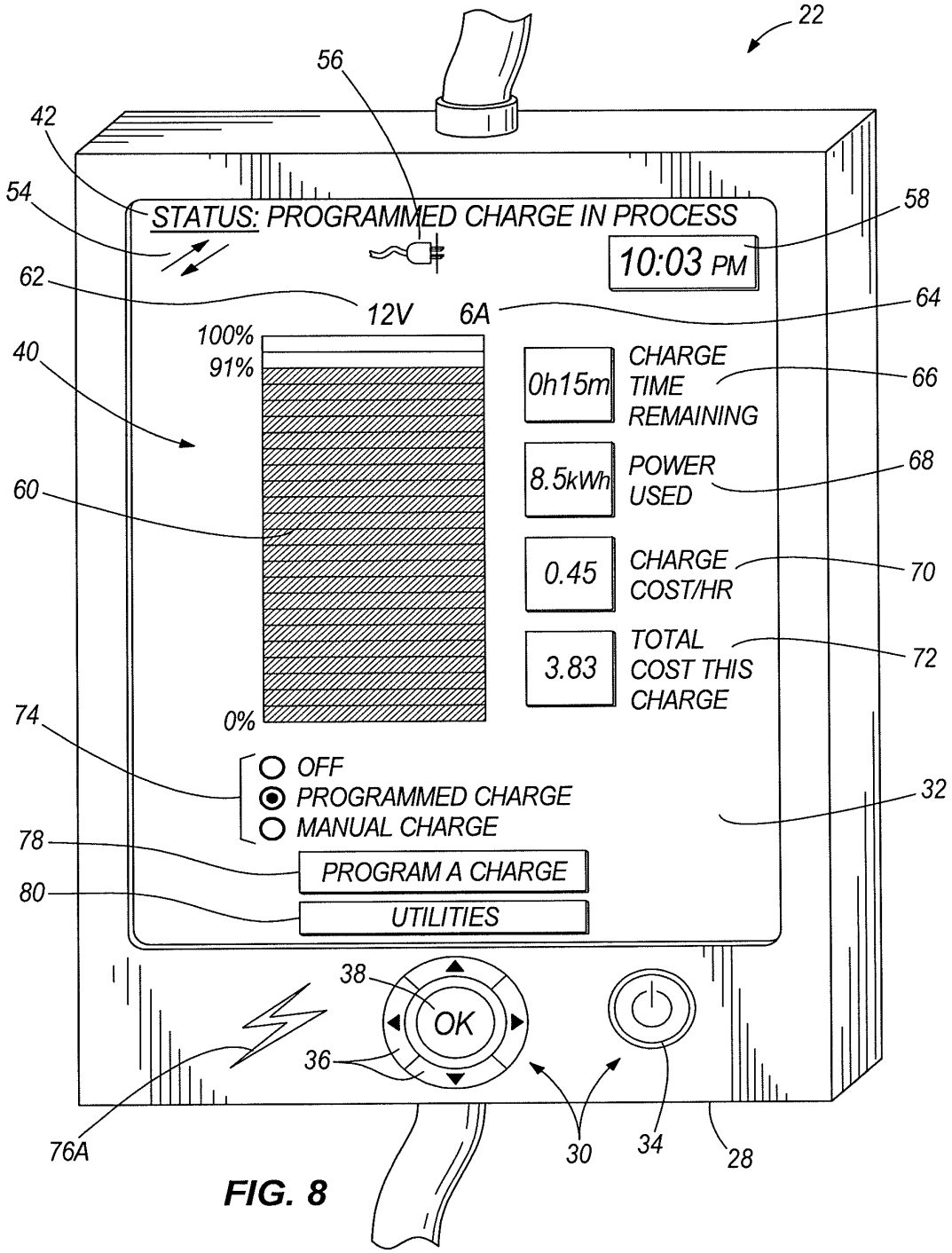

22
56
42
54
STATUS: PROGRAMMED CHARGE IN PROCESS
58
10:03 PM
62
12V
6A
64
100%
91%
40
0h15m
CHARGE TIME REMAINING
66
8.5kWh
POWER USED
68
60
0.45
CHARGE COST/HR
70
3.83
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
78
PROGRAM A CHARGE
80
UTILITIES
38
OK
36
76A
30
34
28

FIG. 8

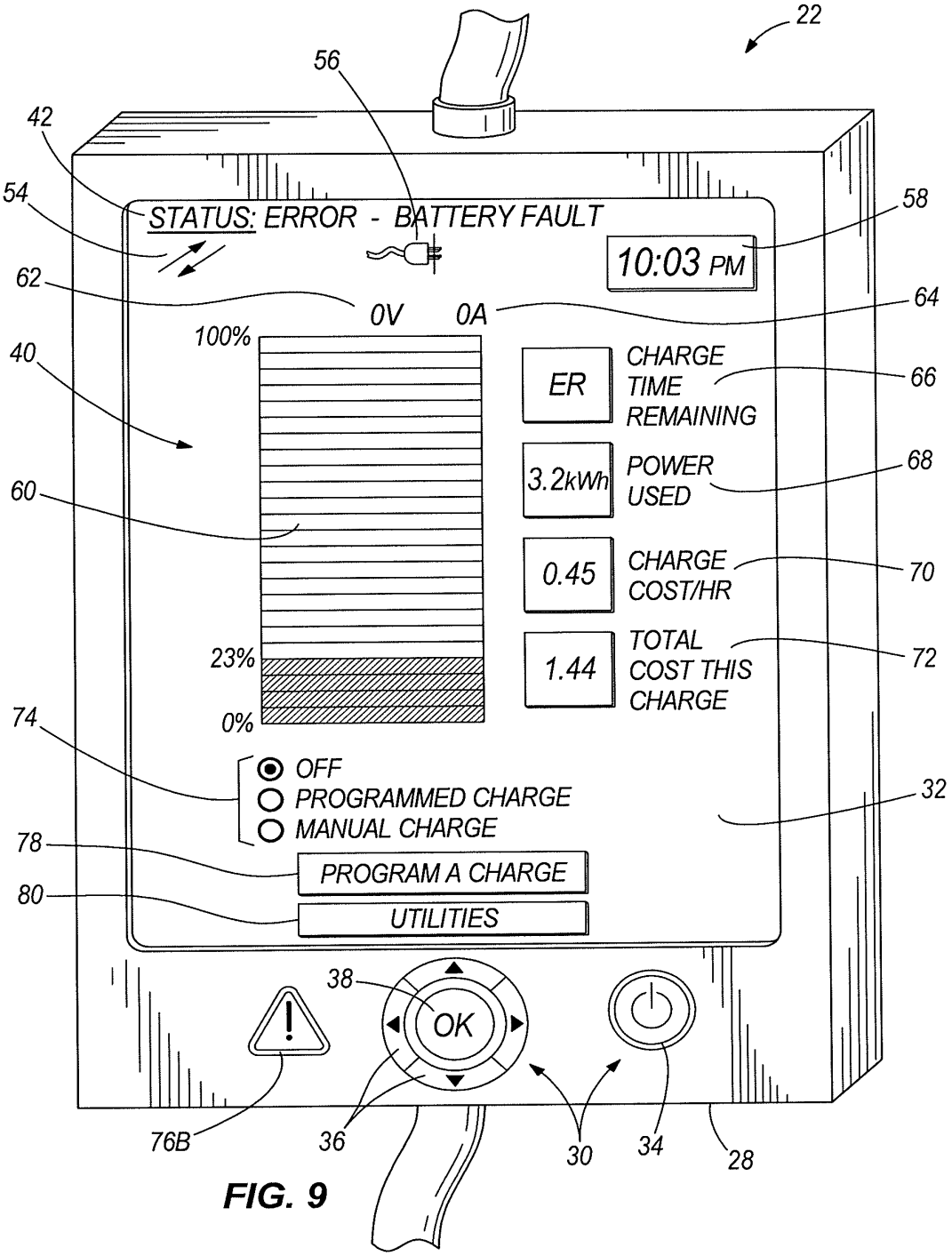

22
56
42
54
STATUS: ERROR - BATTERY FAULT
58
10:03 PM
62
0V
0A
64
100%
40
ER
CHARGE TIME REMAINING
66
3.2kWh
POWER USED
68
60
0.45
CHARGE COST/HR
70
23%
1.44
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
78
PROGRAM A CHARGE
80
UTILITIES
38
OK
76B
36
30
34
28

FIG. 9

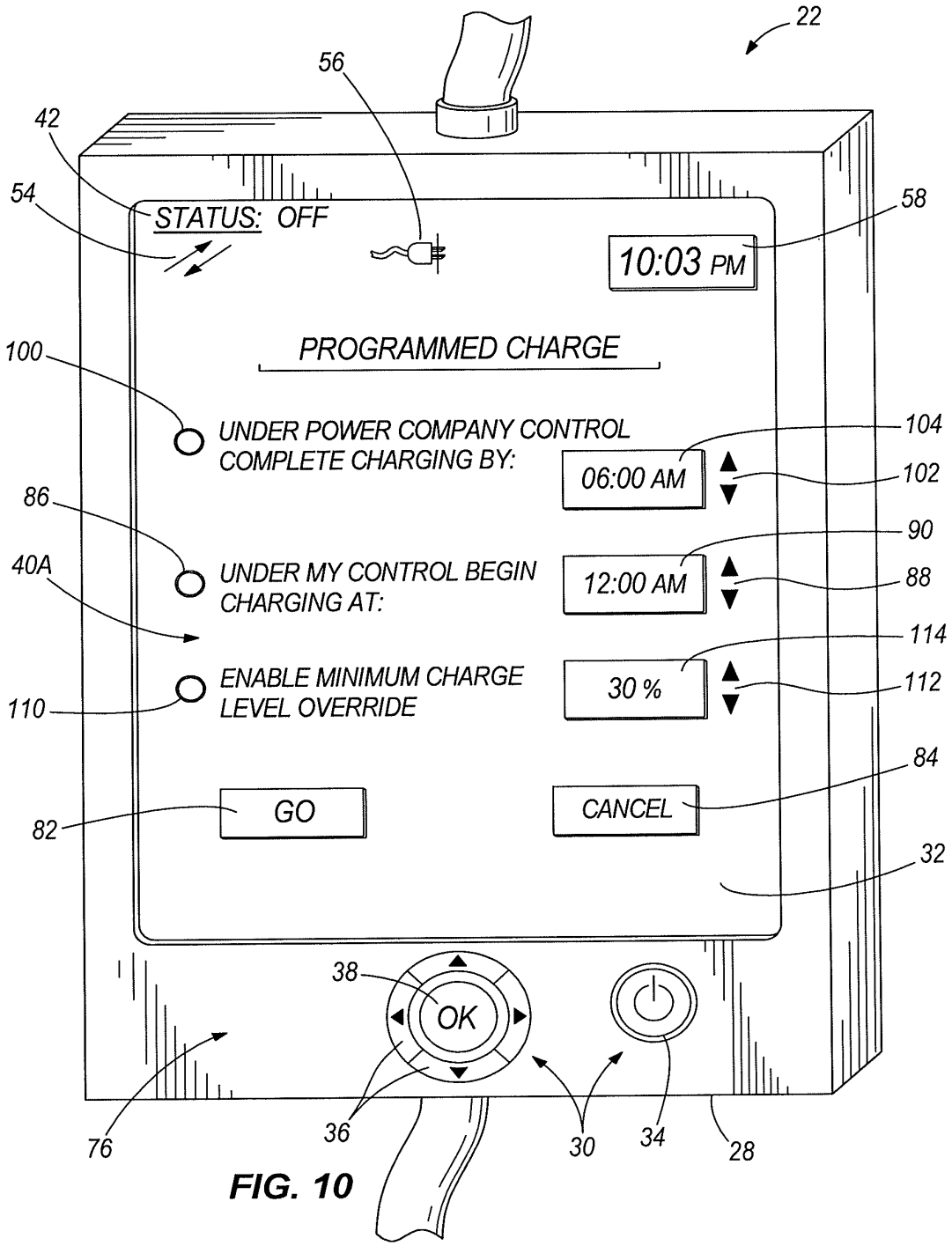

22
56
42
54
STATUS: OFF
58
10:03 PM
PROGRAMMED CHARGE
100
UNDER POWER COMPANY CONTROL
COMPLETE CHARGING BY:
104
06:00 AM
102
86
UNDER MY CONTROL BEGIN
CHARGING AT:
90
40A
12:00 AM
88
114
ENABLE MINIMUM CHARGE
LEVEL OVERRIDE
110
30 %
112
84
GO
82
CANCEL
32
38
OK
76
36
30
34
28

FIG. 10

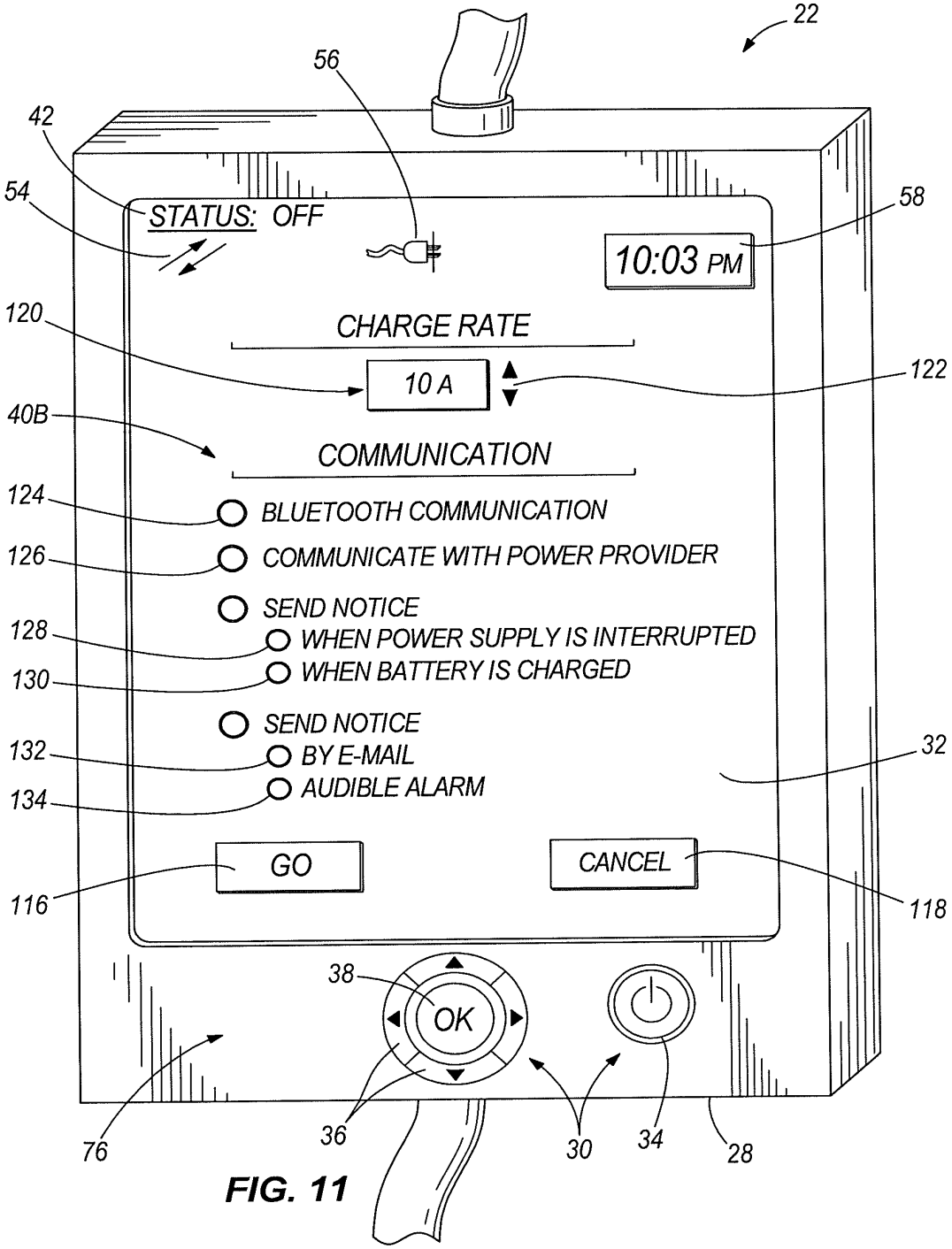

22
56
42
54
STATUS: OFF
58
10:03 PM
120
CHARGE RATE
10 A
122
40B
COMMUNICATION
124
BLUETOOTH COMMUNICATION
126
COMMUNICATE WITH POWER PROVIDER
SEND NOTICE
128
WHEN POWER SUPPLY IS INTERRUPTED
130
WHEN BATTERY IS CHARGED
SEND NOTICE
132
BY E-MAIL
134
AUDIBLE ALARM
32
GO
CANCEL
116
118
38
OK
76
36
30
34
28

FIG. 11

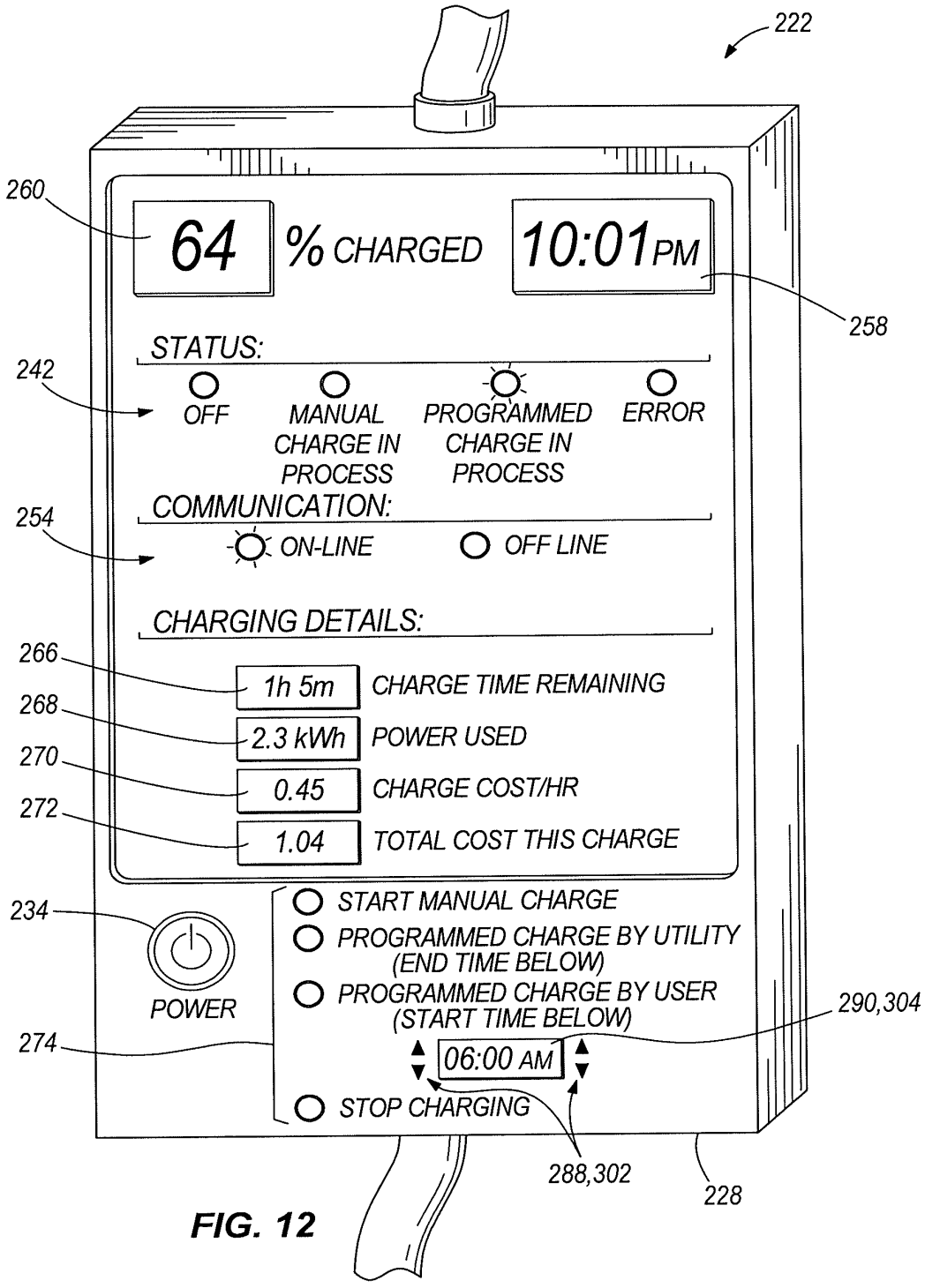

222
260
64
% CHARGED
10:01 PM
258
STATUS:
242
OFF
MANUAL CHARGE IN PROCESS
PROGRAMMED CHARGE IN PROCESS
ERROR
COMMUNICATION:
254
ON-LINE
OFF LINE
CHARGING DETAILS:
266
1h 5m
CHARGE TIME REMAINING
268
2.3 kWh
POWER USED
270
0.45
CHARGE COST/HR
272
1.04
TOTAL COST THIS CHARGE
234
POWER
START MANUAL CHARGE
PROGRAMMED CHARGE BY UTILITY (END TIME BELOW)
PROGRAMMED CHARGE BY USER (START TIME BELOW)
290,304
274
06:00 AM
STOP CHARGING
288,302
228

FIG. 12

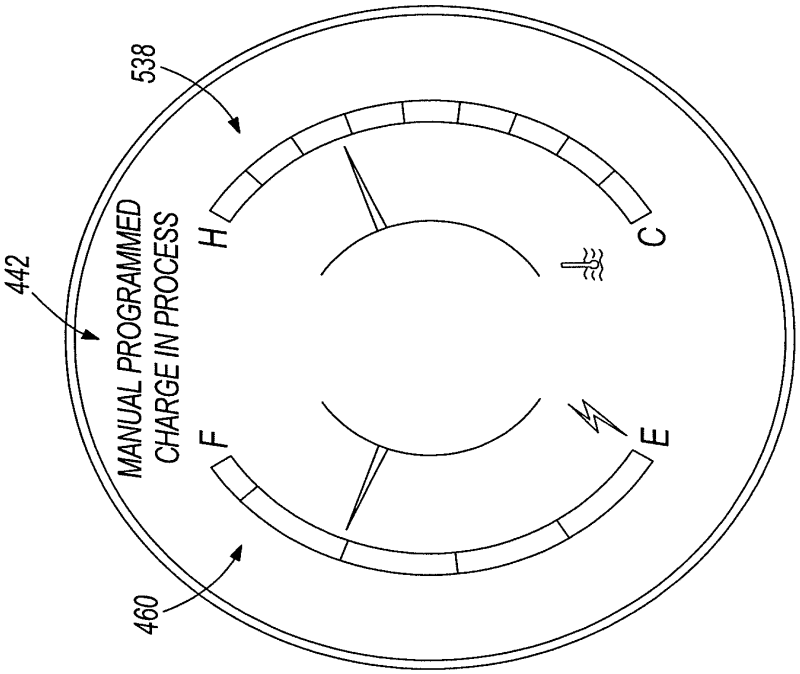

442
MANUAL PROGRAMMED
CHARGE IN PROCESS
538
H
C
F
E
460

FIG. 13

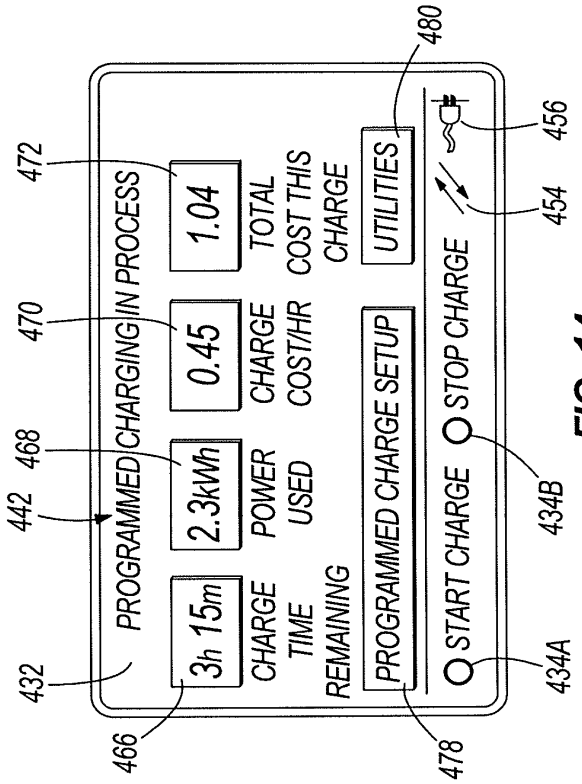

480
456
454
472
470
468
442
432
466
478
434B
434A
PROGRAMMED CHARGING IN PROCESS
3h 15m
2.3kWh
0.45
1.04
CHARGE TIME REMAINING
POWER USED
CHARGE COST/HR
TOTAL COST THIS CHARGE
UTILITIES
PROGRAMMED CHARGE SETUP
START CHARGE
STOP CHARGE

FIG. 14

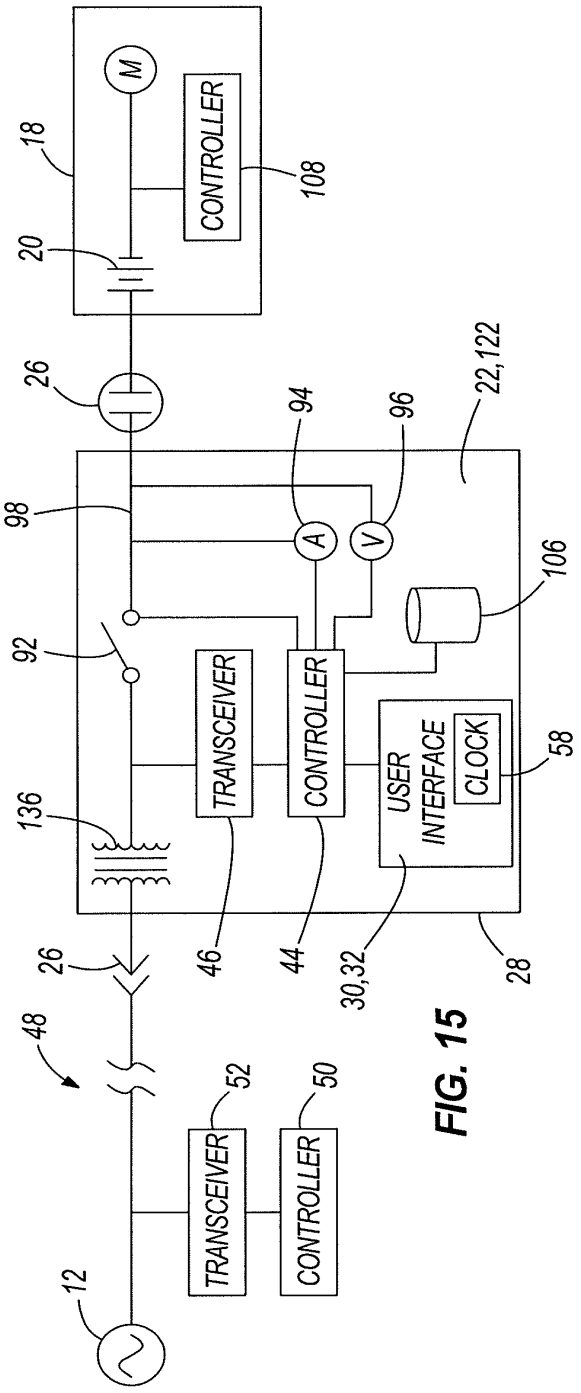

M
CONTROLLER
18
20
108
26
94
96
22,122
98
A
V
106
92
TRANSCEIVER
CONTROLLER
USER INTERFACE
CLOCK
58
136
46
44
30,32
28
26
48
52
50
TRANSCEIVER
CONTROLLER
12

FIG. 15

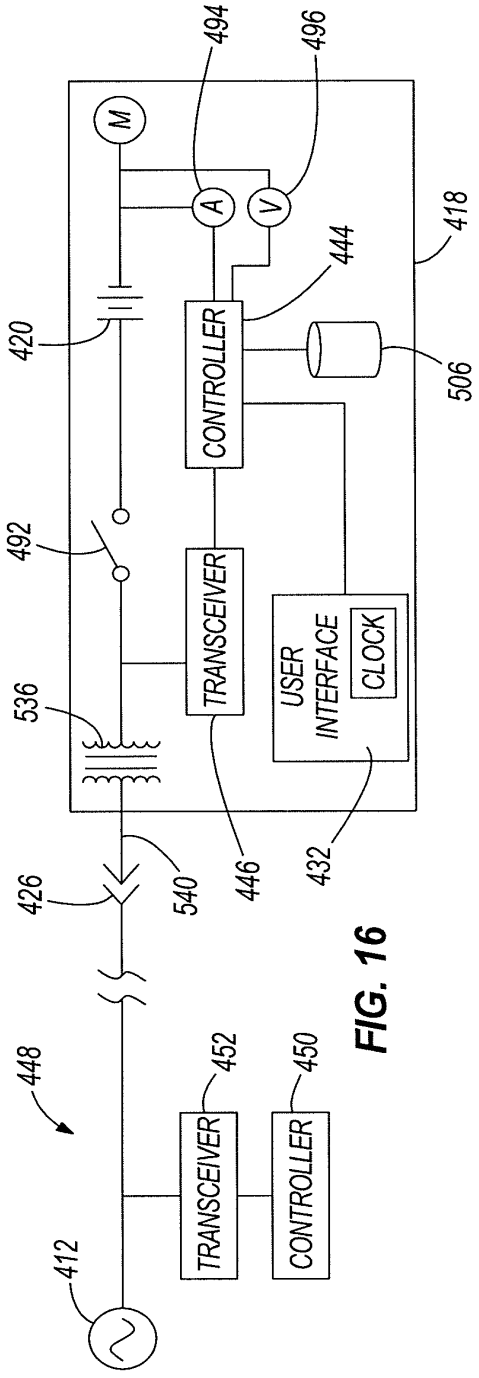

M
494
496
A
V
418
420
444
CONTROLLER
506
492
TRANSCEIVER
USER INTERFACE
CLOCK
536
426
540
446
432
448
452
450
TRANSCEIVER
CONTROLLER
412

FIG. 16

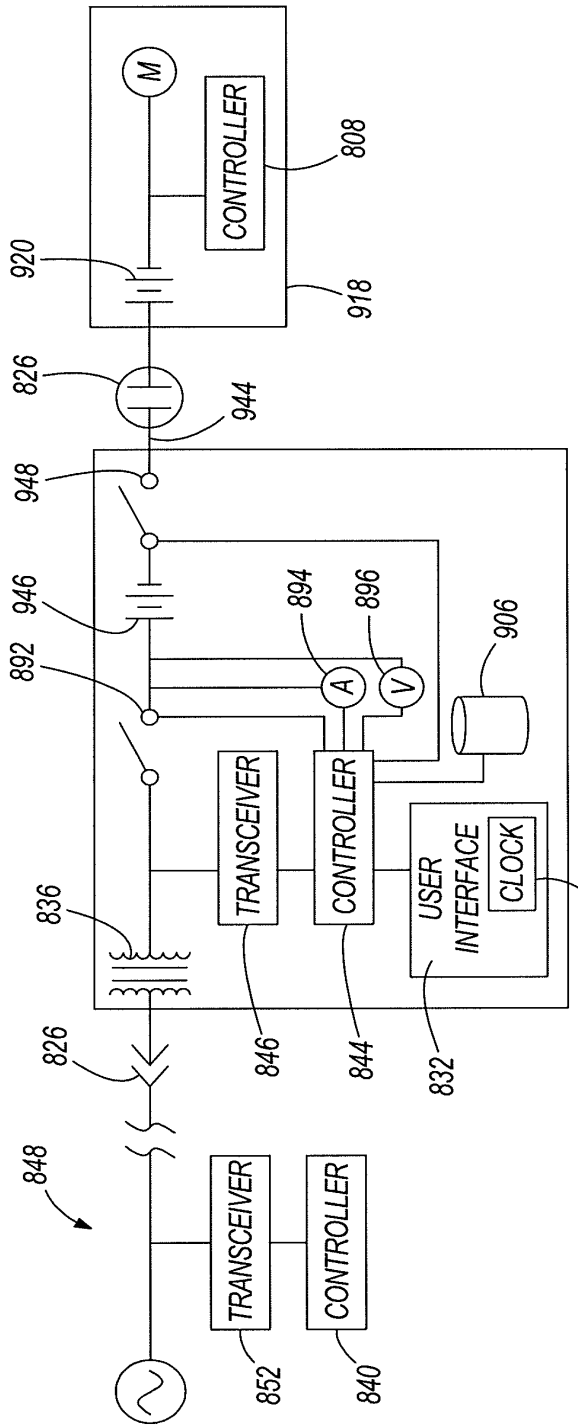

M
CONTROLLER
808
920
918
826
944
948
946
894
896
906
892
A
V
TRANSCEIVER
CONTROLLER
USER INTERFACE
CLOCK
858
836
826
846
844
832
848
TRANSCEIVER
CONTROLLER
852
840

FIG. 17

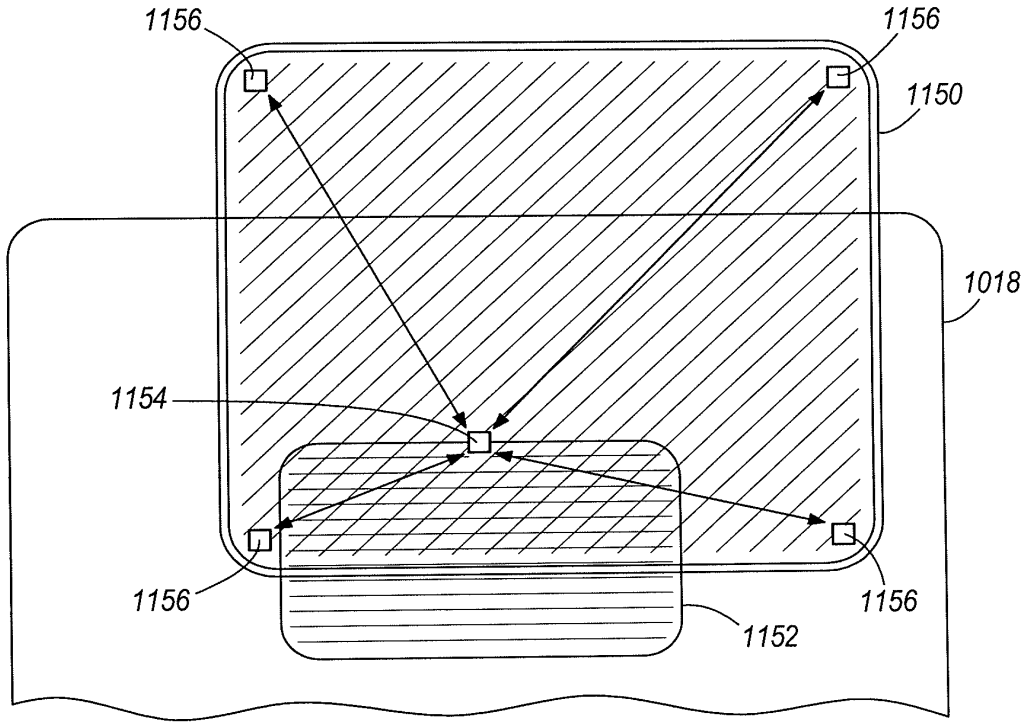

1156
1156
1150
1018
1154
1156
1156
1152

FIG. 18

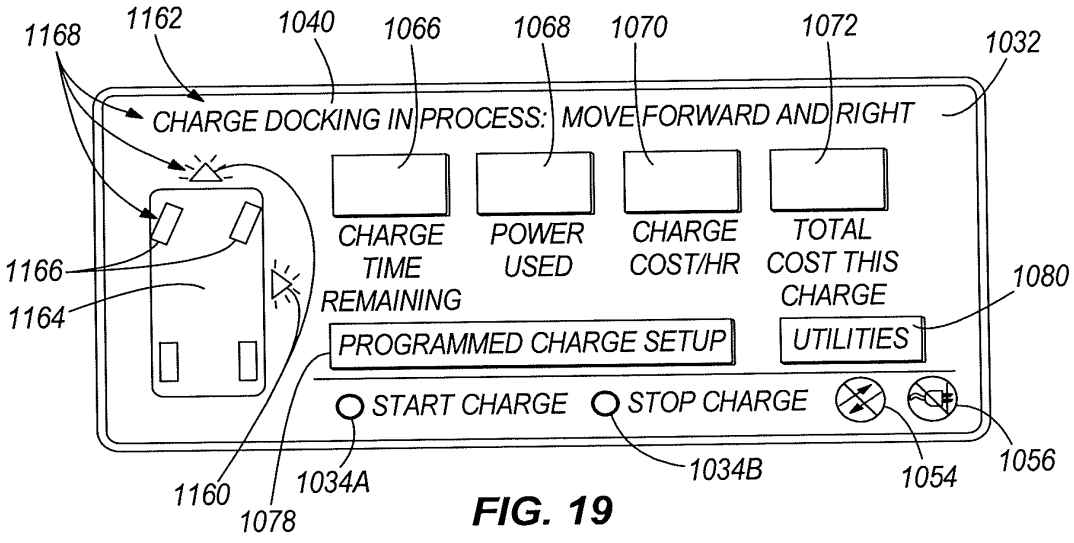

1168
1162
1040
1066
1068
1070
1072
1032
CHARGE DOCKING IN PROCESS: MOVE FORWARD AND RIGHT
CHARGE TIME REMAINING
POWER USED
CHARGE COST/HR
TOTAL COST THIS CHARGE
1166
1164
1080
PROGRAMMED CHARGE SETUP
UTILITIES
START CHARGE
STOP CHARGE
1160
1078
1034A
1034B
1054
1056

FIG. 19

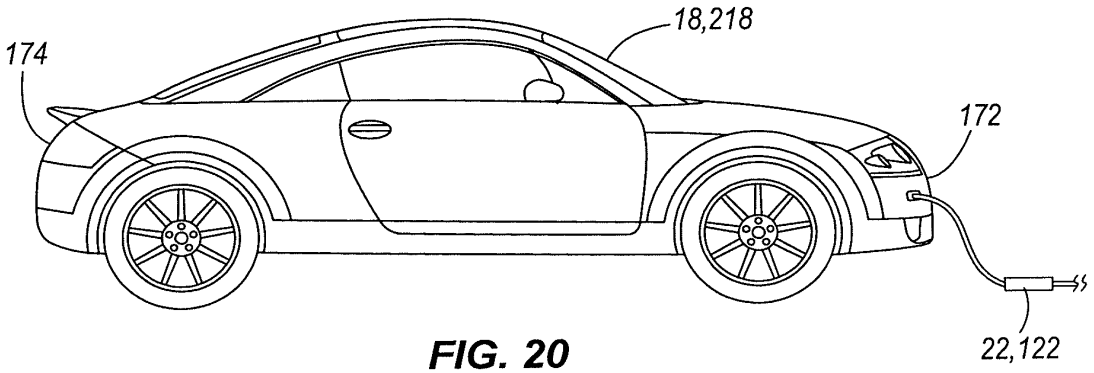


FIG. 20

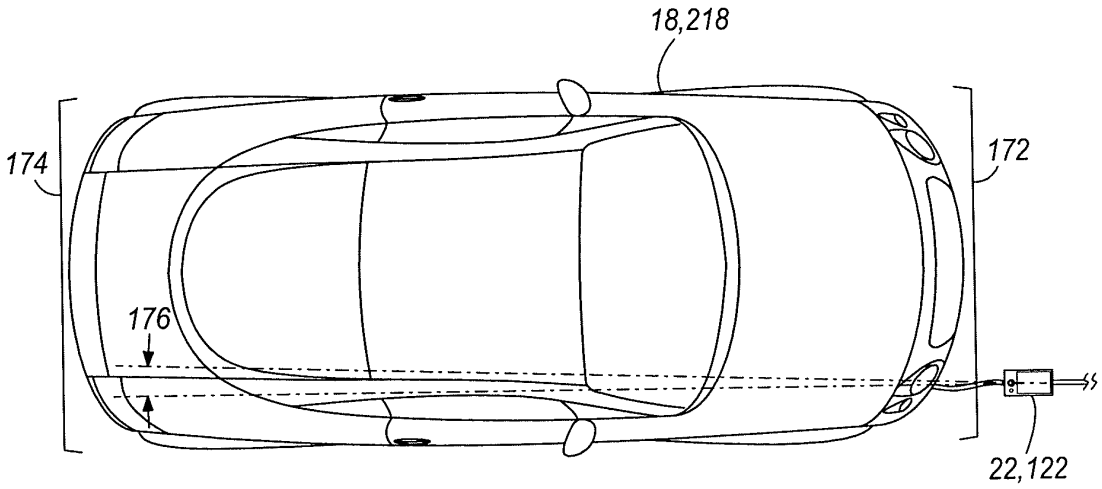


FIG. 21

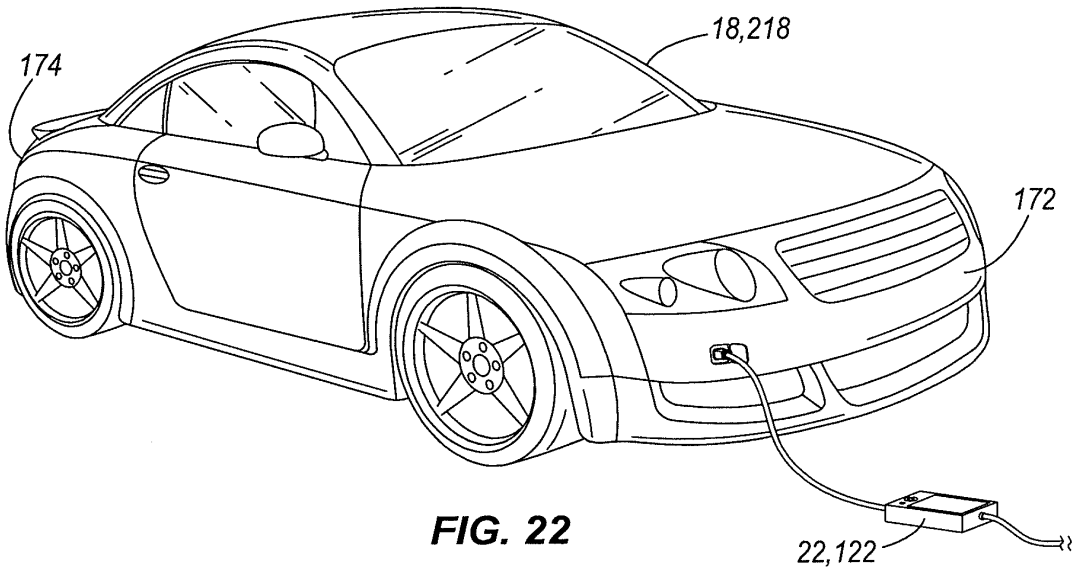


FIG. 22

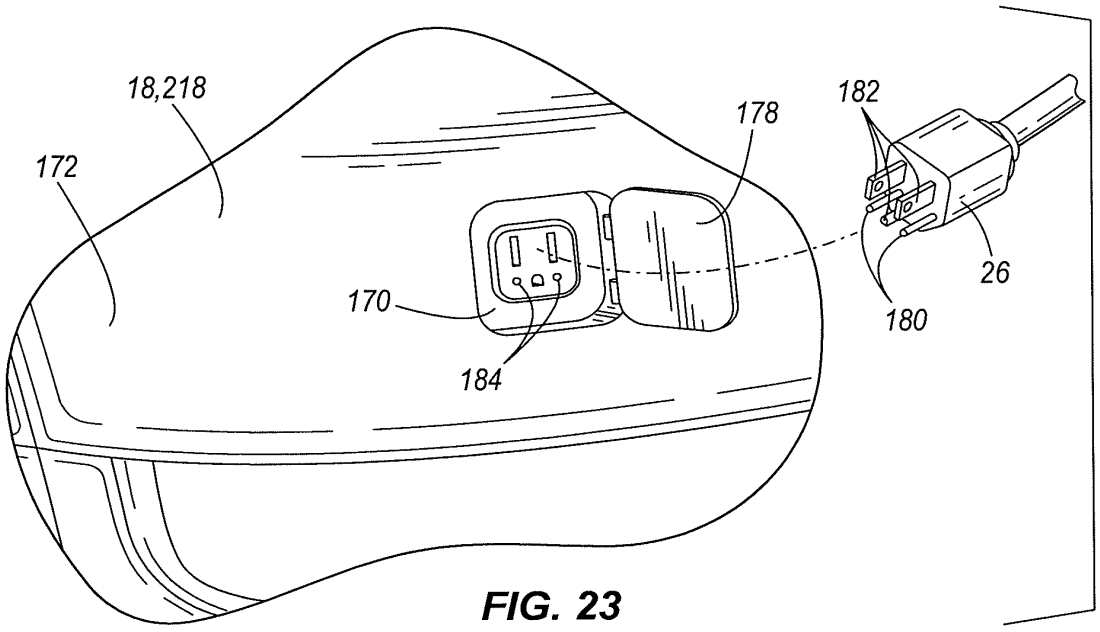


FIG. 23

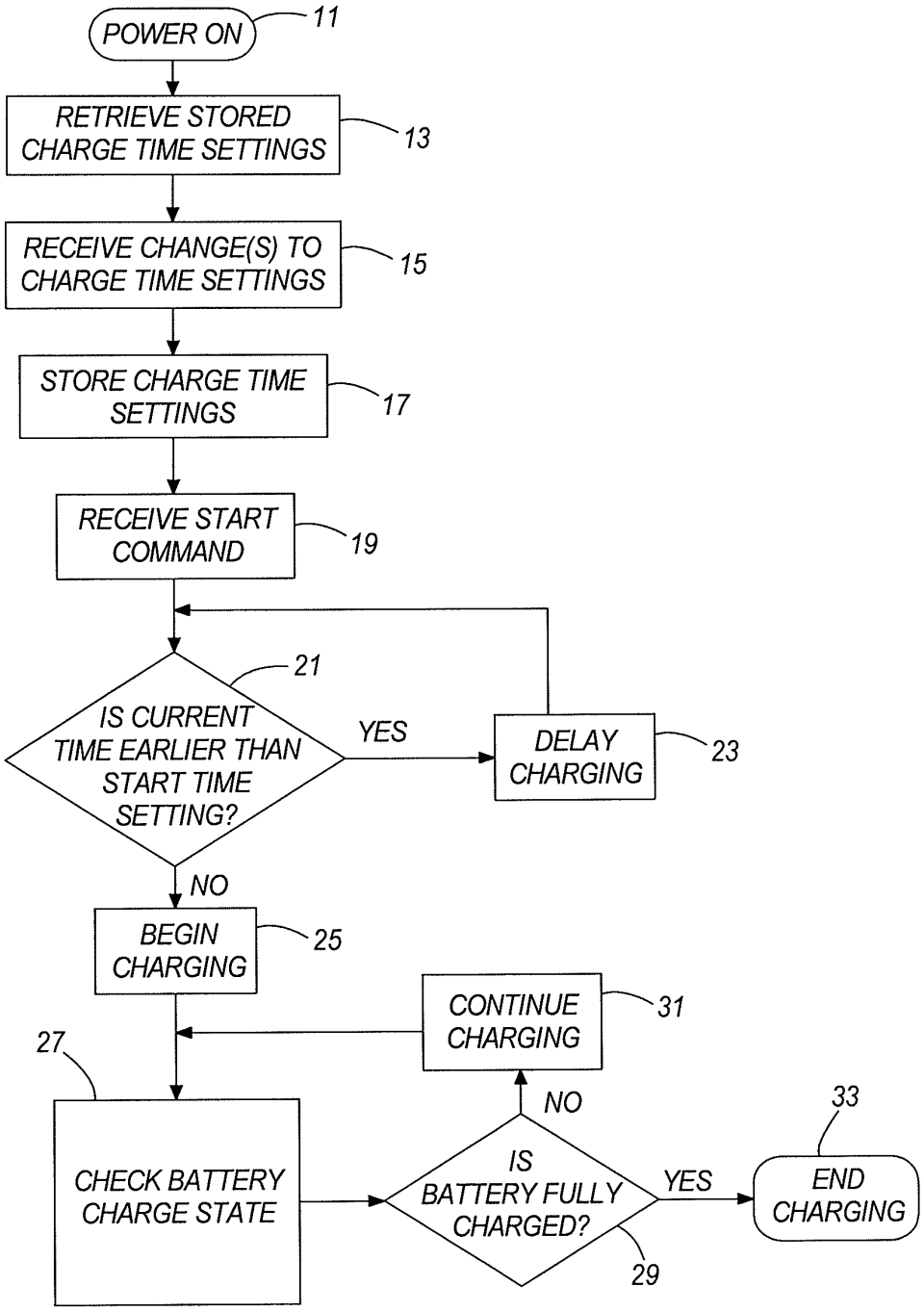

POWER ON
11
RETRIEVE STORED CHARGE TIME SETTINGS
13
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
15
STORE CHARGE TIME SETTINGS
17
RECEIVE START COMMAND
19
21
IS CURRENT TIME EARLIER THAN START TIME SETTING?
YES
DELAY CHARGING
23
NO
BEGIN CHARGING
25
CONTINUE CHARGING
31
27
CHECK BATTERY CHARGE STATE
NO
IS BATTERY FULLY CHARGED?
29
YES
33
END CHARGING

FIG. 24

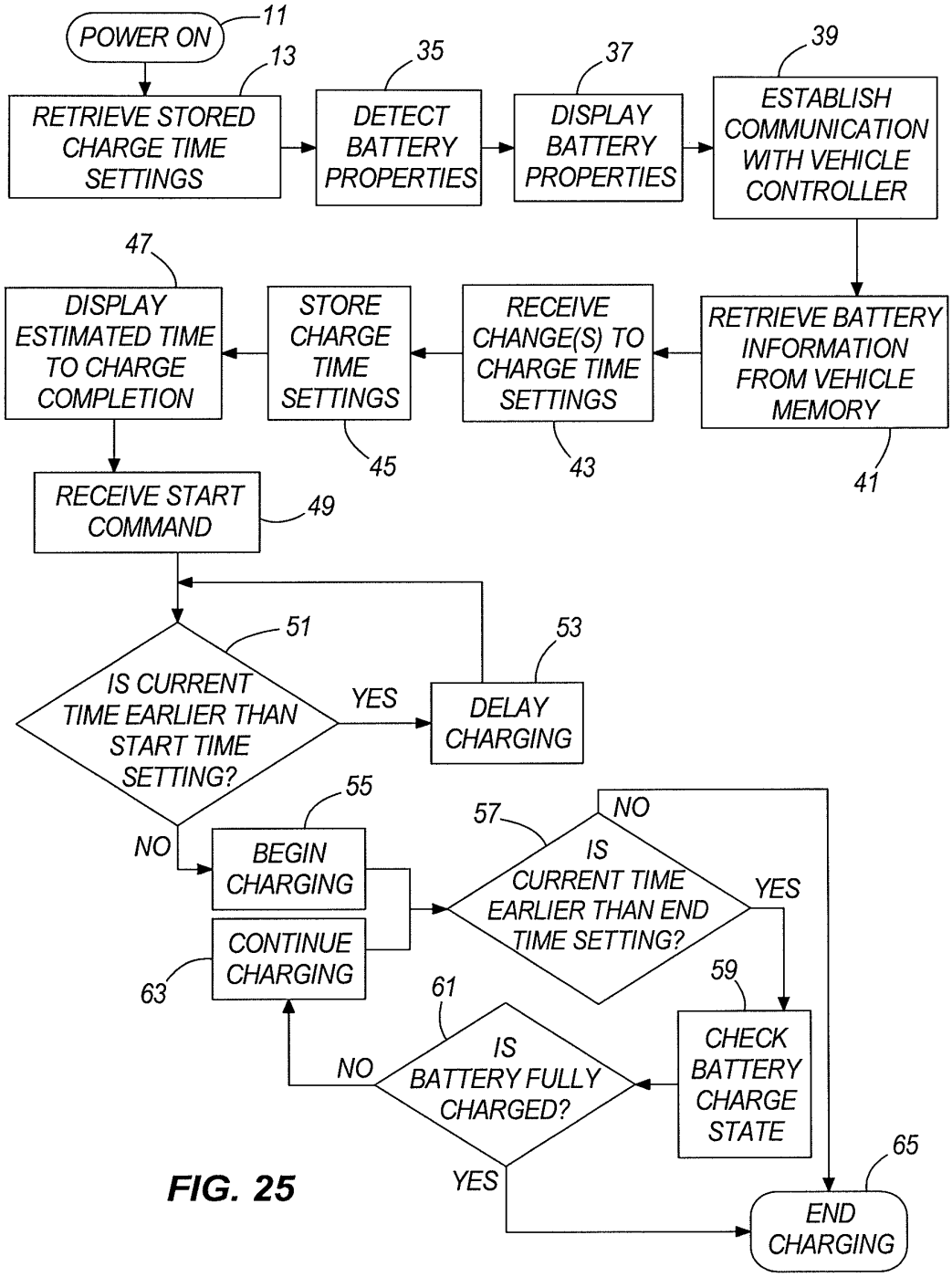

POWER ON
11
RETRIEVE STORED CHARGE TIME SETTINGS
13
DETECT BATTERY PROPERTIES
35
DISPLAY BATTERY PROPERTIES
37
ESTABLISH COMMUNICATION WITH VEHICLE CONTROLLER
39
RETRIEVE BATTERY INFORMATION FROM VEHICLE MEMORY
41
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
43
STORE CHARGE TIME SETTINGS
45
DISPLAY ESTIMATED TIME TO CHARGE COMPLETION
47
RECEIVE START COMMAND
49
IS CURRENT TIME EARLIER THAN START TIME SETTING?
51
YES
DELAY CHARGING
53
NO
BEGIN CHARGING
55
CONTINUE CHARGING
63
IS CURRENT TIME EARLIER THAN END TIME SETTING?
57
NO
YES
CHECK BATTERY CHARGE STATE
59
IS BATTERY FULLY CHARGED?
61
NO
YES
END CHARGING
65

FIG. 25

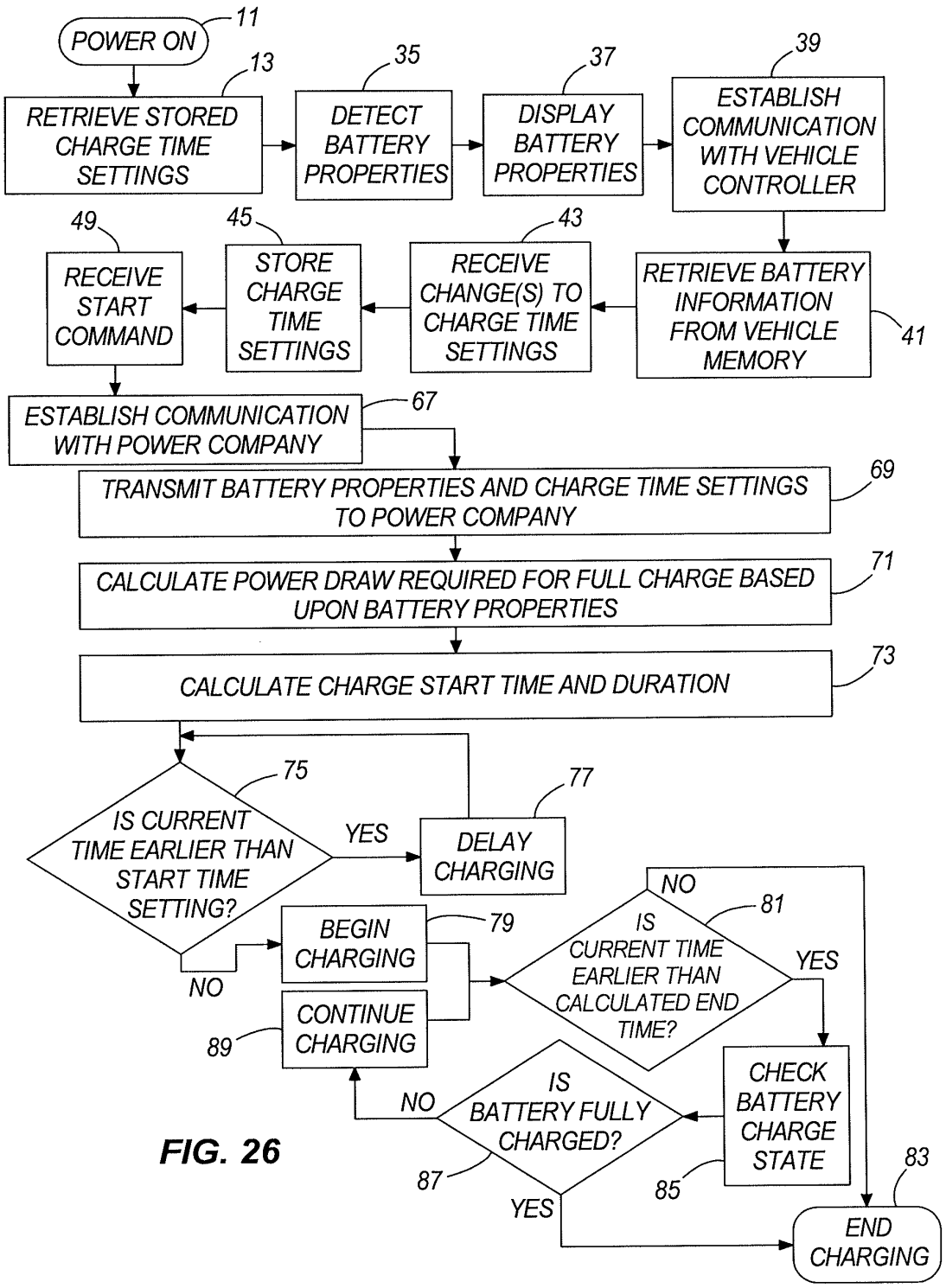

POWER ON
11
RETRIEVE STORED CHARGE TIME SETTINGS
13
DETECT BATTERY PROPERTIES
35
DISPLAY BATTERY PROPERTIES
37
ESTABLISH COMMUNICATION WITH VEHICLE CONTROLLER
39
RETRIEVE BATTERY INFORMATION FROM VEHICLE MEMORY
41
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
43
STORE CHARGE TIME SETTINGS
45
RECEIVE START COMMAND
49
ESTABLISH COMMUNICATION WITH POWER COMPANY
67
TRANSMIT BATTERY PROPERTIES AND CHARGE TIME SETTINGS TO POWER COMPANY
69
CALCULATE POWER DRAW REQUIRED FOR FULL CHARGE BASED UPON BATTERY PROPERTIES
71
CALCULATE CHARGE START TIME AND DURATION
73
IS CURRENT TIME EARLIER THAN START TIME SETTING?
75
YES
DELAY CHARGING
77
NO
BEGIN CHARGING
79
CONTINUE CHARGING
89
IS CURRENT TIME EARLIER THAN CALCULATED END TIME?
81
NO
YES
IS BATTERY FULLY CHARGED?
87
NO
YES
CHECK BATTERY CHARGE STATE
85
END CHARGING
83

FIG. 26

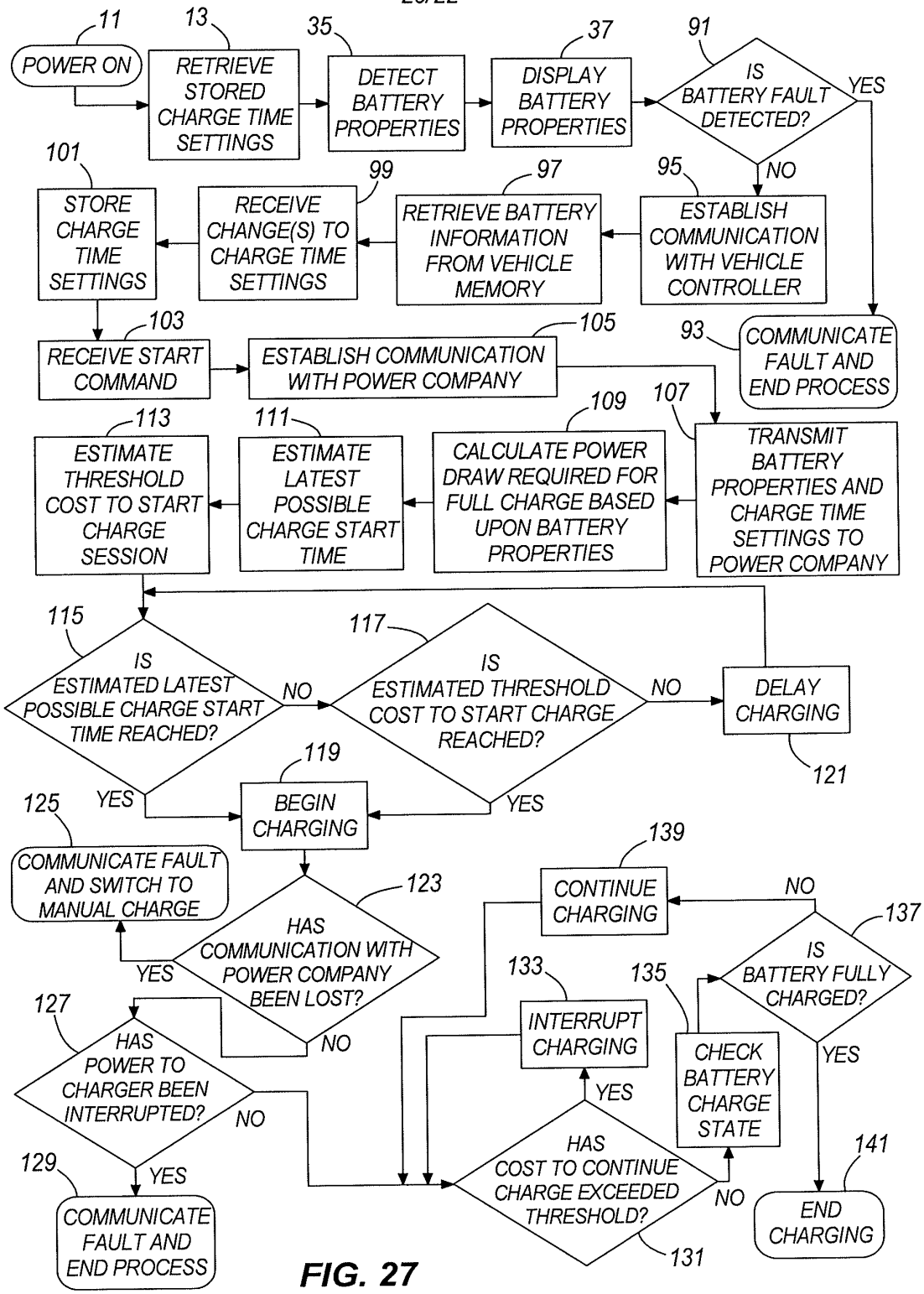

11
POWER ON
13
RETRIEVE STORED CHARGE TIME SETTINGS
35
DETECT BATTERY PROPERTIES
37
DISPLAY BATTERY PROPERTIES
91
IS BATTERY FAULT DETECTED?
YES
NO
95
ESTABLISH COMMUNICATION WITH VEHICLE CONTROLLER
97
RETRIEVE BATTERY INFORMATION FROM VEHICLE MEMORY
99
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
101
STORE CHARGE TIME SETTINGS
93
COMMUNICATE FAULT AND END PROCESS
103
RECEIVE START COMMAND
105
ESTABLISH COMMUNICATION WITH POWER COMPANY
107
TRANSMIT BATTERY PROPERTIES AND CHARGE TIME SETTINGS TO POWER COMPANY
109
CALCULATE POWER DRAW REQUIRED FOR FULL CHARGE BASED UPON BATTERY PROPERTIES
111
ESTIMATE LATEST POSSIBLE CHARGE START TIME
113
ESTIMATE THRESHOLD COST TO START CHARGE SESSION
115
IS ESTIMATED LATEST POSSIBLE CHARGE START TIME REACHED?
NO
YES
117
IS ESTIMATED THRESHOLD COST TO START CHARGE REACHED?
NO
YES
DELAY CHARGING
121
119
BEGIN CHARGING
125
COMMUNICATE FAULT AND SWITCH TO MANUAL CHARGE
123
HAS COMMUNICATION WITH POWER COMPANY BEEN LOST?
YES
NO
127
HAS POWER TO CHARGER BEEN INTERRUPTED?
NO
YES
129
COMMUNICATE FAULT AND END PROCESS
139
CONTINUE CHARGING
NO
137
IS BATTERY FULLY CHARGED?
YES
133
INTERRUPT CHARGING
135
CHECK BATTERY CHARGE STATE
YES
HAS COST TO CONTINUE CHARGE EXCEEDED THRESHOLD?
NO
131
141
END CHARGING

FIG. 27

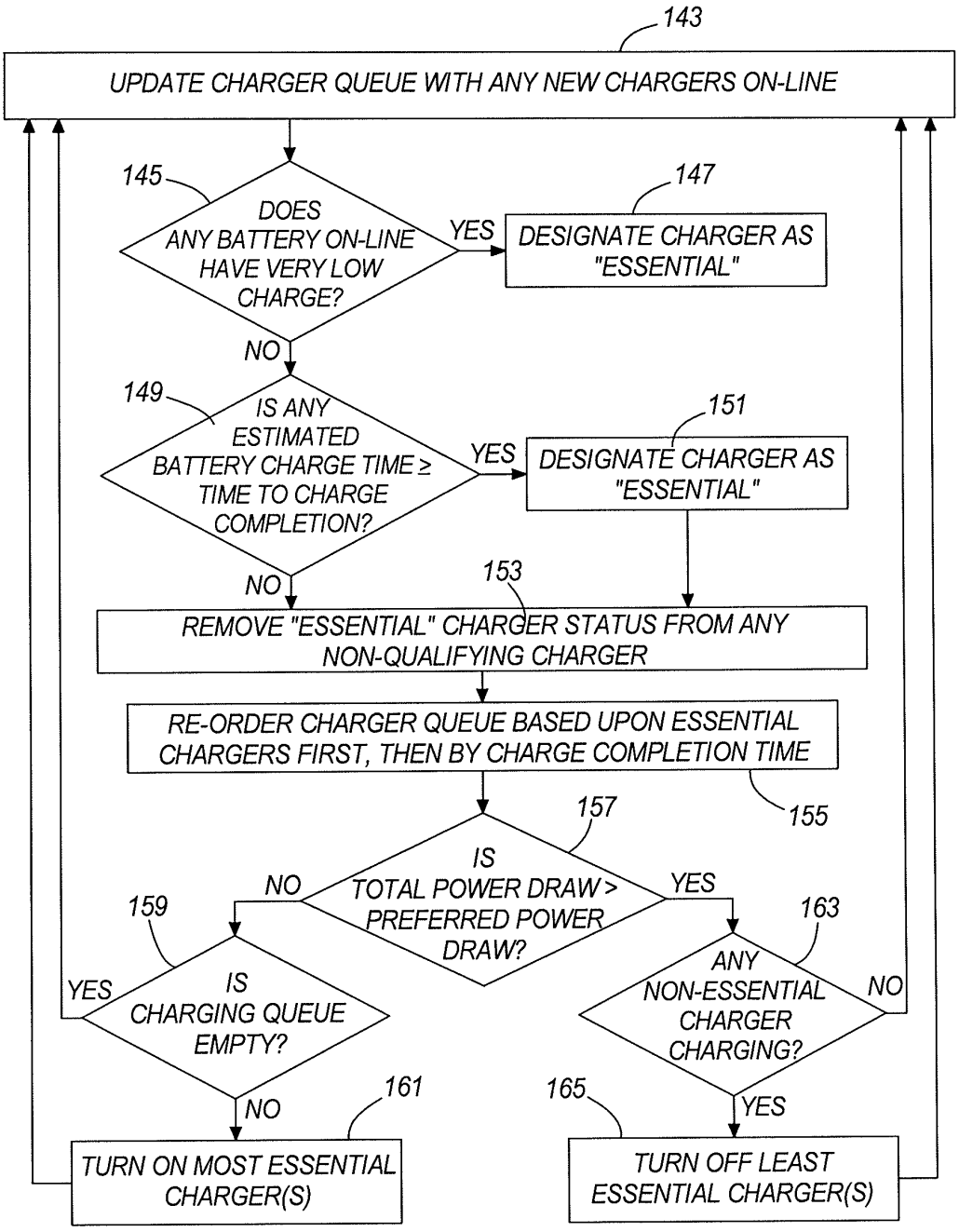

143
UPDATE CHARGER QUEUE WITH ANY NEW CHARGERS ON-LINE
145
DOES ANY BATTERY ON-LINE HAVE VERY LOW CHARGE?
YES
147
DESIGNATE CHARGER AS "ESSENTIAL"
NO
149
IS ANY ESTIMATED BATTERY CHARGE TIME ≥ TIME TO CHARGE COMPLETION?
YES
151
DESIGNATE CHARGER AS "ESSENTIAL"
NO
153
REMOVE "ESSENTIAL" CHARGER STATUS FROM ANY NON-QUALIFYING CHARGER
RE-ORDER CHARGER QUEUE BASED UPON ESSENTIAL CHARGERS FIRST, THEN BY CHARGE COMPLETION TIME
155
157
IS TOTAL POWER DRAW > PREFERRED POWER DRAW?
NO
YES
159
IS CHARGING QUEUE EMPTY?
YES
NO
161
TURN ON MOST ESSENTIAL CHARGER(S)
163
ANY NON-ESSENTIAL CHARGER CHARGING?
NO
YES
165
TURN OFF LEAST ESSENTIAL CHARGER(S)

FIG. 28

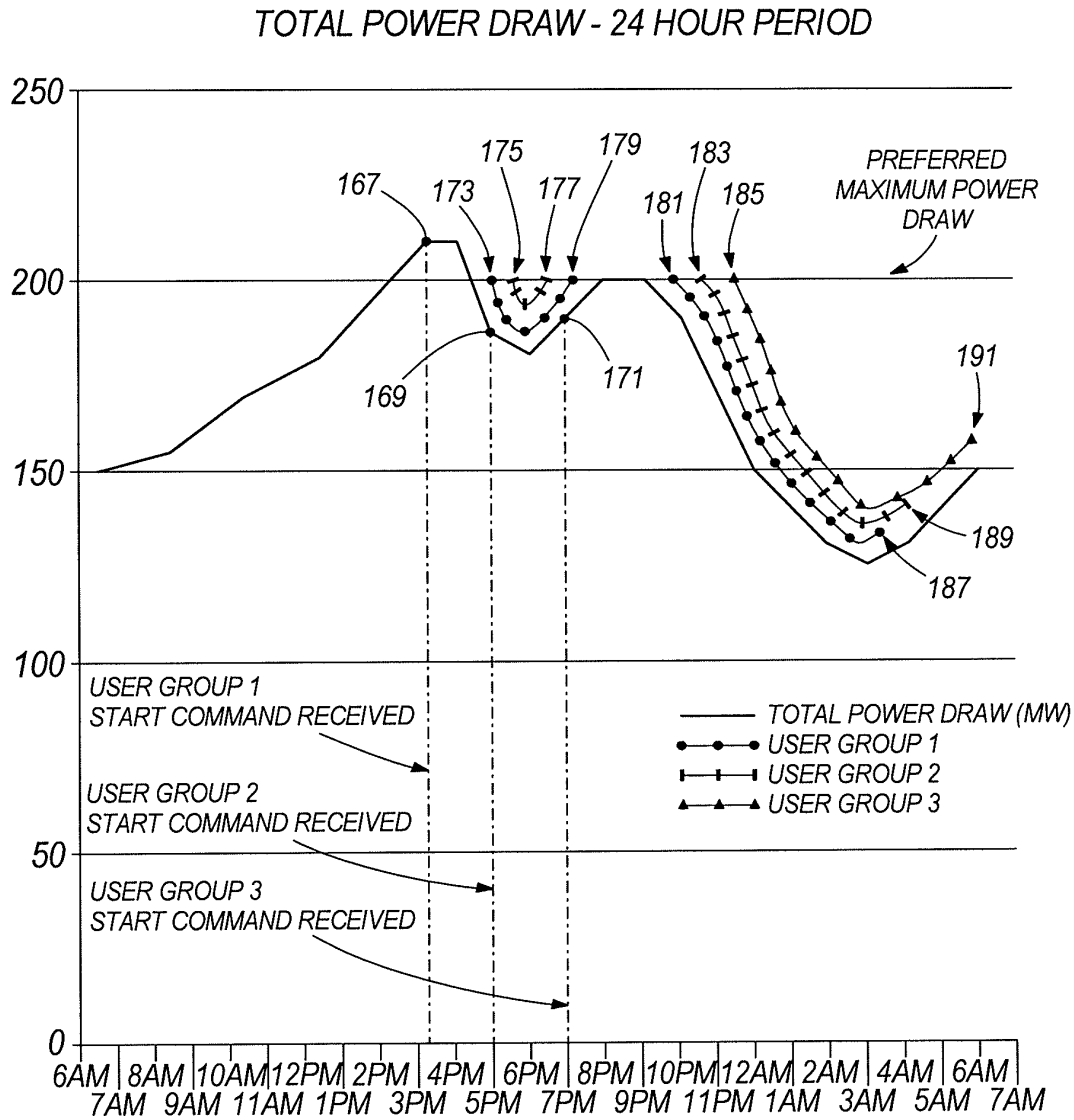

TOTAL POWER DRAW - 24 HOUR PERIOD
250
200
150
100
50
0
167
173
175
177
179
181
183
185
PREFERRED MAXIMUM POWER DRAW
169
171
191
189
187
USER GROUP 1 START COMMAND RECEIVED
USER GROUP 2 START COMMAND RECEIVED
USER GROUP 3 START COMMAND RECEIVED
TOTAL POWER DRAW (MW)
USER GROUP 1
USER GROUP 2
USER GROUP 3
6AM 7AM 8AM 9AM 10AM 11AM 12PM 1PM 2PM 3PM 4PM 5PM 6PM 7PM 8PM 9PM 10PM 11PM 12AM 1AM 2AM 3AM 4AM 5AM 6AM 7AM

FIG. 29

Document made available under the Patent Cooperation Treaty (PCT)

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Number: 61/189,353
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Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



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190038

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APPLICATION NUMBER: *61/189,353*
FILING DATE: *August 18, 2008*
RELATED PCT APPLICATION NUMBER: *PCT/US09/54174*

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61/189353
08/18/2008



CERTIFICATION UNDER 37 CFR 1.10

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Signature

8/18/08

Date

PROVISIONAL PATENT APPLICATION

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

Sir:

Enclosed for filing is a complete provisional patent application entitled "VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD" invented by:

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

and including the following documents:

Specification (including any claims) - 63 pages
Drawings - 22 sheets
Total number of pages in application - 85
No filing fee is included at this time.
Applicant claims small entity status

Please direct all communications in, or pertaining to, this application to the following customer's number:

Respectfully submitted,

Christopher B. Austin
935 17th Avenue
Grafton, WI 53024

VEHICULAR BATTERY CHARGER, CHARGING SYSTEM, AND METHOD

BACKGROUND

[0001] In light of the ever-rising costs of energy in the global market, energy consumers of all types seek to reduce the impact such costs to the greatest extent possible. One popular manner of doing so is the use of vehicles that do not rely solely (and in some cases, at all) upon petroleum products as a source of energy. Many such vehicles have been developed that rely exclusively or in large part on batteries that must be recharged from a source of electrical power external to the vehicle. Such vehicles are referred to hereinafter simply as "electric vehicles," it being understood that this term refers to any vehicle requiring an external supply of electrical power to charge the vehicle for normal use. By way of example and without limitation, the term "electric vehicle" therefore refers to vehicles whose primary source of power is electrical batteries, as well as vehicles that have other sources of power (e.g., biofuel, fuel cells, natural gas, compressed air, and the like) in addition to or in lieu of electrical batteries, but that are designed to be supplied with electrical power from an external source to improve efficient operation of the vehicle.

[0002] Unfortunately, significant limitations exist to the widespread utilization of electric vehicles. For example, most households have a small number of appliances, devices, and systems that require a significant draw of electrical power from a power supplier. The introduction of an electrical vehicle as another daily draw of electric power for a household would place unprecedented strain on community power systems, many of which are already incapable of meeting peak demands. This problem is exacerbated by the fact that in some cases, the daily draw of electric power to charge the battery of an electric vehicle may be the highest of a household.

[0003] Simply put, existing power infrastructure for most communities is incapable of meeting the demand that widespread use of rechargeable electric vehicles would place on the infrastructure. Until electrical power distribution infrastructure is updated to meet this demand (and even after such a time), improvements in energy distribution and utilization for charging electric vehicle batteries are welcome in the art.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 is a schematic diagram of a power generation and distribution system for a community.

[0005] FIG. 2 illustrates a vehicular charging system according to an embodiment of the present invention.

[0006] FIG. 3 illustrates a vehicular charging system according to another embodiment of the present invention.

[0007] FIG. 4 illustrates a vehicular charging system according to another embodiment of the present invention.

[0008] FIG. 5 is a perspective view of a vehicle charger according to an embodiment of the present invention.

[0009] FIG. 6 is a perspective view of a portion of the vehicular charger illustrated in FIG. 5, shown in a first state.

[0010] FIG. 7 is a perspective view of the vehicular charger illustrated in FIGs. 5 and 6, showing the vehicular charger in a second state.

[0011] FIG. 8 is a perspective view of the vehicular charger illustrated in FIGs. 5-7, showing the vehicular charger in a third state.

[0012] FIG. 9 is a perspective view of the vehicular charger illustrated in FIGs. 5-8, showing the vehicular charger in a fourth state.

[0013] FIG. 10 is a perspective view of the vehicular charger illustrated in FIGs. 5-9, showing the vehicular charger in a fifth state.

[0014] FIG. 11 is a perspective view of the vehicular charger illustrated in FIGs. 5-10, showing the vehicular charger in a sixth state.

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[0015] FIG. 12 is a perspective view of a portion of a vehicular charger according to another embodiment of the present invention.

[0016] FIG. 13 illustrates a vehicle display according to an embodiment of the present invention.

[0017] FIG. 14 illustrates another vehicle display according to an embodiment of the present invention.

[0018] FIG. 15 is a schematic electrical diagram of a vehicular charging system according to an embodiment of the present invention.

[0019] FIG. 16 is a schematic electrical diagram of a vehicular charging system according to another embodiment of the present invention.

[0020] FIG. 17 is a schematic electrical diagram of a vehicular charging system according to another embodiment of the present invention.

[0021] FIG. 18 a schematic diagram of a portion of a inductive vehicular charging system according to an embodiment of the present invention.

[0022] FIG. 19 illustrates a vehicular display for the inductive vehicular charging system illustrated in FIG. 18.

[0023] FIG. 20 is a side view of a vehicle and vehicular charger according to an embodiment of the present invention.

[0024] FIG. 21 is a top view of the vehicle and vehicular charger shown in FIG. 19.

[0025] FIG. 22 is a perspective view of the vehicle and vehicular charger shown in FIGs. 19 and 20.

[0026] FIG. 23 is a perspective detail view of the vehicle and vehicular charger shown in FIGs. 19-21.

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[0027] FIG. 24 is a flowchart illustrating a method of operation of a vehicular charger according to an embodiment of the present invention.

[0028] FIG. 25 is a flowchart illustrating a method of operation of a vehicular charger according to another embodiment of the present invention.

[0029] FIG. 26 is a flowchart illustrating a method of operation of a vehicular charger according to another embodiment of the present invention.

[0030] FIG. 27 is a flowchart illustrating a method of operation of a vehicular charger according to another embodiment of the present invention.

[0031] FIG. 28 is a flowchart illustrating a method of operation of a vehicular charging system according to an embodiment of the present invention.

[0032] FIG. 29 illustrates power draw from a power grid over a period of time, as controlled in part by a vehicular power charging system according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0033] Before any embodiments of the present invention are explained in detail, it is to be understood that the present invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the accompanying drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description, and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Unless specified or limited otherwise, the terms "mounted," "connected," "supported," and "coupled" and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings. Further, "connected" and "coupled" are not restricted to physical or mechanical connections or couplings.

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[0034] A power generation and distribution system in which vehicle chargers and vehicle charging systems according to the present invention can be used is illustrated schematically in FIG. 1, and is indicated generally at 10. The system 10 includes one or more sources of power 12 that supply a community, such as one or more power plants generating electric power from natural gas, coal, water flow, nuclear power, geo-thermal power, wind, solar power, other power sources, and any combination thereof. Any number of sources of power 12 can supply the electricity needs of the community, and can be located within the community and/or located distant from the community. For example, electric power can be generated in one or more power plants located in or nearby the community, whereas additional electric power can be supplied from other more distant power plants as needed in times of peak demand.

[0035] Electric power is distributed from the sources of power 12 in any conventional manner, such as by a number of power lines 14 running from the sources of power 12 to various locations in the community. Electric power can be further distributed within the community by additional power lines 14 and power distribution infrastructure. Such power lines and power distribution infrastructure (in their various forms) are known to those skilled in the art, and are not therefore described further herein.

[0036] Electric power is transmitted over the power lines 14 to a number of different locations 16 in the community, each of which draws and uses the electrical power for various purposes. One or more electric vehicles 18, 618, 1018 are at some of these locations, and draw an amount of electric power for purposes of charging one or more batteries 20, 620, 1020 (see FIGs. 2-4) of each electric vehicle 18, 618, 1018. Each electric vehicle 18, 618, 1018 in the community is releasably connected to the vehicular charging system 10. In the illustrated embodiment of FIGs. 2 and 3, each electric vehicle 18, 618 is releasably electrically and mechanically connected by a respective cord 22, 744 as will be described in greater detail below. In other embodiments (e.g., FIG. 4), one or more of the electric vehicles 1018 are releasably electrically connected to the vehicular charging system 10, but are not mechanically connected thereto. In such cases, the electric vehicles 1018 can be electrically connected by use of induction charging as described in greater detail below.

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[0037] A vehicle charging cord 22 according to an embodiment of the present invention is illustrated in FIG. 5, and is shown in use in FIG. 2. The illustrated vehicle charging cord 22 has a first end 24 adapted to releasably connect to an electrical outlet (not shown) of a business, residence, or other building or facility, and a second end 26 adapted to releasably connect to the electric vehicle 18. In this regard, the first end 24 can have, for example, a standard U.S. two-prong or three-prong male electrical connector (i.e., grounded or ungrounded) intended for connection to a 120V AC supply of electric current, a U.S. Type B electrical connector intended for connection to a 220V AC supply of electric current, any electrical connector suitable for a 240V AC supply of electrical current, a Japanese Type B electrical connector meeting JA1-15 electrical standards, a British Type G electrical connector meeting British BS 1363 electrical standards, a European Type F electrical connector meeting CENELEC electrical standards, a French Type E electrical connector meeting French electrical standards, a Chinese Type I electrical connector meeting Chinese electrical standards, or a Type D or M electrical connector meeting Indian electrical standards. Any other releasable electrical connector suitable for connection to an electrical outlet of a building or facility, or for connection to a power cord, power device, or other power interface with the electrical system of the building or facility can be used as desired. In this regard, although the first end 24 of the vehicle charging cord 22 shown in FIG. 5 has a U.S. Type B plug, it will be appreciated that the first end 24 can have any number and arrangement of blades, pins, and apertures for releasable mating engagement with an electrical connector of a power cord, power device, or other power interface as just described.

[0038] The second end 26 of the vehicle charging cord 22 can have any suitable plug for releasable connection with a mating electrical connector of the vehicle. In this regard, the second end 26 of the vehicle charging cord 22 can have any number of blades and/or pins for mating with associated apertures of the mating electrical connector of the vehicle, and can also or instead have any number of apertures for mating with associated blades and/or pins of the mating electrical connector of the vehicle. The second end 26 can be connected directly to an electrical connector of a vehicle, or to a power cord, power device, or other power interface with the electrical power system of a vehicle.

[0039] The vehicle charging cord 22 can be any gauge suitable for carrying electric current to charge the vehicle 18 and for also meeting country and local electrical codes. Also, the

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vehicle charging cord 22 illustrated in FIG. 5 is insulated with flexible plastic or other suitable material.

[0040] The vehicle charging cord 22 illustrated in FIGs. 2 and 5 also has a housing 28 intermediate the ends 24, 26 of the cord 22. In other embodiments, the housing 28 can be located at or define an end of the cord 22, in which case the housing 28 can carry any of the electrical connectors described above with regard to ends 24, 26 of the vehicle charging cord 22.

[0041] The illustrated housing 28 has a substantially parallelepiped shape. Depending at least in part upon the shape and size of the electronics within the housing (described below) for performing any desired electrical transformer function, and the shape and size of the electrical elements used for the control features described below, the housing 28 can be larger or smaller than that shown in FIG. 5, and can have any other shape desired, (e.g., a cube shape, a spherical, elliptical, or other rotund shape, an irregular shape, and the like).

[0042] With reference now to FIGs. 5-11, and also with reference to FIG. 15 (which illustrates a vehicular charging system utilizing the vehicular charger of FIGs. 2, 5-11, a number of user-manipulatable controls 30 and a display 32 are provided on the housing 28. The illustrated housing 28 also contains electrical components for transforming power supplied thereto (indicated generally at 136), and control circuitry for performing the vehicle battery charging management functions described in greater detail below. The display 32 shown in FIGs. 5-11 and 15 is an LCD display 32, although any other type of display can be used as desired. The user-manipulatable controls 30 include a power button 34, a number of navigation buttons 36, and a select button 38 (see FIGs. 6-11). The power button 34 can be pressed by a user to turn the vehicle charging cord 22 on and off, thereby enabling and disabling the vehicle charging cord 22 to charge one or more batteries 20 of a vehicle 18 connected thereto. The navigation buttons 36 can be pressed by a user to navigate through one or more screens upon the display 32 (described in greater detail below), whereas the select button 38 can be pressed by a user to select one or more options on the screen(s).

[0043] In the illustrated embodiment, four navigation buttons 36 (up, down, left, and right) are positioned around the select button 38, all of which are adjacent the power button 34. However, in other embodiments, the navigation buttons 36, select button 38, and power button

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34 can be in any other arrangement on the housing 28. Also, it will be appreciated that the user-manipulatable controls 30 can be buttons as shown in FIGs. 5-11, but can instead or also be any other type of user-manipulatable control. For example, any of the user-manipulatable controls 30 can be dome or tact switch, heat-sensitive, or other types of buttons, can be knobs or dials, and the like. Also, fewer or more user-manipulatable controls 30 can be used in other embodiments, such as for vehicle charging cords 22 not having a power button 34 (i.e., automatically powered upon connection to a power source), vehicle charging cords 22 having more or fewer navigation buttons (depending in some embodiments upon the arrangement of options on screens 32 shown on the display 32), and the like.

[0044] Although a display 32 in conjunction with a number of button-type user-manipulatable controls 34, 36, 40 is employed in the embodiment of FIGs. 2, 5-11 and 15, in other embodiments, the display 32 and any number of the button-type user-manipulatable controls 34, 36, 40 can be replaced by a touch screen (not shown). The touch screen can enable a user to display options, navigate between two or more screens, and select options by inputting commands directly into the display 32, and in some embodiments can simplify control of the vehicle charging cord 22.

[0045] With reference now to FIG. 15, in some embodiments, the vehicle charging cord 22 has a controller 44 located within the housing 28 and at least partially controlling operations of the vehicle charging cord 22. The controller 44 in the illustrated embodiment of FIGs. 2, 5-11 and 15 is a programmable processor of any suitable type, but in some embodiments can take other forms such as non-programmable processor, a system of discrete logic elements, and any combination thereof. The illustrated vehicle charging cord 22 also has a transceiver 46 coupled to the controller 44, enabling the controller 44 to communicate with another controller. The other controller can be one or more processors of a personal computer, phone, PDA, or other processor-based device associated with a user of the vehicle charging cord 22, one or more processors of a server or other computer associated with a power utility providing power to the vehicle charging cord 22, and the like). In the illustrated embodiment of FIGs. 2, 5-11 and 15, the other controller is a remote computer of a power utility 48, and is indicated at 50. The controller 50 of the power utility 48 is coupled to a power utility transceiver 52 to enable the power utility 48 to communicate with the controller 44 of the vehicle charging cord 22.

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[0046] The transceiver 46 of the vehicle charging cord 22 and the transceiver 52 for the computer of the power utility 48 can each take any suitable form. However, it will be appreciated that the transceiver 52 for the computer of the power utility 48 can be selected to enable the computer of the power utility 48 to communicate with multiple vehicle charging cord controllers 44 of the same or different users. Also, the transceiver 46 of the vehicle charging cord 22 and/or the transceiver 52 for the computer of the power utility 48 can be replaced by a separate transmitter and a separate receiver enabling two-way communication between the controller 50 of the power utility 48 and the controller 44 of the vehicle charging cord 22. Such communication can be via the power lines 14 (see FIG. 1) between the computer of the power utility 48 and the locations 16 at which the vehicle charging cord 22 is used. In this regard, reference herein and in the appended claims to a "receiver" and a "transmitter" is intended to encompass transceivers as well as separate receivers and transceivers.

[0047] Any power line communication (PLC) system or combination of PLC systems adapted for carrying data over power lines 14 can be used for communication between the controllers 44, 50 described above, such as distribution line carrier (DLC) PLC systems, broadband over lines carrier (BLC) systems, low-speed narrow-band communication systems (proposed and used in Demand Side Management systems), and the like. Communication between the controller 50 of the power utility 48 and the controller 44 of the vehicle charging cord 22 can be through any number of substations between the power utility 48 and the location 16 at which the vehicle charging cord 22 is used. Also, depending at least in part upon the PLC system(s) used, such communication can be through any number of repeaters as is well known to those skilled in the art of PLC systems.

[0048] The controller 50 of the power utility 48 (with which the controller 44 of the vehicle charging cord 22 communicates) can be located anywhere between the location 16 of the user and the sources of power 12. For example, the controller 50 of the power utility 48 can be located at a facility where power is generated, at an office of the power utility 48, at any of a number of substations between the source of power 12 and the location 16 of the user, and the like.

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[0049] By connecting the first end 24 of the vehicle charging cord 22 to an electrical outlet of a building or facility (or to a power cord, power device, or other power interface with the electrical system of the building or facility), communication can be established over the vehicle charging cord 22, the electrical system of the home, building, or other facility (e.g., through wiring and one or more circuit breakers thereof), and low and high-voltage power lines to the power utility 48 and the controller 50 of the power utility 48 described above. In some embodiments, this communication can be established automatically upon plugging in the first end 24 of the vehicle charging cord 22, whereas in other embodiments, this communication is established when the vehicle charging cord 22 is turned on or when a user enters an appropriate command to establish this communication (described in greater detail below). Communication between processors established automatically upon their connection are well known to those skilled in the art, and are not therefore described further herein.

[0050] As discussed above, communication between the controller 44 of the vehicle charging cord 22 and the controller 50 of the power utility 48 can be over power lines, wiring, or other conductors. However, it will be appreciated that communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22. By way of example only, the vehicle charging cord 22 can have a wireless processor and associated antenna, receiver, and transmitter enabling wireless communication with a wireless service provider, and ultimately to the controller 50 of the power utility 48. Like the PLC communication described above, wireless communication between the controller 50 of the power utility 48 and the vehicle charging cord 22 can be established automatically upon plugging in the first end 24 of the vehicle charging cord 22, when the vehicle charging cord 22 is turned on, or when a user enters an appropriate command to establish this communication (described in greater detail below).

[0051] In some embodiments, the controller 44 of the vehicle charging cord 22 communicates with a user's computer rather than, or in addition to, communicating with the controller 50 of the power utility 48. This communication can be any combination of wired or wireless communication. For example, a residence-based, office-based, or other facility-based

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PLC system can be used to communicate between the controller 44 of the charging cord 22 and a user's computer (via the electrical system of the residence, office, or other facility). In other embodiments, the vehicle charging cord 22 can have a wireless processor adapted for communication with a user's computer. Such communication can be through any suitable wireless personal area network (WPAN) (using, for example, ZigBee®, Bluetooth®, or any other WPAN wireless technology), wireless local area network (WLAN), and the like. Like the PLC communication described above, communication between the controller 50 of the power utility 48 and the user's computer can be established automatically upon plugging in the first end 24 of the vehicle charging cord 22, when the vehicle charging cord 22 is turned on, or when a user enters an appropriate command to establish this communication (described in greater detail below).

[0052] Upon connection with a user's computer (wireless or otherwise), a user can control the vehicle charging cord 22 in any of the same manners as a power utility 48 described in greater detail below. Alternatively or in addition, communication between the controller 44 of the vehicle charging cord 22 and the controller of 50 of the power utility 48 can be established through the user's computer. Specifically, wired or wireless communication between the controller 44 of the vehicle charging cord 22 and the user's computer can be used in conjunction with a connection between the user's computer and the controller 50 of the power utility 48 to enable communication between the controller 44 of the vehicle charging cord 22 and the controller 50 of the power utility 48. Such communication can thereby enable the power utility 48 to control the vehicle charging cord 22 (in any of the manners described below) via the user's computer.

[0053] With reference now to FIGs. 6-11, the illustrated vehicle charging cord 22 has a first screen 40 providing information regarding the vehicle charging cord 22, a battery connected thereto, and the status of charging operations of the vehicle charging cord 22. In the illustrated embodiment of FIGs. 2, 5-11 and 15, the screen 40 has a vehicle charging cord status indicator 42, which displays the status of charging operations. The status indicator 42 can indicate whether the vehicle charging cord 22 is charging a battery, the type of charging operations being performed by the vehicle charging cord 22, and/or whether an error in charging the battery has been detected.

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[0054] In the state of the vehicle charging cord 22 shown in FIGs. 6, 10, and 11, the vehicle charging cord 22 is not charging a battery connected thereto, nor is the vehicle charging cord 22 programmed or otherwise controlled to charge a battery (described in greater detail below). Accordingly, the status indicator 42 displays "OFF". In the state of the vehicle charging cord 22 shown in FIG. 7, the vehicle charging cord 22 is in the process of charging a vehicle battery in "manual" mode (i.e., not based upon a time of day). Therefore, the status indicator 42 displays "MANUAL CHARGE IN PROCESS" in FIG. 7. In the state of the vehicle charging cord 22 shown in FIG. 8, the vehicle charging cord 22 is in the process of charging a battery based upon one or more instructions that can include a time of day to begin charging the battery and/or a time of day to stop battery charging (discussed in greater detail below). Accordingly, the status indicator 42 displays "PROGRAMMED CHARGE IN PROCESS" in FIG. 8. Finally, in the state of the vehicle charging cord 22 shown in FIG. 9, an error has been detected by the vehicle charging cord 22 in the process of attempting to charge the battery. Therefore, the status indicator 42 display "ERROR – BATTERY FAULT" in FIG. 9. In some embodiments, the vehicle charging cord 22 can have appropriate circuitry to detect a variety of charging problems, including without limitation a damaged battery, a damaged vehicle charging cord 22, a disconnection between the vehicle charging cord 22 and a source of power used to charge the vehicle battery, and/or a disconnection between the vehicle charging cord 22 and the battery to be charged. A large number of conventional circuits capable of detecting such problems exist, and are not therefore described further herein. Such circuits fall within the spirit and scope of the present invention.

[0055] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a communication status indicator 54. The communication status indicator 54 indicates whether communication exists between the controller 44 of the vehicle charging cord 22 and a computer (e.g., a computer of the power utility 48, the user's computer, a mobile phone, PDA, or other processor-based device as described above, and the like). For example, in the "OFF" state of the vehicle charging cord 22 illustrated in FIG. 6, no communication exists between the controller 44 of the vehicle charging cord 22 and a computer, so the communication status indicator 54 displays an appropriate indicator. In the other states of the vehicular charging cord 22 illustrated in FIGs. 7-11, including the states of FIGs. 10 and 11 where the vehicle charging cord 22 is in an "OFF" state but is not set to charge a battery, communication has been

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established and maintained between the controller 44 and a computer, so the communication status indicator 54 displays an indicator showing this status.

[0056] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a power connection status indicator 56. The power connection status indicator 56 indicates whether an electrical connection exists between the vehicle charging cord 22 and a source of power (e.g., an electrical system of a house, office, facility, or other location) to charge a battery. When the first end 24 of the illustrated vehicle charging cord 22 is unplugged or is connected to an electrical system not providing power to the vehicle charging cord 22, the power connection status indicator 56 displays such an indicator (see, for example, FIG. 6). Otherwise, if a proper power connection is made, the connection status indicator 56 displays an appropriate indicator showing that such a connection has been made (see, for example, FIGs. 7-11).

[0057] A clock 58 is also displayed on the first screen 40 shown in FIGs. 6-9. Any form of clock can be displayed as desired, preferably indicating whether the displayed time is "A.M." or "P.M.". In some embodiments, time on the clock 58 is maintained by the controller 44 of the vehicle charging cord 22, and can be maintained even if no power is supplied to the vehicle charging cord 22 (e.g., when the vehicle charging cord 22 is unplugged) by a battery of the vehicle charging cord 22. Such a battery (not shown) can be connected to the controller 44 of the vehicle charging cord 22, can be located within the housing 28, and in some embodiments can be removed and replaced by a user as necessary via a door or other battery cover (also not shown). In these and other embodiments, the time displayed upon the clock 58 can be retrieved and displayed by the controller 44 from a computer upon establishment of communication with the computer in any of the manners described above.

[0058] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a battery charge level indicator 60. Using any battery diagnostic circuitry desired, the controller 44 of the vehicle charging cord 22 can detect the level of charge of a battery 20 to which the vehicle charging cord 22 is connected (e.g., by the plug on the second end 26 of the vehicle charging cord 22 described above). The battery charge level indicator 60 illustrated in FIGs. 6-9 is a bar chart displaying charges ranging from 0% to 100%, and also displaying the percentage of full charge of a vehicle battery 20 to which the vehicle charging cord 22 is

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connected (e.g., 31% in FIG. 6). However, other types of battery charge level indicators 60 can be used in other embodiments.

[0059] For example, the battery charge level indicator 60 can be simply a number (e.g., the percentage of full charge of the battery 20, the exact charge level of the battery in amp-hours or in another unit of measurement, another number representative of the amount of charge of the battery 20 but not necessarily in units conventionally used to indicate battery charge, and the like). As another example, the battery charge level indicator 60 can also or instead include any other chart or visual representation, such as a pie chart, an escalating series of bars having different lengths, a symbol having different colors and/or brightness levels representing different battery charge levels, a gauge with a needle or other pointer, text in any language indicating the level of battery charge (e.g., "empty, very low, low, high, full"), and the like. The battery charge level indicator 60 can comprise any graphics, text, or combination of graphics and text to convey the level of charge of the battery 20 to a user, and can be any size desired on the first screen 40. The controller 44 of the vehicular charging cord 22 can monitor the charge level of the battery 20 being charged, and can update the battery charge level indicator 60 continuously or on a periodic basis.

[0060] In some embodiments, the first screen 40 of the vehicular charging cord 22 also displays the voltage and/or amperage used to charge a battery 20 connected thereto. These voltage and/or amperage indicators are included in the embodiment of the vehicle charging cord 22 shown in FIGs. 2, 5-11 and 15, and are given reference numbers 62 and 64, respectively.

[0061] As also shown in FIGs. 6-9, the first screen 40 of the vehicle charging cord 22 can include other information regarding the status of a battery charging session performed by the vehicular charging cord 22, including the amount of time estimated to completely charge the battery 20 (in minutes, minutes and hours, or in any other format), the estimated or actual amount of power already consumed during the present charging session (in kWh or in any other unit of measurement), the actual or estimated cost of charging the connected battery 20 per hour or other unit time, and/or the total actual or estimated cost of the current charging session to the present time. Each of these examples of information is displayed on the first screen 40 shown in FIGs. 6-9, and is indicated with reference numbers 66, 68, 70, and 72, respectively.

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[0062] The charge time remaining indicator 66 and the power used indicator 68 can be calculated by the controller 44 in any of a number of manners well known to those in the art of battery charging and electrical power metering technology. In this regard, it will be appreciated that the charge time remaining can be calculated taking into account the non-linear rate of charging for many batteries 20, wherein the rate of battery charge at different levels of battery charge changes. Formulas for such estimates are well known to those skilled in the art of battery charging, and are not therefore described further herein. The charge cost per hour indicator 70 can be retrieved and displayed by the controller 44 from a computer upon establishment of communication with the computer in any of the manners described above, or can be manually entered into the vehicle charging cord 22 by a user using the user-manipulatable controls 30 and an appropriate data entry cell or menu on the display 32 (not shown). In those embodiments in which the charge cost per hour is retrieved from another computer as described above, the controller 44 can retrieve a cost per kWh figure directly from the power utility 48 (e.g., from the controller 50 of a computer of the power utility 48), from the user's computer in which is stored a cost per kWh figure entered there or retrieved by the user's computer, and the like, and can multiply that figure by an estimated kWh level at which the vehicle charging cord 22 will charge the battery 20 to display the charge cost per hour 70 for the current battery charging session. The total cost to the present time for a charging session 72 can be calculated by the controller 44 simply by multiplying the values of indicators 68 and 70 together.

[0063] In some embodiments, any or all of the indicators 66, 68, 70, and 72 can be updated periodically during a charging session, such as every second, minute, or other time interval. Any or all of the indicators 66, 68, 70, 72 can be continually updated by receiving streaming data from the controller 50 of the power utility 48 or from the user's computer. For example, the charge time remaining indicator 66 can be updated by the controller 44 every second or minute based upon battery charge calculations made at the beginning of the charging session or made periodically during the charging session. As another example, the power used indicator can be updated by the controller 44 every second, minute, or in greater periods of time based upon the actual or estimated power delivered via the vehicle charging cord 22. As yet another example, the charge cost per hour indicator 70 can be updated every second, minute or other time period based upon cost information retrieved by the controller 44 from the controller 50 of the power utility 48 or the user's computer, and/or can be updated immediately upon receiving streaming or

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batch-loaded power cost information from the controller 50 of the power utility 48 or the user's computer.

[0064] The first screen 40 of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 also has a battery charge selector 74 by which a user can select the manner in which the vehicle charging cord 22 will charge a vehicle battery 20. By pressing the navigation buttons 36 and then the select button 38 described above, a user can highlight a desired manner in which the vehicle charging cord 22 will charge a vehicle battery 20 connected thereto. The battery charge selector options illustrated in FIGs. 6-9 include "OFF", "PROGRAMMED CHARGE", AND "MANUAL CHARGE", any of which can be highlighted and selected by a user as just described. Although a radio button format of the battery charge selector 74 is illustrated in the embodiment of FIGs. 2, 5-11 and 15, the battery charge selector 74 can have any other form desired, including without limitation a drop-down or pop-up menu, and the like. Upon selecting the desired charge state as just described, the vehicle charging cord 22 can immediately begin a charging session by beginning to supply current to the battery 20 to which the vehicle charging cord 22 is connected (e.g., by closing a switch 92 coupled to the controller 44 as described in greater detail below), or can begin such a session after a user then presses the power button 34. For example, if the power button 34 is selected after the "MANUAL CHARGE" button has been selected, the controller 44 can causes the switch 92 to close without delay in order to begin charging the vehicle battery 20, whereas if the power button 34 is selected after the "PROGRAMMED CHARGE" button has been selected, the controller 44 can cause the switch 92 to close only after one or more conditions have been met as will be described in greater detail below. In any case, once a user commands and enables the vehicle charging cord 22 to begin charging immediately or to begin charging at a later time based upon a set of instructions as described elsewhere herein, a vehicle charging session begins.

[0065] The operational status of the vehicle charging cord 22 can be displayed by the vehicle charging cord 22 in a number of different manners and locations. For example, the vehicle charging cord status indicator 42 described above can be provided. Alternatively or in addition, one or more graphics (e.g., symbols, colors, and the like) providing the same general status indicators (e.g., off, charging in process, error) can be displayed elsewhere on the housing 28, such as through a translucent or transparent portion of the housing 28, through a lens located on

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the housing 28, and the like. In this regard, one or more graphics can be printed on the interior and/or exterior of the housing 28, can be invisible or substantially not visible to a user when not illuminated, and can be illuminated by one or more lamps, LEDs or other light sources within the housing 28 when such graphics are to be displayed. By way of example only, the controller 44 can display a battery charging symbol such as that shown in FIGs. 7 and 8 in a first charge status display area 76A when a charging session is in process, or when the vehicle charging cord 22 is in the process of charging a battery 20 (as described in greater detail below, the battery 20 may not be actively charging the battery 20 at one or more times during a charging session). As another example, the controller 44 can display an error symbol such as that shown in FIG. 9 in the same or a different charge status display area 76B when any of the battery charging errors described above have been detected. Still other battery charging symbols indicating any other information regarding the status of the vehicle charging cord 22 and its operation can be displayed anywhere on the housing as a supplement to or in addition to the information shown on the display 32 described above. In some embodiments, one or more status display areas 76 as just described can even replace the display 32.

[0066] With continued reference to the illustrated embodiment of FIGs. 2, 5-11 and 15, in some embodiments, the controller 44 of the vehicle charging cord 22 can display two or more different screens upon the display 32. This control enables a user to view substantially more information than that available from other types of displays and from other types of controls and indicators on the housing 28. By way of example only, two such alternative screens 40A, 40B are illustrated in FIGs. 10 and 11, respectively, and can be accessed in a number of different manners. In some embodiments, each screen 40, 40A, 40B is accessed by selecting a navigation button, such as by using navigation button 36 in the illustrated embodiment to highlight a desired navigation button on the screen 40, 40A, 40B. In other embodiments, one or more navigation buttons 36 on the housing 28 are provided to move between screens 40, 40A, 40B, such as forward and back buttons, a single button to scroll though two or more screens 40, 40A, 40B, and the like. Although three different screens 40, 40A, 40B can be shown upon the display 32 in the illustrated embodiment of FIGs. 2, 5-11 and 15, any other number of displays (e.g., 1, 2, 4, or more) can be shown upon the display 32, and can include any number and arrangement of the indicators, selectors, and other information described herein. In still other embodiments, a single screen 40 is provided, only a portion of which is visible on the display 32 at any given time. In

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such cases, other portions of the screen 40 can be viewed by scrolling in any desired direction using one or more navigation buttons 36 or other user-manipulatable controls on the housing 28.

[0067] In the illustrated embodiment of FIGs. 2, 5-11 and 15, the first screen 40 has two navigation buttons 78, 80, each of which causes the controller to display a different screen 40A, 40B when selected by a user in the manner described above. When a first "PROGRAM A CHARGE" navigation button 78 is selected by a user, the controller 44 replaces the first screen 40 with a second screen 40A shown in FIG. 10. This second screen 40A enables a user to change the manner in which the vehicle charging cord 22 will operate to charge one or more batteries 20 connected thereto. The second screen 40A also has navigation buttons 82, 84 that can be selected by a user to return to the first screen 40, whether by making one or more changes to operation of the vehicle charging cord 22 (by selecting the "GO" navigation button 84), or by making no changes to operation of the vehicle charging cord 22 (by selecting the "CANCEL" navigation button 84). In the illustrated embodiment, selection of either navigation button 82, 84 on the second screen 40A will return the user to the first screen 40.

[0068] A valuable feature of the vehicle charging cord 22 of FIGs. 2, 5-11 and 15 is the ability of a user to at least partially control when the vehicle charging cord 22 will begin to charge one or more batteries 20 connected thereto. In many geographic locations, times of day, and times of the year, the ability of power utilities 48 to supply the full power demand of users is limited or is inadequate. Although power utilities can often generate or otherwise obtain additional power at peak periods, such power often comes at a higher price to the power utility 48. Regardless of whether a higher price is paid by the utility, higher power prices are often charged to consumers of the power utility 22 during peak periods. In many cases, power utilities 48 encourage their customers to consume power at non-peak periods, such as a nighttime, and often give significant discounts to those who consume power during such periods. The vehicle charging cord 22 of FIGs. 2, 5-11 and 15 enables the user to take advantage of such cost savings by controlling when vehicle battery charging will occur. Even in those cases where savings to the power consumer are not provided, the vehicle charging cord 22 can be used to reduce power draw upon power utilities 48 at peak times and/or to better manage power consumption.

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[0069] With reference to FIG. 10, the second screen 40A (entitled the "Programmed Charge" screen in FIG. 10) can show any amount of the information shown on the first screen 40 described above, such as the vehicle charging cord status indicator 42, the communication status indicator 54, the power connection status indicator 56, and the clock 58. The second screen 40A enables a user to select a time at which the vehicle charging cord 22 will begin charging a battery 20 connected thereto. For this purpose, the second screen 40A has a button 86 that can be selected (e.g., by user manipulation of the navigation and select buttons 36, 38 as described above) to set the vehicle charging cord 22 to begin charging at a desired time of day. This time of day can be changed and set by one or more time change buttons 88, such as by using the navigation buttons 36 to highlight one of the time change buttons 88 and by using the select button 38 to change the charge start time 90 displayed on the second screen 40A. Any other manner of changing and selecting a desired time can be used as desired, including without limitation drop down or pull-up menus displaying various charge start times that can be selected.

[0070] Once a charge start time has been selected by a user as just described, the user can select the navigation button 82 described above to return to the first screen 40, and can command the vehicle charging cord 22 to begin a charging session by pressing the power button 34. By doing so, the controller 44 of the vehicle charging cord 22 will compare the start time 90 entered by the user to the current time of day (e.g., displayed by the clock 58 as described above), and will begin charging the battery 20 at the entered charge start time 90. With reference to FIG. 15, the vehicle charging cord 22 can have a relay or other electrical switch 92 coupled to the controller 44 and operable by the controller 40 to close at the charge start time 90. Once the charge start time 90 has been reached, the controller 40 can automatically close the switch 92, thereby supplying a current to the battery 20 for charging the battery 20. The switch 92 can remain closed until the controller 40 detects that the battery 20 is fully or sufficiently charged, until an error in charging is detected (as described above), or in some embodiments until a charge stop time or other triggering event occurs. When any such condition is reached, the switch 92 can open, thereby stopping current flow to the battery 20 and stopping the battery charging process. The vehicle charging cord 22 can be provided with any battery charge circuitry suitable for charging the battery 20. Such battery charge circuitry is well know, and can include one or more voltmeters and/or amp meters for this purpose.

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[0071] For example, the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 includes an amp meter 94 and a volt meter 96 electrically coupled to a power line 98 supplying power to the battery 20. The controller 44 can utilize information from the amp meter 94 and/or volt meter 96 to determine whether the battery 20 is fully charged, and to automatically stop charging the battery 20 (e.g., by opening the switch 92) when the battery 20 is fully charged.

[0072] Accordingly, the vehicle charging cord 22 can be programmed to begin charging a battery 20 connected thereto at any time of day desired by a user. A user can therefore select an off-peak power time, and in some applications when the cost of power is reduced.

[0073] It will be appreciated that the time selected by a user to begin charging the battery 20 may not be the most optimal time for a power utility 48 to supply power for charging the battery 20. For example, in an emergency or during an unexpected surge of power demand, an otherwise off-peak time to begin charging the battery 20 may not be desirable for the power utility 20. As another example, widespread use of the vehicle charging cord 22 may result in surges of power demand at particular off-peak times, such as at midnight, 1 a.m., 2 a.m., or other charge start times that may be commonly selected by users in programming the vehicle charging cord 22 as described above. Another valuable feature of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 can help to reduce or eliminate these problems. With reference again to FIG. 10, the second screen 40A has another button 100 that can be selected (e.g., by user manipulation of the navigation and select buttons 36, 38 as described above) to set the vehicle charging cord 22 to complete charging by a desired time of day. This time of day can be changed and set by one or more time change buttons 102, such as by using the navigation buttons 36 to highlight one of the time change buttons 102 and by using the select button 38 to change the charge completion time 104 displayed on the second screen 40A. Any other manner of changing and selecting a desired time can be used as desired, including without limitation drop down or pull-up menus displaying various charge start times that can be selected.

[0074] Once a charge start time has been selected by a user as just described, the user can select the navigation button 82 described above to return to the first screen 40, and can command the vehicle charging cord 22 to begin a charging session by pressing the power button 34. In

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such cases, the controller 44 receives the charge completion time 90 and can delay the start time at which battery charging will commence based upon one or more factors (described below).

[0075] In some embodiments, the controller 44 automatically retrieves power information from a memory 106 coupled to the controller 44. This power information can include the cost of power per unit time, one or more pre-set times, and the like, and can be saved in the memory 106 by the controller 44. The controller 44 can receive the power information from the transceiver 46 of the vehicle charging cord 22, which can receive the power information in communication with the controller 50 and transceiver 52 of the power utility 48 and/or in communication with the user's computer. This communication can occur in any of the manners described above regarding the communication between the controllers 44, 50 and/or between the controller 44 and the user's computer. In this regard, the information can be originally produced by the power utility 48, or can be produced by a user entering the information into the user's computer for transfer to the controller 44 and memory 106 of the vehicle charging cord 22.

[0076] The controller 44 can delay the time at which battery charging will begin based upon the power information just described, whether stored in the memory 106 of the vehicle charging cord 22 or retrieved from the power utility 48 without being stored in the memory 106. In some embodiments, the battery charging start determined by the controller 44 can be based upon a threshold cost of power reached over a period of time. This cost of power can be received periodically by the controller 44 from the power utility 48, such as by the controller 44 of the vehicle charging cord 22 polling the controller 50 of the power utility 48, by the controller 50 of the power utility 48 regularly sending or streaming updated cost of power information to the controller 44 of the vehicle charging cord 22. Upon reaching a desired cost of power (e.g., $0.50/hr., $0.45/hr., $0.40/hr.), the controller 44 of the vehicle charging cord 44 can automatically cause the switch 92 to close, thereby charging the vehicle battery 20. This threshold cost of power can be input by a user into the vehicle charging cord 22 in any of the manners described above in connection with other information entry, such as by another data entry field similar to that of the desired charge start time 90 or the desired charge completion time 104.

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[0077] In some embodiments, the controller 44 can also automatically cause the switch 92 to open if a desired cost of power threshold is reached, thereby interrupting battery charging. In such cases, battery charging can resume in the same manner as it began when the cost of power lowers as detected by the controller 44 of the vehicle charging cord 22. Any number of interruptions and resumptions in charging the vehicle battery 20 can take place in this manner.

[0078] In some embodiments, the controller 44 detects a command from the user to begin a charging session, and through communication with the controller 50 of the power utility 48 (whether initiated by the controller 44 of the vehicle charging cord 22 or initiated by the controller 50 of the power utility 48 by periodic polling or in any other manner), provides a signal to the controller 50 of the power utility 48 that a charging session has been requested. Upon receiving this signal, the controller 50 of the power utility 48 can request or otherwise receive the charge completion time 104 from the controller 44 of the vehicle charging cord 22. In some embodiments, additional information regarding the charging session can also be received, such as the level of charge of the battery 20 connected to the vehicle charging cord 22, and/or the estimated charge time remaining (discussed above in connection with the charge time remaining indicator 66). Still other information can be received by the controller 50 of the power utility 48, such as the capacity of the battery 20, the battery type, the manufacturer of the battery 20, the model or other identification information of the battery 20, and/or the battery age.

[0079] Any or all of this information can be retrieved by or transmitted to the controller 44 of the vehicle charging cord 44 by communication with a controller 108 of the battery 20 (i.e., for batteries 20 having an integrated circuit or other controller adapted for communication with another controller, otherwise known as "smart batteries") or vehicle. For example, the battery capacity, type, manufacturer, model or other identification information, and/or age can be stored in a memory (not shown) of the battery 20 coupled to and accessible by a controller 108 of the battery 20. This information can be stored in the memory of the battery 20 by the manufacturer, supplier, and/or servicer of the battery 20, or in some embodiments by a user. As another example, any or all of this information can be stored in a memory (not shown) of the vehicle 18 coupled to and accessible by a controller 108 of the vehicle 18. This information can be stored in the memory of the vehicle 18 by the manufacturer, supplier, and/or servicer of the vehicle 18, or in some embodiments by a user. For example, upon installation of a battery into the vehicle

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18, the installer can access the controller 108 of the vehicle 18 in a conventional manner to record the battery capacity, type, manufacturer, model or other identification information, and/or age in a memory associated with the vehicle 18. Any of this information can be transmitted to or retrieved by the controller 44 of the vehicle charging cord 22 automatically upon connection to the vehicle 18 or at any other time, and in some embodiments can be stored in the memory 106 of the vehicle charging cord 22. In some embodiments, any of this information can then be retrieved from the memory 106 of the vehicle charging cord 22 and/or from the memory of the vehicle 18 for transmission to the controller 50 of the power utility 48 or for determining when to begin charging a battery 20 based upon any of the embodiments described herein.

[0080] Based upon the battery information obtained by the power utility 48 as described above, the power utility 48 can determine an desirable time to begin charging the battery 20 connected to the vehicle charging cord 22. This time can be based upon a number of factors that are specific to the requested charging session, such as the charge time completion for the requested charging session, as we factors that are independent of the requested charging session, such as the current and anticipated power draw by other customers of the power utility 48, and/or the current and anticipated cost of power to the power utility 48. Accordingly, based upon the battery information obtained by the power utility 48, the power utility 48 can control when the vehicle charging cord 22 starts to charge the battery 20 connected thereto. This control can occur, for example, by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 at a desired start time to trigger closure of the switch 92, or by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 to close the switch 92 at a particular future time (which time can be stored in the memory 106 of the vehicle charging cord 22 or can begin a timer counting to that particular time of day), or in other manners. In this manner, the power utility 48 can maintain a degree of control over power draw while still following an instruction by the user to complete a vehicle charging session by a desired time.

[0081] As just described, in some embodiments the power utility 48 can control when the vehicle charging cord 22 begins charging a battery 20 connected thereto. Alternatively or in addition, in some embodiments the power utility 48 can interrupt charging of a vehicle battery 20 in the event that it is desirable to delay the remainder of the charging process, such as during a

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surge of demand occurring while a battery 20 is being charged, in an emergency, and the like. This interruption can occur, for example, by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 at a desired interruption time to trigger the switch 92 to open, or by sending a signal from the controller 50 of the power utility 48 to the controller 44 of the vehicle charging cord 22 to open the switch 92 at a particular future time (which time can be stored in the memory 106 of the vehicle charging cord 22 or can begin a timer counting to that particular time of day), or in other manners. The power utility 48 can resume charging the vehicle battery 20 in the same manner as described above in connection with beginning to charge the vehicle battery 20. Any number of interruptions and resumptions in charging the vehicle battery 20 can take place based upon the desires and needs of the power utility 48 and the power draw upon the power utility 48.

[0082] Although it is desirable in some applications to delay the time at which charging of the vehicle battery 20 will begin based upon any of the embodiments described herein, it is also desirable in many cases to insure that a minimum level of battery power is immediately available to the user. This minimum level of battery power can be needed, for example, in case of emergency, or in the event that the user unexpectedly needs use of the vehicle 18. In such cases, the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 has another valuable feature. With particular reference to FIG. 10, the second screen 40A of the illustrated vehicle charging cord 22 has a button 110 that can be selected (e.g., by user manipulation of the navigation and select buttons 36, 38 as described above) to set the vehicle charging cord 22 to immediately begin charging the battery 20 until a minimum threshold level of battery charge has been reached regardless of whether a programmed charge has also been selected as described above. This minimum threshold level of battery charge can be changed and set by one or more charge level buttons 112, such as by using the navigation buttons 36 to highlight one of the charge level buttons 112 and by using the select button 38 to change the minimum threshold level of battery charge 114 displayed on the second screen 40A. Any other manner of changing and selecting a desired minimum level of battery charge can be used as desired, including without limitation drop down or pull-up menus displaying various levels of battery charge that can be selected.

[0083] When the button 110 is selected (and in some embodiments, after the user selects the navigation button 82 described above to return to the first screen 40, and after the user

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commands the vehicle charging cord 22 to begin a charging session by pressing the power button 34), the controller 44 determines whether the charge level of the vehicle battery 20 connected thereto is below the threshold input by the user. The battery charge level can be determined as described above. If the battery charge level is below the threshold input by the user, or in some cases at or below the threshold input by the user, the controller 44 of the vehicle charging cord 22 automatically causes the switch 92 to close, thereby charging the vehicle battery 20 without delay. If the user has also requested a programmed charge as described above, the vehicle charging cord 22 continues to charge the vehicle battery 20 until the minimum threshold level of battery charge 114 has been reached. At this time, the vehicle charging cord 22 resumes operation in programmed mode. For example, if the charge start time 90 has already passed or if the current cost of power is below the desired cost of power as described above, the controller 44 can continue to charge the vehicle battery 20, and can do so without interruption following battery charging to the minimum threshold level of battery charge as just described. As another example, if the power utility 48 had determined that the vehicle battery 20 should be charged (e.g., based at least in part upon a charge completion time 104 entered by a user as also described above), the controller 44 can continue to charge the vehicle battery 20, and can do so without interruption following battery charging to the minimum threshold level of battery charge as just described.

[0084] Of course, if the vehicle charging cord 22 is operating in a manual charge mode (e.g., not based upon a time of day as selected using buttons 86 and 100), the vehicle charging cord 22 can begin to charge the vehicle battery 20 immediately after the user presses the power button 34, regardless of the degree to which the battery charge has been depleted.

[0085] In some embodiments, user control over additional functions and features of the vehicle charging cord 22 is enabled by further controls and menus. Additional controls and menus can be shown on the display 32 in either or both of the screens 40, 40A described above, or in any number of additional screens. By way of example only, the vehicle charging cord 22 of the embodiment illustrated in FIGs. 2, 5-11 and 15 has a third screen 40B shown in FIG. 11. This third screen 40B can be a utilities screen accessed by a user when the "UTILITIES" navigation button 80 is selected in a manner as described above. The third screen 40B also has navigation buttons 116, 118 that can be selected by a user to return to the first screen 40, whether

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by making one or more changes to operation of the vehicle charging cord 22 (by selecting the "GO" navigation button 116), or by making no changes to operation of the vehicle charging cord 22 (by selecting the "CANCEL" navigation button 118). In the illustrated embodiment, selection of either navigation button 116, 118 on the third screen 40B will return the user to the first screen 40.

[0086] With continued reference to FIG. 11, the third screen 40B can show any amount of the information shown on the first screen 40 described above, such as the vehicle charging cord status indicator 42, the communication status indicator 54, the power connection status indicator 56, and the clock 58. The third screen 40B can include a battery charge rate selector 120 enabling a user to change the amperage at which the vehicle charging cord 22 charges a battery 20 connected to the vehicle charging cord 22. This amperage can be changed and set by one or more amperage level buttons 122, such as by using the navigation buttons 36 to highlight one of the amperage level buttons 122 and by using the select button 38 to change the amperage of the vehicle charging cord 22 displayed on the third screen 40B. Any other manner of changing and selecting a charging amperage can be used as desired, including without limitation drop down or pull-up menus displaying various charging amperages that can be selected. Although not shown in FIG. 11, in other embodiments, a similar selector can be used to also or instead change the voltage at which the vehicle charging cord 22 charges a matter 20 connected to the vehicle charging cord 22.

[0087] Additional features that can be used in any of the vehicle charging cord embodiments described and/or illustrated herein relate to communication settings of the vehicle charging cord 22. For example, the third screen 40B of the vehicle charging cord 22 illustrated in FIGs. 2, 5-11 and 15 includes a selector 124 that can be selected by a user to enable and disable Bluetooth® wireless communication with another controller, such as the processor of a user's computer. In other embodiments, the same or different selector can be used to enable and disable other types of wireless and wired communication with another controller. The third screen 40B of the illustrated embodiment also has a selector 126 that can be selected by a user to enable and disable wireless and/or wired communication with a power utility 48.

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[0088] In some embodiments, the controller 44 of the vehicle charging cord 22 can send a communication to the user in the event that one or more different events associated with a vehicle charging session occur. By way of example only, by using conventional power detection circuitry, the controller 44 can detect when a supply of power to the vehicle charging cord 22 has been interrupted, such as in a power failure in the electrical system of the user, at the power utility, or anywhere in between. Identifying and communicating this status to a user can be very important to the user, enabling the user to find another source of electrical power to charge the user's vehicle 18, or at least enabling the user to make appropriate plans based upon the existing level of charge in the vehicle battery 20. As another example, and by using conventional battery diagnostic circuitry, the controller 44 can detect when the battery 20 connected thereto is fully charged or has reached any other level of charge (e.g., a minimum battery charge level as described above). Still other events that can be detected and communicated to the user include a battery fault condition, a problem with the vehicle charging cord 22, and the like.

[0089] Upon detection of any of the events just described, the controller 44 of the vehicle charging cord 22 can send a communication to the user providing notice of the event. For example, the third screen 40B of the vehicle charging cord 22 shown in FIG. 11 includes a selector 128 that can be selected by a user to enable and disable the controller 44 automatically sending a communication indicating that power supply to the vehicle charging cord 22 has been interrupted. As another example, the third screen 40B of the vehicle charging cord 22 shown in FIG. 11 includes a selector 130 that can be selected by a user to enable and disable the controller 44 automatically sending a communication indicating that the battery 20 to which the vehicle charging cord 22 is connected is fully charged.

[0090] The controller 44 of the vehicle charging cord 22 can communicate any of the events described above in a number of different manners. For example, the vehicle charging cord 22 can have a speaker or other sound emitting device (not shown) coupled to the controller 44 and capable of emitting an auditory alarm when any of the above-described events have occurred. The audible alarm can be emitted once upon the occurrence of the event, or can be emitted upon the occurrence of the event and at periodic times (e.g., every 5 minutes, every hour, and the like) after the occurrence of the event. As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility

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48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50. Such a signal can automatically trigger a visual or auditory alarm or other notice via the user's computer and/or the controller 50 of the power utility 48, such as by automatically generating a text message or e-mail from the controller 50 of the power utility 48 to a computer, phone, PDA, or other device of the user, by automatically generating a text message or e-mail from the user's computer to a phone, PDA, or other device of the user, by displaying an alert on the user's computer, and the like. Another mode of communication to the user include an automatically generated telephone call from the power utility 48 (triggered by and/or under control of the controller 50) or the user's computer to a phone of the user, followed by an automatically generated voice message communicating the event and played by phone to the user when the phone is answered. Still other modes of alerting the user to any of the events described above are possible, and fall within the spirit and scope of the present invention.

[0091] In the illustrated embodiment of FIGs. 2, 5-11 and 15, the controller 44 of the vehicle charging cord 22 responds to detection of power interruption or completion of battery charge by either causing an e-mail to be sent to the user and/or by generating an auditory alarm from the vehicle charging cord 22 based upon whether respective selectors 132, 134 for such modes of communication are selected on the third screen 40B illustrated in FIG. 11. In other embodiments, other modes of communication can be similarly enabled and disabled by selection of other selectors.

[0092] FIG. 12 illustrates another embodiment of a vehicle charging cord according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging cord described above in connection with FIGs. 2, 5-11 and 15. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 5-11 and 15. Reference should be made to the description above in connection with FIGs. 2, 5-11 and 15 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging cord illustrated in FIG. 12 and described below. Structure and features of the embodiment shown in FIG. 12 that correspond to

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structure and features of the embodiment of FIGs. 2, 5-11 and 15 are designated hereinafter in the 200 and 300 series of reference numbers.

[0093] The embodiment of the vehicle charging cord 222 shown in FIG. 12 provides an example of how the various indicators, selectors, and user-manipulatable controls can take different forms and be located in different positions and arrangements on the housing 228, and how the vehicle charging cord 222 can have any sub-combination of the feature and elements described above (e.g., any sub-combination of the various indicators, selectors, and user-manipulatable controls described above). The illustrated vehicular charging cord 222 does not have an LCD display as shown in the embodiment of FIGs. 2, 5-11 and 15, and instead has a number of LED displays and indicators. For example, the illustrated vehicular charging cord 222 utilizes an LED display for the battery charge level indicator 260, clock 258, charge time remaining indicator 266, power used indicator 268, charge cost per hour indicator 270, total cost indicator 272, and charge start time/charge completion time indicator 290, 304 (both of which are combined into a common indicator as shown). As another example, the illustrated vehicular charging cord 222 utilizes individual LED lights for the vehicle charging cord status indicator 242 and the communication status indicator 254. The use of LED displays and LED lights can reduce manufacturing costs of the vehicle charging cord 222, and in some embodiments can provide a design of the vehicle charging cord 222 less susceptible to damage compared to the use of LCD and other displays.

[0094] As described above in connection with the illustrated embodiment of FIGs. 2, 5-11 and 15, the battery charge level indicator 260 and clock 258 can display information in any form desired. For example, the battery charge level indicator 260 shown in FIG. 12 is a numerical percentage of full charge, but can take any of the other forms described above in connection with the battery charge level indicator 60 of the embodiment of FIGs. 2, 5-11 and 15.

[0095] In contrast to the selectors 74 on the first screen 40 in the embodiment of FIGs. 2, 5-11 and 15, the selectors 274 in the illustrated embodiment of FIG. 12 are individual buttons of any conventional type, including any of the button types described above in connection with the power, navigation, and select buttons 34, 36, 38 of the embodiment of FIGs. 2, 5-11 and 15. By pressing any of the four buttons 274, a user can start a manual charge, start a programmed charge

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of the type described above in connection with the charge start time 90 illustrated in FIG. 10 (i.e., start charging at a time entered by the user), start a programmed charge of the type described above in connection with the charge completion time 104 illustrated in FIG. 10 (i.e., start charging based upon power utility control and complete charging by a time entered by the user), and stop the vehicle charging cord 222 from charging a battery 20 connected thereto.

[0096] Also, in contrast to the time change buttons 88, 102 on the second screen 40A in the embodiment of FIGs. 2, 5-11 and 15, the time change buttons 288, 302 in the illustrated embodiment of FIG. 12 are mechanical buttons of any type, including any of the button types described above in connection with the power, navigation, and select buttons 34, 36, 38 of the embodiment of FIGs. 2, 5-11 and 15. By pressing on the buttons 288, 302 to the left of the charge start time/charge completion time indicator 290, 304, the hour of the time displayed by the charge start time/charge completion time indicator 290, 304 can be adjusted, whereas by pressing on the buttons 288, 302 to the right of the charge start time/charge completion time indicator 290, 304, the minutes of the time displayed by the charge start time/charge completion time indicator 290, 304 can be adjusted. In other embodiments, any other number, position, and type of time change buttons can be used to adjust the time on the charge start time/charge completion time indicator 290, 304. Following entry of a desired time, a user can press any of the first three selectors 274 (followed in some embodiments by pressing the power button 234) to begin a charging session.

[0097] Although LEDs are used in the illustrated embodiment of FIG. 12 for various indicators and selectors 258, 260, 242, 254, 266, 268, 270, 272, 290, 304, any other type of light-emitting device can instead be used as desired.

[0098] The various embodiments of the vehicle charging cords 22, 222 described above and illustrated in FIGs. 2, 5-12 and 15 can provide significant advantages relating to the portability of the vehicle charging cords 22, 222. By virtue of the fact that the opposite ends 24, 26 of the vehicle charging cords 22, 222 are releasably connected to an electrical system providing a source of electrical power and to the battery 20 of a vehicle, respectively, and by virtue of the fact that the other components of the vehicle charging cord cords 22, 222 are contained within a housing to define a single integral unit, the vehicle charging cords 22, 222 are portable, can be

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readily moved from vehicle to vehicle, can thereby be used to charge any number of different vehicles, and can be moved into and out of (and can be transported by) vehicles with ease. Also, portable charging cords 22, 222 of the type described above and illustrated in FIGs. 2, 5-12 and 15 can be purchased by a user and can be releasably connected to the battery 20 of a vehicle 18, thereby eliminating the need to service the vehicle 18 or to the electrical system at which the vehicle will be charged. This can be particularly useful in cases where the ability to charge the battery 20 of the vehicle 18 in different locations only having standard electrical outlets (and otherwise not being specially adapted to charge electric vehicles) is important or desirable.

[0099] In other embodiments, either end 24, 26 of the charging cord 22, 222 can be permanently secured to the electrical system of the house, building, or other facility and/or to the vehicle 18, 218, respectively. For example, one end 24 of the charging cord 22, 222 can be permanently secured to the electrical system of the house, building, or other facility (i.e., not intended or adapted for removal by a user, such as by being wired directly into a junction box or circuit breaker of the electrical system of the house, building, or other facility). In such cases, the charging cord 22, 222 can be wound upon and stored in a floor standing, wall-mounted, or ceiling-mounted reel (not shown), such as those disclosed in U.S. Patent No. 6,439,360, the entire disclosure of which is incorporated herein by reference. The reel can be spring-loaded to enable the vehicle charging cord 22, 222 to be easily wound upon the reel for storage, or can be manually turned for this purpose. In such embodiments, the majority or almost all of the length of the charging cord 22, 222 can be defined between the housing 28, 228 and the end 226 of the charging cord 22, 222 intended for connection to the electrical system of the facility. In this manner, the majority or almost all of the vehicle charging cord 22, 222 can be conveniently stored. Such vehicle charging cords provide a significant benefit to users desiring to charge two or more vehicles 18, 218 at the same facility using the same vehicle charging cord 22, 222, such as for charging one vehicle 18, 218 during the day and for charging another vehicle 18, 218 at night using the same vehicle charging cord 22, 222. The use of one vehicle charging cord 22, 222 for two or more vehicles 18, 218 can provide significant cost savings to the user(s) of the vehicles 18, 218.

[00100] As another example, one end 26 of the charging cord 22, 222 can be permanently secured to the vehicle 18, 218 (i.e., not intended or adapted for removal by a user, such as by

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being permanently connected to one or more wiring harnesses of the vehicle, or by being connected to an electrical junction box or fuse box of the vehicle 18, 218). In such cases, the charging cord 22, 222 also be wound upon and stored in a reel (not shown) carried by the vehicle 18, 218, such as the reels disclosed in U.S. Patent No. 6,439,360 and incorporated by reference above. The reel can be mounted directly to the frame of the vehicle 18, 218, an interior surface of a body part of the vehicle 18, 218, to a bracket or other fixture (e.g., radiator mounting bracket, alternator or battery mounting bracket, and the like) of the vehicle 18, 218, to the front or rear bumper of the vehicle 18, 218, or to any other location providing suitable strength to carry the reel and vehicle charging cord 18, 218. As described above, the reel can be spring-loaded to enable the vehicle charging cord 22, 222 to be easily wound upon the reel for storage on the vehicle, or can be manually turned for this purpose. In such embodiments, the majority or almost all of the length of the charging cord 22, 222 can be defined between the housing 28, 228 and the end 224 of the charging cord 22, 222 intended for connection to the vehicle 18, 218. In this manner, the majority or almost all of the vehicle charging cord 22, 222 can be conveniently stored on the vehicle. The vehicle-mounted vehicle charging cord 22, 222 provides a significant benefit for users needing to charge their vehicle battery 20, 220 in multiple locations, as the vehicle charging cord 22, 222 is conveniently carried by the vehicle 18, 218 from destination to destination.

[00101] Although reel-based vehicle charging cords as just described are described in connection with vehicle charging cords 22, 222 not intended for release by a user from both the vehicle 18, 218 and the electrical system of the facility, it should be noted that the other portable vehicle charging cord embodiments described and/or illustrated herein (i.e., those intended for user release at both ends) can also include a spring-loaded or non-spring-loaded reel as just described. In this manner, such vehicle charging cords 22, 222 can be quickly and conveniently placed in a relatively portable and compact state.

[00102] FIGs. 13, 14, and 16 illustrate an embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging cord described above in connection with FIGs. 2, 5-12 and 15. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection

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with FIGs. 2, 5-12 and 15. Reference should be made to the description above in connection with FIGs. 2, 5-12 and 15 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIGs. 13, 14, and 16 and described below. Structure and features of the embodiment shown in FIGs. 13, 14, and 16 that correspond to structure and features of the embodiment of FIGs. 2, 5-12 and 15 are designated hereinafter in the 400 and 500 series of reference numbers.

[00103] Despite the significant advantages provided by the portable vehicle charging cords 22, 222 described above in connection with FIGs. 2, 5-12 and 15, other significant advantages are realized by incorporating the elements and features of the vehicle charging cords 22, 222 into a vehicle 18. With reference to FIGs. 13, 14, and 16, the illustrated vehicle charging system uses much of the same elements and features described above in connection with the various embodiments of the vehicle charging cords 22, 222. In this regard, FIG. 13 illustrates a portion of the dashboard of a vehicle 18, and includes a battery charge level indicator 460 integrated into the same part of the vehicle dashboard as an oil temperature indicator 538. Also integrated into the same portion of the dashboard, by way of example only, is a vehicle charging status indicator 442. The vehicle charging status indicator 442 shown in FIG. 13 can be similar to the charge status display area 76 described above in connection with the vehicle charging cord 22 of FIGs. 2, 5-11 and 15. Accordingly, one or more lights can be used to illuminate the words "MANUAL CHARGING IN PROCESS" when the vehicle battery charging system is in a manual charging mode as described above, whereas one or more other lights can be used to illuminate the words "PROGRAMMED CHARGE IN PROCESS" when the vehicle battery charging system is in a programmed charging mode as also described above. Any other manner of displaying the vehicle charging status indicator 442 can be used as desired, including without limitation an LED or LCD display, one or more lamps adjacent printed graphics, and the like.

[00104] With continued reference to the illustrated embodiment of FIGs. 13, 14, and 16, the illustrated vehicle charging system can include a display 432 located in the console of the vehicle 18. As used herein, the term "console" refers to any portion of the interior of a vehicle (i.e., in the interior passenger cabin of the vehicle) having one or more manual or electronic controls for controlling operation of a vehicle 18 and/or one or more indicators showing the status of vehicle operation. For example, the console of a vehicle 18 can include a dashboard having a

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speedometer, odometer, RPM gauge, oil temperature gauge, and the like, a navigation screen with associated indicators and/or controls, HVAC indicators and controls, an entertainment center (e.g., radio, DVD or other video system, CD, MP3 or other audio system, and the like) with associated indicators and controls, environmental temperature indicators, travel direction indicators, and the like. The console can be located immediately in front of the driver, to either side of the driver, in central forward area of the vehicle cabin, in an area between the driver's seat and an adjacent passenger seat, in an interior location on the roof or otherwise at a higher elevation than a horizontal line of sight of the user, and the like. Also, the console of the vehicle can extend to and be positioned in any combination of these interior vehicle locations, such as a single console including the dashboard and central area between the driver and passenger seats.

[00105] In some embodiments, the selectors and indicators (including any displays) of the vehicle charging system are located in their own dedicated console, whereas in other embodiments, the console carrying such features also carries other vehicle indicators and controls. Also, the selectors and indicators (including any displays) of the vehicle charging system can be located in two or more consoles, if desired, such as one or more indicators located in the dashboard console of the vehicle 18 and the remainder located in another console located between the driver and passenger at the front of the passenger compartment. Any combination of selectors and indicators located in any combination of vehicle consoles is possible, and falls within the spirit and scope of the present invention.

[00106] The display 432 shown in FIG. 14 is a touch screen display 432, and includes many of the same indicators and selectors used in the vehicle charging cord embodiments described above in connection with FIGs. 2, 5-11 and 15. In particular, the display 432 includes a charge time remaining indicator 466, power used indicator 468, charge cost per hour indicator 470, and total cost indicator 472 like those of the vehicle charging cords 22, 222 described and illustrated above. Also, the illustrated display 432 includes another vehicle charging status indicator 442 that can be used in addition to or in place of that shown in FIG. 13, and a communication status indicator 454 and power connection status indicator 456 similar to those described above in connection with the illustrated embodiment of FIGs. 2, 5-11 and 15. Although a clock can also be included on the display 432, a clock is not included in the display 432 of FIG. 14 in lieu of another clock of the vehicle 18 located elsewhere on the dashboard or console of the vehicle 18.

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This other clock can be connected to the same controller 444 (see FIG. 16) as the rest of the vehicle charging system, thereby providing the controller 444 with the time of day information needed to begin programmed charging operations as described above.

[00107] The display 432 illustrated in FIG. 14 can display multiple screens 440 to be shown upon the display 432, thereby enabling a significantly greater amount of battery and battery charging information to be shown on the display, and/or enabling a greater degree of control over the vehicle charging system. Like the vehicle charging cords 22, 222 described above, navigation between screens 440 on the display 432 is enabled by navigation buttons on the screens. For example, the screen 440 shown in FIG. 14 includes two navigation buttons 478, 480 like those of the illustrated embodiment of FIGs. 2, 5-11 and 15 described above. By pressing one of the navigation buttons 478 (entitled "PROGRAMMED CHARGE SETUP"), the screen 440 is replaced by a charge programming screen (not shown) having any or all of the indicators and selectors 42, 54, 56, 58, 82, 84, 86, 88, 90, 100, 102, 104, 110, 112, and/or 114 described above in connection with the second screen 40A in FIG. 10. These indicators and selectors can have the same or any other arrangement upon the programming screen. By pressing the other navigation button 480 (entitled "UTILITIES"), the screen 440 is replaced by a utilities screen (also not shown) having any or all of the indicators and selectors 42, 54, 56, 58, 116, 118, 120, 122, 124, 126, 128, 130, 132, and/or 134 described above in connection with the third screen 40B in FIG. 11. These indicators and selectors can have the same or any other arrangement upon the utilities screen.

[00108] To begin or stop a manual or programmed charging session, the embodiment of the present invention illustrated in FIGs. 13, 14, and 16 can include a single power button that in some embodiments can change text to indicate whether a selection can be made by a user to start or stop a charging session (e.g., changing from "START CHARGE" to "STOP CHARGE" once a user selects "START CHARGE", or changing from "STOP CHARGE" to "START CHARGE" once the user selects "STOP CHARGE"). In other embodiments, such as that shown in FIGs. 13, 14, and 16, the screen 440 can include separate buttons 434A, 434B to start or stop a charging session, such as to start a manual charge if none of the selectors for a programmed charge have been selected on a programming screen, or to start a programmed charge of any type described herein.

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[00109] Although the in-console display 432 illustrated in FIG. 14 is a touch screen display 432, the display 432 can be any other type of display, such as the other types of displays described and illustrated herein. For example, the touch screen display 432 can be replaced by a display such as that shown in FIGs. 5-11 or FIG. 12, in which cases the vehicle charging system can include navigation buttons (e.g., adjacent the display 432) enabling a user to navigate through a screen and to select any selectors upon the display 432. As another example, the touch screen display 432 can be replaced by any combination of buttons, switches, dials, or other user-manipulatable controls; LEDs and other lights; and displays (e.g., see FIG. 12).

[00110] A schematic diagram of the vehicle charging system in which an in-console display 432 is utilized and/or in which the in-console vehicle charging selectors and indicators are otherwise utilized is shown in FIG. 16. Like the embodiments of FIGs. 2, 5-12 and 15 described above, the system illustrated in FIG. 16 is releasably coupled to a source of power 412 operated and controlled by a power utility 448 having a transceiver 452 and controller 444 (e.g., a computer) that can communicate via a PLC system with the controller 444 of the vehicle charging system. In the illustrated embodiment of FIG. 16, however, the display 432 and other controls and indicators are located in one or more in-cabin consoles of the vehicle 418. Therefore, a power cord 540 having ends 424, 426 described above in connection with the embodiments of FIGs. 2, 5-12 and 15 (but without the housing and other components carried in or on the housing) can be used to releasably connect the battery 420 of the vehicle 418 with the electrical system of the facility used to charge the battery 420 as also described above. As with the earlier-described embodiments, the power cord 540 can be releasably coupled to the vehicle 418, and in other embodiments can instead be stored on-board the vehicle 418 when not in use (e.g., by a cord reel mounted on the vehicle as described above). Also as with the earlier-described embodiments, the power cord 540 can also or instead be releasably coupled to the electrical system of the house, office, or other facility to enable the power cord 540 to be more readily and easily moved within and removed from the facility, or can be permanently connected to the electrical system.

[00111] With continued reference to FIG. 16, the illustrated vehicle charging system also includes a transceiver 446 for communication between the controller 444 on board the vehicle 418 and the transceiver 452 and controller 440 of the power utility 448, a power transformer 536,

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an amp meter 494, a volt meter 496, a switch 492, and a memory 506 performing the same functions described above in conjunction with the embodiments of FIGs. 2, 5-12, and 15. It should be noted that the controller 444 of the vehicle charging system can be a dedicated controller (e.g., a processor or set of discrete logic elements) separate from the other controllers of the vehicle (e.g., those used to control vehicle startup, vehicle access and security, and engine operation, smart battery controllers, and the like), or can be the same as such other controller(s). Accordingly, the electronics of the vehicle charging system according to some embodiments of the present invention can be fully or partially integrated into one or more other controllers of the vehicle, or can be separate therefrom. In either case, the controller 444 can be located within a housing (not shown), and can be connected via suitable wiring harnesses or other wired or wireless electrical connections to an electrical connector on the vehicle (adapted for releasable mating connection to an external power cord as described above) or to a power cord carried by the vehicle as also described above. Similarly, the memory 506, transceiver 446, and clock can be dedicated solely for operation of the vehicle charging system as described in earlier embodiments, or can instead be shared by other systems of the vehicle 418.

[00112] The vehicle charging system shown in FIG. 16 can function in the same manners described above in connection with the embodiments of FIGs. 2, 5-12, and 15, it being understood that communications, power control, programming, and other features of the vehicle charging system are performed on-board the vehicle 418 rather than in a vehicle charging cord as shown in FIGs. 2, 5-12, and 15. Accordingly, power supply and communications in the embodiment of FIG. 16 can include power supply and communications over one or more suitable power cords, wiring harnesses, and the like of the vehicle performing the same functions (including PLC and power transmission functions) as the flexible power cords on both sides of the housings 28, 228 illustrated in FIGs. 2 and 5-12.

[00113] FIG. 3 illustrates another embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging cord described above in connection with FIGs. 2, 5-12 and 15. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 5-12 and 15. Reference should be made to the description above in connection with

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FIGs. 2, 5-12 and 15 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIG. 3 and described below. Structure and features of the embodiment shown in FIG. 3 that correspond to structure and features of the embodiment of FIGs. 2, 5-12 and 15 are designated hereinafter in the 600 and 700 series of reference numbers.

[00114] The vehicle charging system illustrated in FIG. 3 operates in substantially the same manner as that of FIGs. 2, 5-12 and 15. However, in the illustrated embodiment of FIG. 3, the vehicle charging system is embodied in a cabinet 742. The cabinet 742 performs functions similar to the housings 28, 228 described and illustrated herein, such as to house the controller, transformer, and other electronics of the vehicle charging system. In some embodiments, the cabinet 742 can be wall-mounted and/or floor-mounted (such as that shown in FIG. 3).

[00115] The cabinet 742 of the vehicle charging system can include a display 732 having any of the features and performing any of the functions described above in connection with the displays 32 of the embodiments shown in FIGs. 2, 5-11, 14, and 15. The display 732 can be a touch screen display or any other type of display as described herein, and can be accompanied by any number and type of user manipulatable controls (e.g., navigation buttons) as also described herein. Any combination of selectors and indicators (including displays) described and/or illustrated herein can be provided on the cabinet to perform the vehicle charging functions also described herein.

[00116] In some embodiments, the cabinet 742 is provided with a power cord 744 terminating in a plug 624 that can be releasably connected to a vehicle 618 (and to the battery 620 thereof). The plug 624 can take any of the forms described above in connection with the embodiments of FIGs. 2, 5-12, and 15. In some embodiments, the power cord 744 can be stored on a reel (not shown) in or adjacent the cabinet 742. The reel can take any of the forms described above in connection with other embodiments of the present invention. Although the cabinet 742 can provide a convenient location for storage of the power cord 744, the power cord 744 can instead be permanently or releasably coupled to the vehicle 618 for storage on the vehicle 618 when the power cord 744 is not in use. For example, the power cord 744 can be stored upon a reel of the vehicle 618 as described in greater detail above. In those embodiments in which the power cord

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744 is intended to be stored and carried by the vehicle 618, the power cord 744 can have an opposite end terminating in a plug (such as any of the plugs described above in connection with plug 26 shown in FIG. 5). The cabinet 742 can be provided with any number of electrical connectors for releasable mating engagement with the plug (and for any number of other plugs on power cords 744 extending to other vehicles 618).

[00117] FIG. 17 illustrates another embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging system described above in connection with FIGs. 2, 3, and 5-16. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 3, and 5-16. Reference should be made to the description above in connection with FIGs. 2, 3, and 5-16 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIG. 17 and described below. Structure and features of the embodiment shown in FIG. 17 that correspond to structure and features of the embodiments of FIGs. 2, 3, and 5-16 are designated hereinafter in the 800 and 900 series of reference numbers.

[00118] Like the embodiment of FIGs. 2, 3, and 5-16, the vehicle charging system of FIG. 17 also includes a transceiver 846 for communication between a controller 844 and the transceiver 852 and controller 840 of the power utility 848, a power transformer 836, an amp meter 894, a volt meter 896, a switch 892, and a memory 906 performing the same functions described above in conjunction with the embodiments of FIGs. 2, 5-12, and 15. A clock 858, display 832, and associated user-manipulatable controls as described above (or other types and combinations of selectors and indicators, with or without displays) are also included for providing information to the user and for receiving instructions from the user in any of the manners also described above.

[00119] The vehicle charging system of FIG. 17 includes a battery 946 that can be charged in any of the same manual or programmed manners described above in connection with the embodiments of FIGs. 2, 3, and 5-16. The battery 946 is separate from the battery 920 of the vehicle 918, and can have any size sufficient for at least partially charging the battery 920 of the vehicle 918 when connected thereto. Rather than or in addition to charging a battery 920 of the

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vehicle 918 as described herein in connection with other embodiments of the present invention, the vehicle charging system of FIG. 17 operates to charge the battery 946 that remains at the house, building, or other facility at which vehicle charging takes place. The battery 946 therefore functions as a reservoir of power that can collect and store a charge for later transfer to batteries 946 of one or more vehicles 918. Accordingly, although the battery 946 can have any size suitable for charging a battery 920 of a vehicle 918, in some embodiments the battery 946 has a capacity capable of fully charging the battery 920 of at least one vehicle 918 when the battery 920 of the vehicle 918 has no charge or substantially no charge.

[00120] The battery 946 can be located anywhere in a house, building, or other facility where vehicle battery charging is desired, and in some embodiments is located an a garage in which the vehicle is stored. For example, the battery 946 can be stored in a cabinet also housing the rest of the vehicle charging system (e.g., in a lower portion of the cabinet 742 illustrated in FIG. 3). In some embodiments, the battery 946 can be sufficiently oversized (in voltage, current, or capacity) for completely charging a drained vehicle battery 920 connected thereto so that improved or optimized battery charging conditions can be achieved. The battery 946 can also be oversized to carry sufficient charge for charging two or more fully or substantially discharged vehicle batteries 920. Also, in some embodiments, the vehicle charging system can have one or more power converters (e.g., DC to DC converters) to increase the output voltage of the battery 946 sufficiently for charging the vehicle battery 920.

[00121] With continued reference to the illustrated embodiment of FIG. 17, the vehicle charging system can include an additional relay or other electrical switch 948 coupled to the controller 844. The switch 948 can enable a user to begin charging the battery 920 of a vehicle 918 connected to the vehicle charging system only when desired. Accordingly, the controller 844 can send a signal to close the switch 948 upon receiving a command from a user (e.g., via a user-manipulatable control having any of the forms described herein) to begin charging the battery 920 of a vehicle 918 connected thereto. Like the other embodiments described and illustrated herein, the switch 948 can be controlled by a user and/or can be controlled by a power utility 948 via the transceivers 846, 852 and controllers 840, 844.

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[00122] By virtue of the battery 946 in the embodiment of FIG. 17, control over a community's power draw needed for charging vehicles 918 is greatly increased. Rather than wait until a vehicle 918 is connected to the electrical system of a house, building, or other facility in order to supply power to charge the battery 920 of the vehicle 918, the user or power utility 848 can be free to supply vehicle battery charging power at any convenient time. For example, if the power utility 848 has a period of relatively low daytime demand that is unexpected (such as a drop in power draw during an otherwise peak or high demand time), the power utility 848 can begin charging the battery 946 regardless of whether the vehicle 918 is in another location. This flexibility can enable the power utility 848 to independently send relatively low-cost battery charging power – and/or for the user to independently draw relatively low-cost battery charging power - at times of power surplus regardless of the location of the vehicle 918 to be charged.

[00123] In some embodiments, the vehicle charging system of FIG. 17 can also operate in a manner similar to the embodiments of FIGs. 2, 3, and 5-16, whereby a user can connect the battery 920 of the vehicle 918 for charging, and the battery 920 can be charged in any manual or programmed mode by closure of the switches 892, 948 under control of the controller 844. Such charging can take place without draining the battery 946 described above (such as by a suitable electrical bypass around the battery 946), or can be supplemented by any amount of charge existing in the battery 946. In this regard, if the cost for charging or partially charging the battery 946 of the vehicle charging system is higher than the calculated cost of charging the battery 920 of the vehicle 918 at the desired charging start time (both figures being available to the controller 844 as described above, and being storable in and retrievable from the memory 906 as desired), the controller 844 can control the switches 892, 948 to charge the vehicle battery 920 using the charge from the system battery 946 first. If the opposite is true, the controller 844 can control the switches 892, 948 to charge the vehicle battery 920 using power directly from the power utility 848 without draining the system battery 946. These operating conditions can be continually monitored by the controller 844, which in some embodiments can automatically react to changing power supply costs while charging is in process by changing the source of charging current (i.e., system battery 946 or power utility 848).

[00124] The vehicle charging system of FIG. 17 is illustrated in the form of a portable vehicle charging cord, such as the embodiments of FIGs. 2, 5-12, and 15. However, the features of the

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vehicle charging system of FIG. 17 can be incorporated into any of the vehicle charging system embodiments described and/or illustrated herein, including those illustrated in FIGs. 3, 13, 14, 16, and FIGs. 4, 18, and 19 (described below).

[00125] FIGs. 4, 18, and 19 illustrate another embodiment of a vehicle charging system according to the present invention. This embodiment employs much of the same structure and has many of the same properties as the embodiments of the vehicle charging systems described above in connection with FIGs. 2, 3, and 5-17. Accordingly, the following description focuses primarily upon the structure and features that are different the embodiments described above in connection with FIGs. 2, 3, and 5-17. Reference should be made to the description above in connection with FIGs. 2, 3, and 5-17 for additional information regarding the structure and features, and possible alternatives to the structure and features of the vehicle charging system illustrated in FIGs. 4, 18, and 19 and described below. Structure and features of the embodiment shown in FIGs. 4, 18, and 19 that correspond to structure and features of the embodiments of FIGs. 2, 3, and 5-17 are designated hereinafter in the 1000 and 1100 series of reference numbers.

[00126] The vehicle charging system illustrated in FIGs. 4, 18, and 19 has the same components and features as described above in connection with the on-board vehicle charging system of FIGs. 13, 14, and 16, but is further adapted for charging the battery 1020 of the vehicle 1018 by induction charging. Accordingly, the vehicle charging system illustrated in FIGs. 4, 18, and 19 has a touch screen display 1032 having a charge time remaining indicator 1066, power used indicator 1068, charge cost per hour indicator 1070, and total cost indicator 1072 as described in greater detail in the embodiments above. Also, the illustrated display 1032 includes a vehicle charging status indicator 1042 (not shown in FIG. 19, but in the text banner at the top of the illustrated display 1032 in FIG. 19 when docking is not in process), a communication status indicator 1054, and a power connection status indicator 1056 as described in greater detail in the embodiments above.

[00127] The display 1032 illustrated in FIG. 19 can display multiple screens 1040 to be shown upon the display 1032, thereby enabling a significantly greater amount of battery and battery charging information to be shown on the display, and/or enabling a greater degree of control over the vehicle charging system. Navigation between screens 1040 on the display 1032 is enabled by

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navigation buttons on the screens 1040. For example, the screen 1040 shown in FIG. 19 includes two navigation buttons 1078, 1080 for navigation to programming and utility screens as described in greater detail in the embodiments above. Also, the screen 1040 has separate buttons 1034A, 1034B to start or stop a charging session.

[00128] Although the in-console display 1032 illustrated in FIG. 19 is a touch screen display 1032, the display 1032 can be any other type of display, such as the other types of displays described and illustrated herein. For example, the touch screen display 1032 can be replaced by a display such as that shown in FIGs. 5-11 or FIG. 12, in which cases the vehicle charging system can include navigation buttons (e.g., adjacent the display 1032) enabling a user to navigate through a screen and to select any selectors upon the display 1032. As another example, the touch screen display 1032 can be replaced by any combination of buttons, switches, dials, or other user-manipulatable controls; LEDs and other lights; and displays (e.g., see FIG. 12).

[00129] With reference now to FIG. 4, the vehicle charging system of FIGs. 4, 18, and 19 utilizes a conventional battery induction charging system in order to charge the battery 1020 of the vehicle 1018, and includes a charging pad 1150 having a power supply core (not shown) energized to supply power via induction to a power receiving core of the vehicle (shown schematically at 1152 in FIG. 18). By way of example only, an inductive vehicular battery charger system that can be used is disclosed in U.S. Patent No. 6,525,510, the entire contents of which are incorporated herein by reference. The power supply core of the charging pad 1150 is electrically connected to and receives power from a vehicular charger that is the same as that described above in connection with the embodiment of FIG. 3. In particular, the core of the charging pad 1150 is electrically connected to the electrical system of the house, building, or other facility at which charging is to take place via a below-ground or above-ground power line 1144 extending to a cabinet 1142 having any of the selectors and indicators (including display(s)) described above in connection with FIG. 3. In this regard, any of the alternative vehicle charger features and structures also described above in connection with the embodiment of FIG. 3 can also be applied in the inductive vehicular charging system of FIGs. 4, 18, and 19.

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[00130] As is well known to those in the art of inductive battery charging, proper alignment between the power supply core and the power receiving core of the battery charger is important for efficient battery charging. In the illustrated embodiment of FIGs. 4, 18, and 19, this alignment can be achieved by user operation of the vehicle 1018. In particular, one or more sensors 1154 can be provided on the vehicle 1018 and can be positioned to detect the presence and proximity of the vehicle charging pad 1150 and core thereof. The sensors 1154 can be inductive sensors adapted to detect the presence of metallic elements 1156 in the vehicle charging pad 1150 or having known positions with respect to the vehicle charging pad 1150 and core. Alternatively, the sensors 1154 can be Hall Effect sensors adapted to detect the magnetic field of magnets or electromagnets having known positions on or with respect to the vehicle charging pad 1150 and core. In other embodiments, the sensors 1154 can be RFID sensors adapted to detect the position of one or more RFID transmitters having known positions on or with respect to the vehicle charging pad 1150 and core. Still other types of sensors 1154 can instead be used, including without limitation optical sensors, eddy current sensors, and ultrasonic sensors for use in conjunction with optical, eddy current, and ultrasonic sensing and position systems, all of which operate on principles well-known to those skilled in the art. By detecting the distance between the sensor(s) 1154 on the vehicle 1018 and one or more reference points on the charging pad 1150 (or having known positions with respect to the charging pad 1150), the position of the sensor(s) 1154 with respect to the charging pad 1150 can be identified via triangulation. Triangulation systems operating to detect the relative position of objects based upon any of these technologies are well-known to those skilled in the art, and are not therefore described further herein.

[00131] In other embodiments, the locations of the sensors 1154 and the elements 1156 (e.g., metallic elements 1156, magnets or electromagnets, RFID transmitters, and the like, as described above) detected by the sensors 1154 can be reversed, whereby one or more of the sensors 1154 can be located on the charging pad 1150 or located at known positions with respect to the charging pad 1150 for detecting one or more elements 1156 (e.g., metallic elements 1156, magnets or electromagnets, RFID transmitters, and the like, as described above) of the vehicle 1018.

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[00132] The controller (not shown) of the inductive vehicle charging system illustrated in FIGs. 4, 18, and 19 receives signals from the sensor(s) 1154 described above, and based upon a conventional triangulation algorithm as described above, determines the direction in which the vehicle 1018 must move for desired alignment of the vehicle 1018 (and power receiving core connected to the battery 1020 of the vehicle 1018) with respect to the charging pad 1150 and core thereof. Upon making this determination, the controller can display directional instructions to the user. In the illustrated embodiment of FIGs. 4, 18, and 19, directional indicators 1160 are displayed on the same touch screen display 1032 described above, along with a text line 1162 noting the direction the vehicle 1018 should move for proper charging alignment. In other embodiments, this information can be provided on another display (e.g., on a display located in a console of the vehicle 1018), or can be located on another type of display (not necessarily a touch screen). Also, in some embodiments, this information can be presented without a display 1032, such as by illumination of one or more LEDs or other lights to illuminate an arrow or other symbol, text, or any combination of symbols and text providing directional instructions to the user.

[00133] By way of example only, the touch screen display 1032 illustrated in FIG. 19 presents text 1162 indicating the direction in which the user should move the vehicle 1018 for proper charging alignment, presents arrow symbols 1160 in any combination (e.g., forward, rearward, left, right) around a graphical depiction of the vehicle 1164, and also displays a graphical depiction of the front wheels 1166 turned in the direction needed for proper charging alignment. Any combination of these and other alignment symbols and text instructions 1168 can be displayed to the user to indicate how the vehicle 1018 should be moved for proper charging alignment. Such symbols and/or text 1168 can be updated continuously or periodically as the position of the sensors 1154 and vehicle 1018 change with respect to the charging pad 1150 and core thereof, until alignment within a predetermined acceptable error calculated by the controller is achieved. In some embodiments, the control(s) selected to begin a charging session (e.g., the "START CHARGE" selector 1034A on the touch screen display 1032 of the illustrated embodiment) are disabled until such alignment is achieved.

[00134] By utilizing the sensors 1154, sensed elements 1156, and alignment indicators 1168 as just described, proper alignment of the vehicle 1018 with respect to the charging pad 1150 can

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be conveniently and quickly achieved without requiring the user to leave the vehicle 1018. Also, a charging session can be started without the need to plug in the vehicle 1018.

[00135] Although the induction-based vehicle charging system described above in connection with FIGs. 4, 18, and 19 is presented in the context of an on-board vehicle charging system (i.e., where the display 1032, and other indicators and selectors are located in one or more consoles of the vehicle 1032, it should be noted that the vehicle alignment features described above can be used in connection with any of the other vehicle charging systems herein.

[00136] Another feature of the present invention regards the location at which a cord-based vehicle charging system is attached to the vehicle. As described above, some vehicle charging systems according to the present invention utilize a cord 22, 222, 540, 744, 944 that is releasably or permanently attached to the vehicle 18, 218, 418, 618, 818. It will be appreciated that such a tethered connection can present the danger of a user accidentally moving the vehicle 18, 218, 418, 618, 818 before disconnecting the cord 22, 222, 540, 744, 944 from the vehicle 18, 218, 418, 618, 818. Depending upon the position and orientation of the electrical connector of the vehicle 18, 218, 418, 618, 818 to which the cord 22, 222, 540, 744, 944 is connected, and the manner in which the opposite end of the cord 22, 222, 540, 744, 944 is attached to the electrical system of the house, building, or other facility, such movement can create significant damage to the vehicle 18, 218, 418, 618, 818, cord 22, 222, 540, 744, 944, and/or the electrical system of the house, building, or other facility. In some embodiments of the present invention, this damage can be mitigated or avoided by virtue of the position of the electrical connector of the vehicle 18, 218, 418, 618, 818.

[00137] With reference now to FIGs. 20-23, another embodiment of the present invention is illustrated, and is presented in the context of the vehicle charging cords 22, 122 in the embodiments of FIGs. 2, 5-12, and 15 by way of example only. In this regard, the features described below in connection with FIGs. 20-23 can be utilized in conjunction with any of the vehicle charging systems disclosed herein in which a power cord 22, 222, 540, 744, 944 is attached to a vehicle 18, 218, 418, 618, 818 for purposes of charging the battery 20, 222, 422, 622, 822 of the vehicle 18, 218, 418, 618, 818.

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[00138] As shown in FIGs. 20-22, the plug 26 of the vehicle charging cord 22, 222 releasably connects to the electrical connector 170 of the vehicle 18, 218. In the illustrated embodiment of FIGs. 20-22, the electrical connector 170 of the vehicle is located in a front surface 172 of the vehicle 18, 218. Accordingly, in the event a user moves the vehicle 18, 218 in a rearward direction without disconnecting the vehicle charging cord 22, 222, the opportunity for the plug 26 of the vehicle charging cord 22, 222 to automatically disconnect by virtue of rearward movement of the vehicle 18, 218 is significantly increased. Of course, a significant factor in the amount of shear and tension force exerted upon the plug 26, vehicle charging cord 22, 222, and electrical connector 170 prior to this disconnection is the location of the other end of the vehicle charging cord 22, 222. In those embodiments where the other end (e.g., plug 24) of the vehicle charging cord 22, 222 is connected to the electrical system of a house, building, or other facility substantially in front of the vehicle 18, 218, this force can be significantly less than the disconnection force needed in those embodiments in which the other end of the vehicle charging cord 22 is connected at a location laterally disposed from the vehicle 18, 218. However, for those applications in which the vehicle 18, 218 must be backed up to exit the vehicle charging area, this location of the electrical connector 170 can significantly reduce the amount of disconnection force compared to locations of the electrical connector 170 located on a side or rear of the vehicle 18, 210.

[00139] Although not illustrated, in some embodiments, the electrical connector 170 of the vehicle 18, 218 is located in a rear surface 174 of the vehicle 18, 218. Accordingly, in the event a user moves the vehicle 18, 218 in a forward direction without disconnecting the vehicle charging cord 22, 222, the opportunity for the plug 26 of the vehicle charging cord 22, 222 to automatically disconnect by virtue of forward movement of the vehicle 18, 218 is significantly increased. As described above, a significant factor in the amount of shear and tension force exerted upon the plug 26, vehicle charging cord 22, 222, and electrical connector 170 prior to this disconnection is the location of the other end of the vehicle charging cord 22, 222. In those embodiments where the other end (e.g., plug 24) of the vehicle charging cord 22, 222 is connected to the electrical system of a house, building, or other facility substantially behind the vehicle 18, 218, this force can be significantly less than the disconnection force needed in those embodiments in which the other end of the vehicle charging cord 22 is connected at a location laterally disposed from the vehicle 18, 218. However, for those applications in which the vehicle

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18, 218 must be moved forward to exit the vehicle charging area, this location of the electrical connector 170 can significantly reduce the amount of disconnection force compared to locations of the electrical connector 170 located on a side or front of the vehicle 18, 218.

[00140] In some embodiments, a clearance or light interference fit is provided between the plug 24 of the vehicle charging cord 22, 222 and the electrical connector 170 (located in a front or rear surface 172, 174 of the vehicle 18, 218 as described above), thereby providing a reduced amount of force needed to disconnect the plug 24 from the electrical connector 170. In some embodiments, a force needed for disconnection of the plug 24 from the electrical connector 170 is no greater than about 20 pounds (measured in a direction parallel to motion of the plug 24 with respect to the electrical connector 170 during connection) to avoid or reduce damage to the vehicle charging cord 22, 222, electrical connector 170, and vehicle 18, 218. In other embodiments, this force is no greater than about 10 pounds to avoid or reduce damage to the vehicle charging cord 22, 222, electrical connector 170, and vehicle 18, 218. In still other embodiments, this force is no greater than about 5 pounds to avoid or reduce damage to the vehicle charging cord 22, 222, electrical connector 170, and vehicle 18, 218.

[00141] As indicated above, the angle at which the force of disconnection is applied upon the electrical connector 170 and plug 24 can have a significant impact upon the shear and tension forces experienced by the electrical connector 170 and plug 24 when the vehicle 18, 218 is moved without unplugging the vehicle charging cord 22, 222. To reduce or mitigate these forces, the orientation of the electrical connector 170 with respect to the vehicle 18, 218 is selected to fall within a range of angles measured from a forward direction of the vehicle 18, 218. In particular, in some embodiments, the electrical connector 170 is oriented so that an angle 176 (see FIG. 21) between the forward direction of the vehicle 18, 218 (defined by proper alignment of the vehicle under normal operating conditions) and the direction of motion of the plug 24 with respect to the electrical connector 170 during connection is no greater than about 50 degrees. In other embodiments, this angle 176 is no greater than about 40 degrees to reduce or mitigate the disconnection force. In still other embodiments, this angle 176 is no greater than about 30 degrees to reduce or mitigate the disconnection force. In combination with the maximum disconnection forces according to some embodiments as described above, these orientation angles 176 of the electrical connector 170 can help to ensure damage-free

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disconnection of the vehicle charging cord 22, 222 from the electrical connector 170 of the vehicle 18, 218 regardless of whether the electrical connector 170 is located in the front or rear surface 172, 174 of the vehicle 18, 218 as described above.

[00142] In some embodiments, the vehicle 18, 218 is provided with two or more electrical connectors 170 in different locations (e.g., different sides) on the exterior of the vehicle 18, 218, any of which can be connected to a vehicle charging cord 22, 222 to charge the battery 20, 220 of the vehicle 18, 218. For example, one electrical connector 170 can be located in a front surface 172 of the vehicle 18, 218, and another electrical connector 170 can be located in a rear surface 172 of the vehicle 18, 218. Both such electrical connectors 170 can be connected to the battery 20, 220 and controller 44, 244 of the vehicle 18, 218 by suitable power wiring (e.g., wiring harnesses) extending along the vehicle 18, 218. In such embodiments, a user can choose to connect the vehicle charging cord 22, 222 to the electrical connector 170 closest to the location at which the vehicle charging cord 22, 222 is connected to the electrical system of the house, building, or other charging facility, or can connect the vehicle charging cord 22, 222 to the electrical connector 170 oriented at the smallest angle with respect to such a location upon accidental movement of the vehicle 18, 218. This ability to choose between two or more electrical charging connectors 170 can present significant convenience to the user while helping to prevent damage to the vehicle charging cord 22, 222 and vehicle 18, 118 upon accidental movement of the vehicle 18, 118 while still plugged in.

[00143] The illustrated embodiment of FIGs. 20-23 is presented with reference to a vehicle charging cord 22, 222 intended for releasable connection at an electrical connector 170 of the vehicle 18, 218. However, it should be noted that the same principles of disconnect force, disconnect angle, and cord-to-vehicle interface location apply regardless of whether the vehicle charging cord 22, 222 is intended to be disconnected at the vehicle 18, 218. In this regard, some embodiments of the present invention provide a vehicle charging cord 22, 222 that is not intended for disconnection from the vehicle 18, 218 (as presented above in connection with earlier-described embodiments). However, in such embodiments, the vehicle charging cord 22, 222 and/or the electrical wiring of the vehicle 18, 218 can be provided with an electrical connector that can automatically disconnect upon experiencing a threshold force. Any electrical connector located in the wiring of the vehicle 18, 218 or in the cord extending therefrom to a

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source of electrical power can be used. For example, in embodiments in which a power cord extending from the vehicle 18, 218 can be retracted onto a reel located on the vehicle 18, 218 as described above, the power cord can have a releasable electrical connection at a point along the length of the cord. As another example, the power cord can be provided with a releasable electrical connector located at the housing 28, 228 or cabinet 742, 1142 of the vehicle charging system. In any such case, the power cord can automatically disconnect upon experiencing a threshold force such as those described above, thereby preventing damage (or further damage) to the vehicle 18, 218 or the electrical system of the house, building, or other charging facility. Such disconnection can be frangible, meaning that the cord and/or connector is at least partially destroyed upon disconnection, or can be re-connectable by a user or service technician.

[00144] In some embodiments, the electrical connector 170 is located in a surface of the vehicle 18, 218 that is recessed with respect to adjacent (e.g., surrounding) exterior body surfaces of the vehicle 18, 218. This feature can help to reduce exposure of the electrical connector 170 to the environment around the vehicle 18, 218. In these and other embodiments, the electrical connector 170 is located behind a door 178 that can either slide or pivot with respect to the electrical connector 170 in order to reveal the electrical connector 170 for connection and charging. The door 178 can also help to reduce exposure of the electrical connector 170 to the environment around the vehicle 18, 218. In some embodiments, the door 178 can be opened manually by a user pushing, pulling, and/or rotating the door 178. However, in other embodiments, the door 178 can be at least partially opened remotely by a cable, solenoid and associated power wiring, mechanical linkage, and other elements connected to a user-manipulatable control in the vehicle 18, 218. Any mechanism used to open a fuel door for a gasoline or diesel-powered vehicle can be used for this purpose, and falls within the spirit and scope of the present invention.

[00145] As described in greater detail above, the controller 44, 244 of the vehicle charging cords 22, 222 can communicate with a controller 108 of the vehicle 18, 218, such as by PLC-based communication. As an alternative or in addition to such communication, the vehicle charging cord 22, 222 (and all other vehicle charging cords described and/or illustrated herein) can enable such communication by dedicated wiring in the same cord 22, 222. An example of such a cord 22, 222 is illustrated in FIGs. 20-23, and with particular reference to FIG. 23. In this

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embodiment, the plug 26 of the vehicle charging cord 26 has two communication pins 180 in addition to power and ground blades 182. The communication pins 180 are electrically coupled to wires or other electrical lines extend along the cord 22, 222, and can extend into and establish electrical communication with sockets 184 of the electrical connector 170. By this connection, communication along the cord 22, 222 on one or more electrical lines separate from power and ground lines of the cord 22, 222 can be established. It will be appreciated that such communication lines can be appropriately shielded for better performance, in some embodiments. Also, any number of such communication lines and associated pins 180 can be provided on the cord 22, 222. Furthermore, although pins 180 are illustrated in the embodiment of FIGs. 20-23, any other type of electrical connector (e.g., sockets adapted for connection to pins on the electrical connector 170) can instead be used. Such communication lines can also be used on the opposite end of the cord 22, 222 for communication between the controller 44, 244 and a controller 50, 250 of a power utility 48, 248, and can be used in any of the cord-based vehicle charging system embodiments disclosed herein.

[00146] Operation of a vehicle charging system according to an embodiment of the present invention to perform a manual charging session will now be described with reference to FIG. 24. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 24 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 24, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32. Next, the controller 44 can receive charge time and other settings 15 entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 17).

[00147] Following a command to start a manual battery charging session (at 19) based upon a start time selected by a user (such as by the user selecting selector 86 in the second screen 40A

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shown in FIG. 10 and entering a charge start time in selector 90), the controller 44 can continue to compare the time of the clock 58 with the charge start time entered by the user (at 21) until the start time is reached by the clock 58. Until the start time is reached, the controller continues to delay 23 charging of the battery 20 connected thereto. Once the start time is reached, the controller 44 closes the electrical switch 92 at 25, and begins charging the battery 20. Next, using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 27. If a determination is made that the battery 20 is not fully charged at 29, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 31. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 33.

[00148] Operation of a vehicle charging system according to another embodiment of the present invention to perform a programmed charging session will now be described with reference to FIG. 25. In this embodiment, additional features are provided compared to the charging session described above in connection with FIG. 24. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 25 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 25, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32.

[00149] Next, at 35, the controller 44 can employ the battery diagnostic circuitry described above to detect one or more properties of the battery 20 connected to the vehicle charging cord 22, such as the charge level of the battery 20, the voltage of the battery 20, the condition of the battery 20 (e.g., whether the battery 20 is faulty), and the like, and can display (at 37) any or all of this information to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15. The controller 44 can also establish communication with

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the controller 108 of the vehicle 18 at 39, and can retrieve information regarding the battery 20 (e.g., battery make, model, age, and the like) at 41 via the controller 108 of the vehicle 18 or directly from a memory of the vehicle 18.

[00150] At step 43, the controller 44 can receive charge time and other settings entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 45). The controller 44 can also display the charge time remaining 66 at 47. Following a command to start a programmed battery charging session (at 49) based upon a start time selected by a user (such as by the user selecting selector 86 in the second screen 40A shown in FIG. 10 and entering a charge start time in selector 90), the controller 44 can continue to compare the time of the clock 58 with the charge start time entered by the user (at 51) until the start time is reached by the clock 58. Until the start time is reached, the controller continues to delay 53 charging of the battery 20 connected thereto. Once the start time is reached, the controller 44 closes the electrical switch 92 at 55 to begin charging the battery 20.

[00151] Next, at 57, the controller 44 compares the time of the clock 58 with an end time setting that can be entered into the vehicle charging cord 22 according to some alternative embodiments of the present invention. If the end time has been reached, the controller 44 ends the charging session by opening the electrical switch 92 at 65. Otherwise, if the end time setting has not yet been reached, battery charging continues, and using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 59. If a determination is made that the battery 20 is not fully charged at 61, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 63. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 65.

[00152] Operation of a vehicle charging system according to another embodiment of the present invention to perform a programmed charging session will now be described with reference to FIG. 26. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 26 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to

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FIG. 26, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32.

[00153] Next, at 35, the controller 44 can employ the battery diagnostic circuitry described above to detect one or more properties of the battery 20 connected to the vehicle charging cord 22, such as the charge level of the battery 20, the voltage of the battery 20, the condition of the battery 20 (e.g., whether the battery 20 is faulty), and the like, and can display (at 37) any or all of this information to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15. The controller 44 can also establish communication with the controller 108 of the vehicle 18 at 39, and can retrieve information regarding the battery 20 (e.g., battery make, model, age, and the like) at 41 via the controller 108 of the vehicle 18 or directly from a memory of the vehicle 18.

[00154] At step 43, the controller 44 can receive charge time and other settings entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 45). Following a command to start a programmed battery charging session (at 49) based upon a battery charging end time selected by a user (such as by the user selecting selector 100 in the second screen 40A shown in FIG. 10 and entering a charge end time in selector 104), the controller 44 can establish communication with the power utility 48 at 67, and can transmit (or enable the power utility 48 to retrieve) the charge time settings, any other settings, and the battery property information to the power utility 48 at 69.

[00155] Next, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can calculate the power required to fully charge the battery 20 based at least in part upon the level of charge of the battery 20 at 71. The controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can then calculate the amount of time needed to fully charge the battery 20 based upon the power required to do so, and can thereby estimate

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the time of day at which charging can begin based at least in part upon the battery charging end time and the estimated duration of time necessary to fully charge the battery 20 (at 73).

[00156] At step 75, the controller 44 can continue to compare the time of the clock 58 with the charge start determined as described above until the start time is reached by the clock 58. Until the start time is reached, the controller continues to delay 77 charging of the battery 20 connected thereto. Once the start time is reached, the controller 44 closes the electrical switch 92 at 79 to begin charging the battery 20.

[00157] Next, at 81, the controller 44 compares the time of the clock 58 with an end time setting that can be entered into the vehicle charging cord 22 according to some alternative embodiments of the present invention. If the end time has been reached, the controller 44 ends the charging session by opening the electrical switch 92 at 83. Otherwise, if the end time setting has not yet been reached, battery charging continues, and using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 85. If a determination is made that the battery 20 is not fully charged at 87, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 89. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 83.

[00158] Operation of a vehicle charging system according to another embodiment of the present invention to perform a programmed charging session will now be described with reference to FIG. 27. By way of example only, operation will be described in connection with the illustrated embodiment of FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIG. 27 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein. With continued reference to FIG. 27, power is first established 11 to the vehicle charging cord 22, such as (in some embodiments) by plugging the vehicle charging cord 22 into an electrical outlet of the house, building or other facility at which charging is to take place, or by pressing the power button 34 in these and other embodiments. Upon receiving power, the controller 44 can retrieve any charge settings 13 previously entered and saved into memory 106, and can display such settings when the appropriate screen(s) 40 are shown upon the display 32.

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[00159] Next, at 35, the controller 44 can employ the battery diagnostic circuitry described above to detect one or more properties of the battery 20 connected to the vehicle charging cord 22, such as the charge level of the battery 20, the voltage of the battery 20, the condition of the battery 20 (e.g., whether the battery 20 is faulty), and the like, and can display (at 37) any or all of this information to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15. With this information, the controller 44 can determine whether the battery 20 is defective or otherwise has a fault at 91, and can communicate a battery fault message to the user in any of the manners also described above in connection with the embodiment of FIGs. 2, 5-11, and 15 if a fault exists (at 93). The controller 44 can also establish communication with the controller 108 of the vehicle 18 at 95, and can retrieve information regarding the battery 20 (e.g., battery make, model, age, and the like) at 97 via the controller 108 of the vehicle 18 or directly from a memory of the vehicle 18.

[00160] At step 99, the controller 44 can receive charge time and other settings entered by a user via the display 32 and associated navigation buttons 36, 38, and in some embodiments can store such settings in memory 106 (at 101). Following a command to start a programmed battery charging session (at 103) based upon a battery charging end time selected by a user (such as by the user selecting selector 100 in the second screen 40A shown in FIG. 10 and entering a charge end time in selector 104), the controller 44 can establish communication with the power utility 48 at 105, and can transmit (or enable the power utility 48 to retrieve) the charge time settings, any other settings, and the battery property information to the power utility 48 at 107.

[00161] Next, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can calculate the power required to fully charge the battery 20 based at least in part upon the level of charge of the battery 20 at 109. The controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can then calculate the amount of time needed to fully charge the battery 20 based upon the power required to do so, and can thereby estimate the latest time of day at which charging can begin based at least in part upon the battery charging end time and the estimated duration of time necessary to fully charge the battery 20 (at 111). Also, at 113, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can set an acceptable threshold cost of power (e.g., per unit time) at or below which battery charging will begin. In some embodiments, this threshold cost of power is entered by a

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user into the vehicle charging cord 22 in any of the manners of user interface described herein, or can be set by the power utility 48 based upon the desired maximum power cost determined by the power utility 48.

[00162] At step 115, the controller 44 can compare the time of the clock 58 with the latest estimated charge time, and at step 117 can compare the current cost of power (e.g., per unit time) with the threshold cost of power determined at step 113. If the latest estimated charge start time has been reached or if the threshold cost of power has been reached, the controller 44 closes the electrical switch 92 at 119 to begin charging the battery 20. Otherwise, the controller 44 continues to delay 121 charging of the battery 20 connected thereto.

[00163] Next, at 123, the controller 44 can check or otherwise determine whether communication has been lost with the controller 50 of the power utility 48. If communication has been lost, the controller 44 can send a communication fault message to the user in any of the manners described above in connection with the embodiment of FIGs. 2, 5-11, and 15 (at 125). Otherwise, the controller 44 can check or otherwise determine whether the supply of power to the vehicle charging cord 22 has been interrupted at 127. If the supply of power has been interrupted, the controller 44 can send a power interrupt fault message to the user in any of the manners also described above in connection with the embodiment of FIGs. 2, 5-11, and 15 (at 129).

[00164] On a continuing basis as the battery 20 is being charged, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can monitor the cost of power supplied to the battery 20, and can compare this cost with the threshold cost of power described above (at 131). If the cost of power supplied to the battery 20 exceeds the threshold cost of power, the controller 44 of the vehicle charging cord 22 or the controller 50 of the power utility 48 can interrupt charging of the battery at 133, such as by opening the electrical switch 92 of the vehicle charging cord 92. Otherwise, using the battery diagnostic circuitry described above, the controller 44 determines the charge level of the battery 20 at 135. If a determination is made that the battery 20 is not fully charged at 137, the controller 44 continues to keep the electrical switch 92 closed, thereby continuing to charge the battery 20 at 139. Otherwise, the controller 44 ends the charging session by opening the electrical switch 92 at 141.

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[00165] Four examples of vehicle charging operation according to embodiments of the present invention are described above in connection with FIGs. 24-27. It should be noted any sub-combination of the steps described in connection with FIGs. 24-27 can be performed in other embodiments. Also, although the steps of the various processes presented above are described as occurring in a particular order, a number of the steps of each process can occur in different orders without departing from the spirit and scope of the present invention. Furthermore, steps and combinations of steps described in combination with one or more of the embodiments of FIGs. 24-27 can be employed in the processes of the other embodiments of FIGs. 24-27. For example, the battery fault check and notification steps 91, 93, the communication fault and notification steps 123, 125, and/or the power interruption fault check and notification steps 127, 129 in the process illustrated in FIG. 27 can be utilized in any of the other embodiments disclosed herein, including those of FIGs. 24-26.

[00166] Also, in the various processes described and illustrated herein, the controller 44 is described as performing a number of functions. Based upon the ability of those vehicle charging systems herein to communicate with a processor of a power utility, any of these functions can instead or also be performed by the processor of the power utility communicating and controlling the vehicle charging cords 22 or systems.

[00167] As described above, the use of any of the vehicle charging systems described and/or illustrated herein can provide significant control to a user in determining the conditions under which vehicle battery charging will occur. This control can result in cost savings to the user without impacting the user's daily routine. However, other benefits accrue to power utilities providing power to users of these vehicle charging systems. By at least partially controlling the time at which battery charging will occur and/or by having the ability to interrupt and re-start battery charging by a large number of users in a community, the power utility can better distribute power usage over a period of time, thereby providing significant cost savings to the power utility.

[00168] An example of how a power utility can control multiple vehicle charging systems according to the present invention is illustrated in FIGs. 28 and 29. By way of example only, operation will be described in connection with users employing vehicle charging cords 22, 222

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such as those illustrated in FIGs. 2, 5-11, and 15, it being understood that any portion or all of the operation described in connection with FIGs. 28 and 29 can be applied in any of the other vehicle charging system embodiments described and/or illustrated herein.

[00169] With reference first to FIG. 28, the controller 50 of the power utility 48 (which can be defined by one or more servers and associated computer equipment) can communicate with the vehicle charging cords 22, 222 of multiple users, and can continuously or periodically update a queue or other list of on-line users who have requested a battery charge session as described above (at 143).

[00170] In some embodiments, the controller 50 sorts the on-line users based upon one or more factors, such as the charge time end setting (i.e., earlier charge time end settings having priority), the estimated charge time needed for fully charging each battery 20 (i.e., longer charge times having priority), the time at which the battery charge session was requested, and the like. By way of example only, the controller 50 in the process of FIG. 28 checks at 145 whether any of the batteries 20 that are on-line have a very low charge, such as a charge below a minimum level set by the user at selector 112 on the second screen 40B shown in FIG. 10, or a charge below a minimum level set by the power utility 48. As another example, the controller 50 in the process of FIG. 28 checks at 149 whether the estimated time to fully charge any battery 20 is equal to or greater than the time available for battery charging (i.e., to the battery charge completion time entered by the user at selector 100 on the second screen 40B shown in FIG. 10). If the controller 50 determines that a battery 20 has a very low charge or will require a charging duration equal to or greater than the charging time available, the controller 50 can flag or otherwise indicate that the vehicle charging cord 22, 222 has priority over other vehicle charging cords 22, 222 (at 147 and 151, respectively).

[00171] The controller 50 can also remove a priority designation from any on-line vehicle charging cord 22, 222 no longer meeting this criteria (at 153), such as on-line charging cords 22, 222 that have been supplied with power based upon the fact that their respective batteries 20 had a very low charge, but that now have supplied their batteries 20 with a sufficient minimum threshold charge. At step 155, the queue of on-line vehicle charging cords 22, 222 can be re-

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ordered based upon the determination of which vehicle charging cords 22, 222 are flagged as having priority (described above), and upon any of the other factors also described above.

[00172] Next, the controller 50 at 157 can determine whether the total power draw from the community or the total power draw of all vehicle charging cords 22, 222 exceeds a threshold maximum level of power draw. This maximum level of power draw can be set by a power utility 48 based upon a threshold level of power cost to the power utility 48, the maximum output of power that can be supplied by the power utility 48 to the community, an amount of power budgeted by the power utility 48 for charging vehicle batteries via the vehicle charging cords 22, 222, other factors, and any combination thereof. If the total power draw does not exceed the maximum level of power draw set by the power utility 48, and if the queue of vehicle charging cords 22, 222 awaiting charging is empty (at 159), the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143. Otherwise, the controller 50 of the power utility 48 can send signals at 161 to one or more vehicle charging cords 22, 222 to begin charging their respective batteries 20 by closing their electrical switches 92. Such signals can be sent to any vehicle charging cords 22, 222 flagged with priority, and then to any other vehicle charging cords 22, 222. In either case, such signals are sent to vehicle charging cords 22, 222 in the order presented in the vehicle charging queue (ordered as described above). Following this step, the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143.

[00173] If the total power draw described above exceeds the maximum level of power draw set by the power utility 48 as determined by the processor at step 157, and if any vehicle charging cords 22, 222 are not flagged as having priority (check by the processor 50 made at step 163) as described above, the controller 50 can send signals to one or more vehicle charging cords 22, 222 not flagged as having priority to at least temporarily stop charging the batteries 20 connected thereto (e.g., by opening the electrical switches 92 of such vehicle charging cords 22, 222) at step 165. In some embodiments, such signals can be sent by the power utility in batches, such as signals sent to two or more of such vehicle charging cords 22, 222 at a given time or under a common command. Following this step, the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143. Otherwise, if the processor 50 determines that all vehicle charging cords 22, 222 are flagged as

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having priority at 163, the controller 50 can re-initiate the vehicle charging cord management process by again updating the vehicle charging cord queue at 143.

[00174] In light of the fact that the vehicle charging cord management process illustrated in FIG. 28 can be performed on a continual basis, it will be appreciated that the steps described above in connection with FIG. 28 can be carried out in a number of different orders without departing from the spirit and scope of the present invention.

[00175] With reference now to FIG. 29, an example application of the vehicle charging cord management process of FIG. 28 is provided. FIG. 29 illustrates the total power draw (in kW) of a community upon a power utility 48 over a 24-hour period of time. As shown in FIG. 29, the maximum preferred power draw of the power utility 48 described above in connection with FIG. 28 is 200 kW. As also shown in FIG. 29, the power draw of the community varies significantly over the 24-hour period, peaking around 3pm and falling to a lowest level between 2am and 3am. Any number of factors can define this power draw over the 24-hour period, including without limitation the number of users using air conditioning or electrical heating units during the day and the times at which such units are operated by the users, the times at which any large manufacturing operations begin and end operations, and the like. For example, the second peak shown in FIG. 29 can be the result of one or more manufacturing plants in a community drawing significant power during a second shift.

[00176] Based upon the amount of power drawn from the power utility 29 as shown in FIG. 29, the power utility 48 can control and operate a number of vehicle charging systems according to the present invention based upon non-peak time periods and upon other factors as described above (charge time end settings, estimated charge times needed to fully charge batteries 20, times at which battery charge sessions were requested, and the like). For example, a first group of users requesting charge sessions at 2pm (point 167 in FIG. 29) can have priority over other groups of users requesting charge sessions at 4pm and 6pm (points 169 and 171), respectively. Accordingly, once the controller 50 of the power utility 48 determines that the power draw by the community has fallen below the preferred maximum level of power draw (e.g., step 157 in FIG. 28; point 173 in FIG. 29), the controller 50 can send signals to the vehicle charging systems of the first group of users to begin battery charging. Taking this additional power draw into

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account, the controller 50 of the power utility 48 can later determine that the power draw by the community has fallen further (point 175 in FIG. 29), and that the vehicle charging systems of the second user group can be turned on. However, if the total power draw by the community rises again, such as based upon a large draw from a manufacturing facility operating a second shift, the controller 50 of the power utility 48 can temporarily turn off the vehicle charging systems of the second user group and then the first user group in series (points 177 and 179, respectively), and can turn on the vehicle charging systems of the first and second user groups in series once the total power draw by the community falls again (points 181 and 183, respectively).

[00177] Although the third user group requested charging sessions much earlier as described above, the total power draw by the community remained too high to permit the controller 50 of the power utility 48 to turn on the vehicle charging systems of the third user group until 11pm. At this point (185 in Fig. 29), the total power draw taking into account the first and second groups of users falls sufficiently to permit the controller 50 to turn on the vehicle charging systems of the third user group while still remaining below the preferred maximum power draw described above. The batteries corresponding to the first, second, and third groups of users illustrated in FIG. 29 become fully charged at different times, and cause battery charging to stop at points 187, 189, and 191, respectively.

[00178] Application of a vehicle charging system management process (using vehicle charging systems of the present invention) is shown by way of example in FIG. 29. It will be appreciated that a similar process can be implemented for any other power draw profile of a community, and that any number of charging initiations, interruptions, and re-initiations can occur for any number of users or groups of users throughout the course of a 24-hour period based at least in part upon the needs of the users and any preferred maximum level of power draw determined by the power utility.

[00179] The embodiments described above and illustrated in the figures are presented by way of example only and are not intended as a limitation upon the concepts and principles of the present invention. As such, it will be appreciated by one having ordinary skill in the art that various changes in the elements and their configuration and arrangement are possible without departing from the spirit and scope of the present invention. For example, the vehicle charging

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systems described above and illustrated in connection with the embodiments of FIGs. 2, 5-11 and 15; FIG. 3; FIGs. 4, 18, and 19; FIG. 12; FIGs. 13, 14, and 16; FIG. 17; FIGs. 20-23; FIG. 24, FIG. 25, FIG. 26, FIG. 27, and FIGs 28 and 29 each have a number of features, elements, and/or steps. Although these features, elements, and steps are described and illustrated in connection with each embodiment, it should be noted that any sub-combination of such features, elements, and steps can be utilized in other embodiments of the present invention. The particular combination of features, elements, and steps in each illustrated embodiment is presented by way of example only, and does not indicate or imply that embodiments of the present invention must have all such features, elements, and steps.

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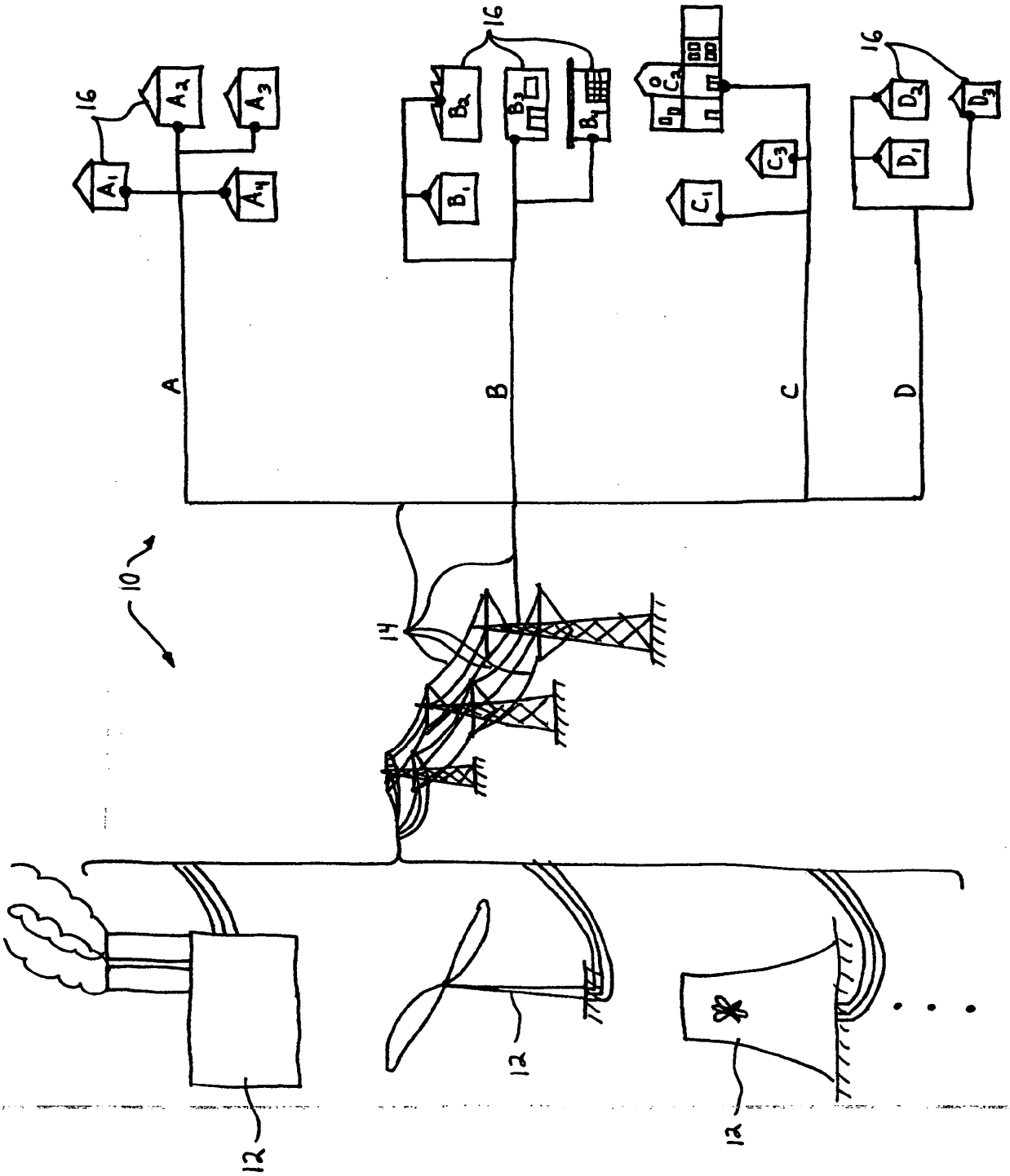

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B2
B3
B4
B
C1
C2
C3
C4
C
16
D1
D2
D3
D
10
14
12
12
12

FIG. 1

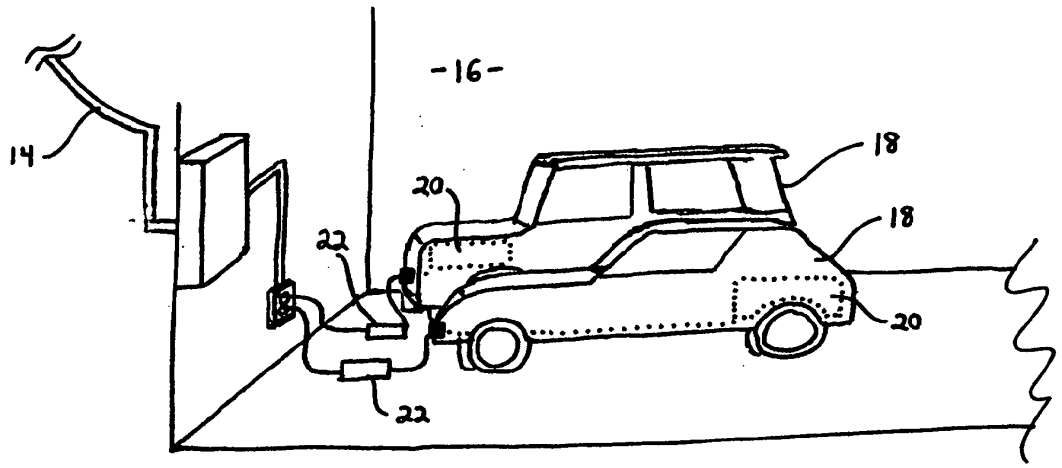


FIG. 2

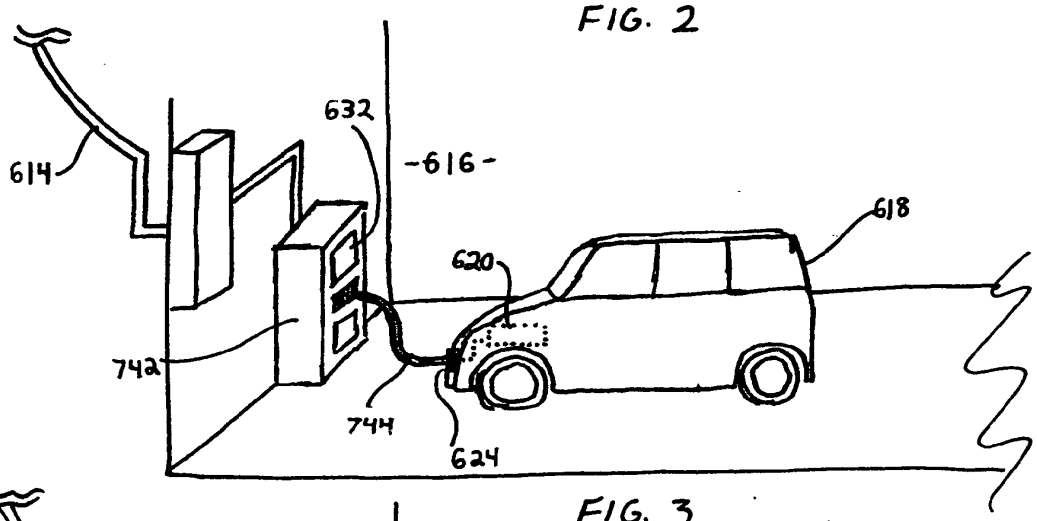


FIG. 3

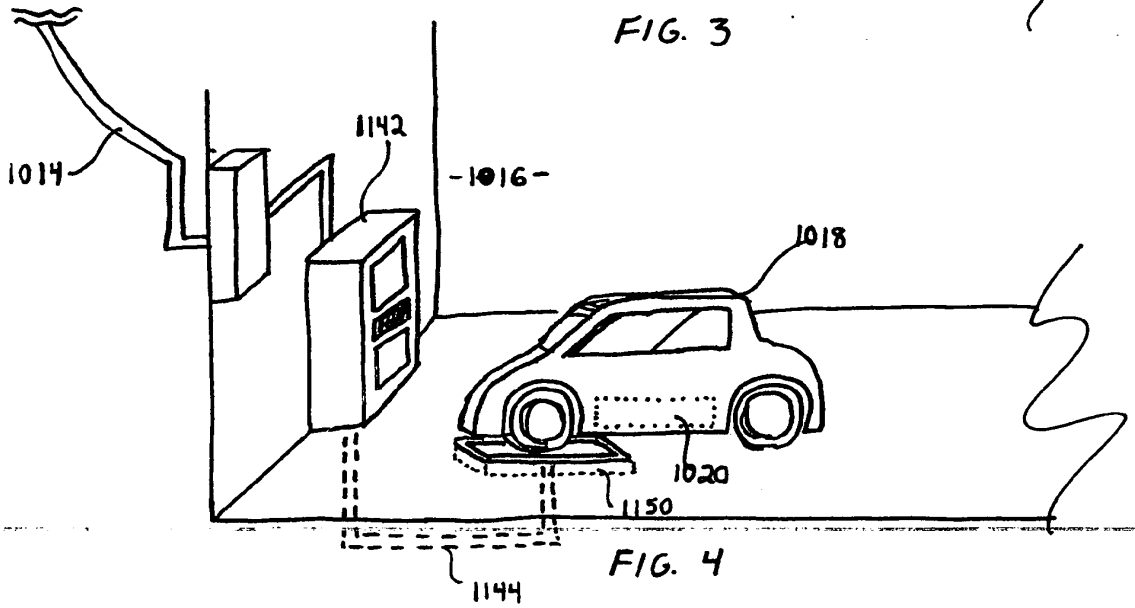


FIG. 4

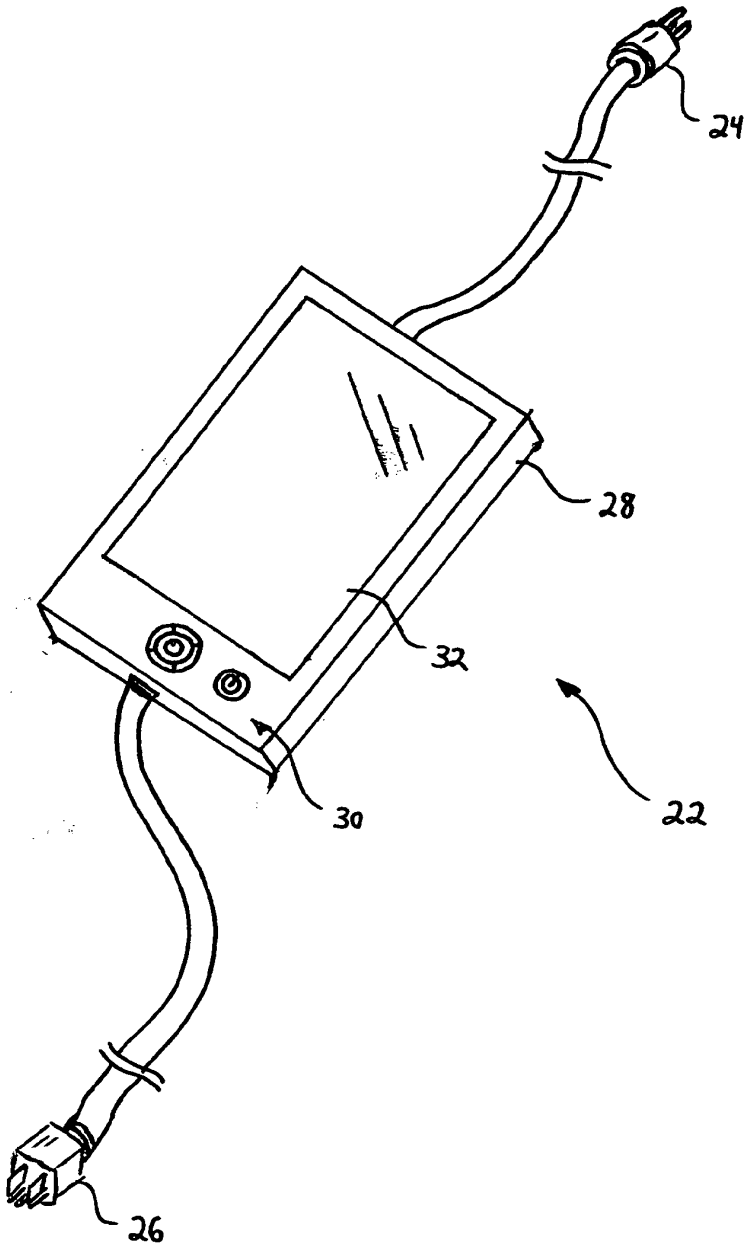


FIG. 5

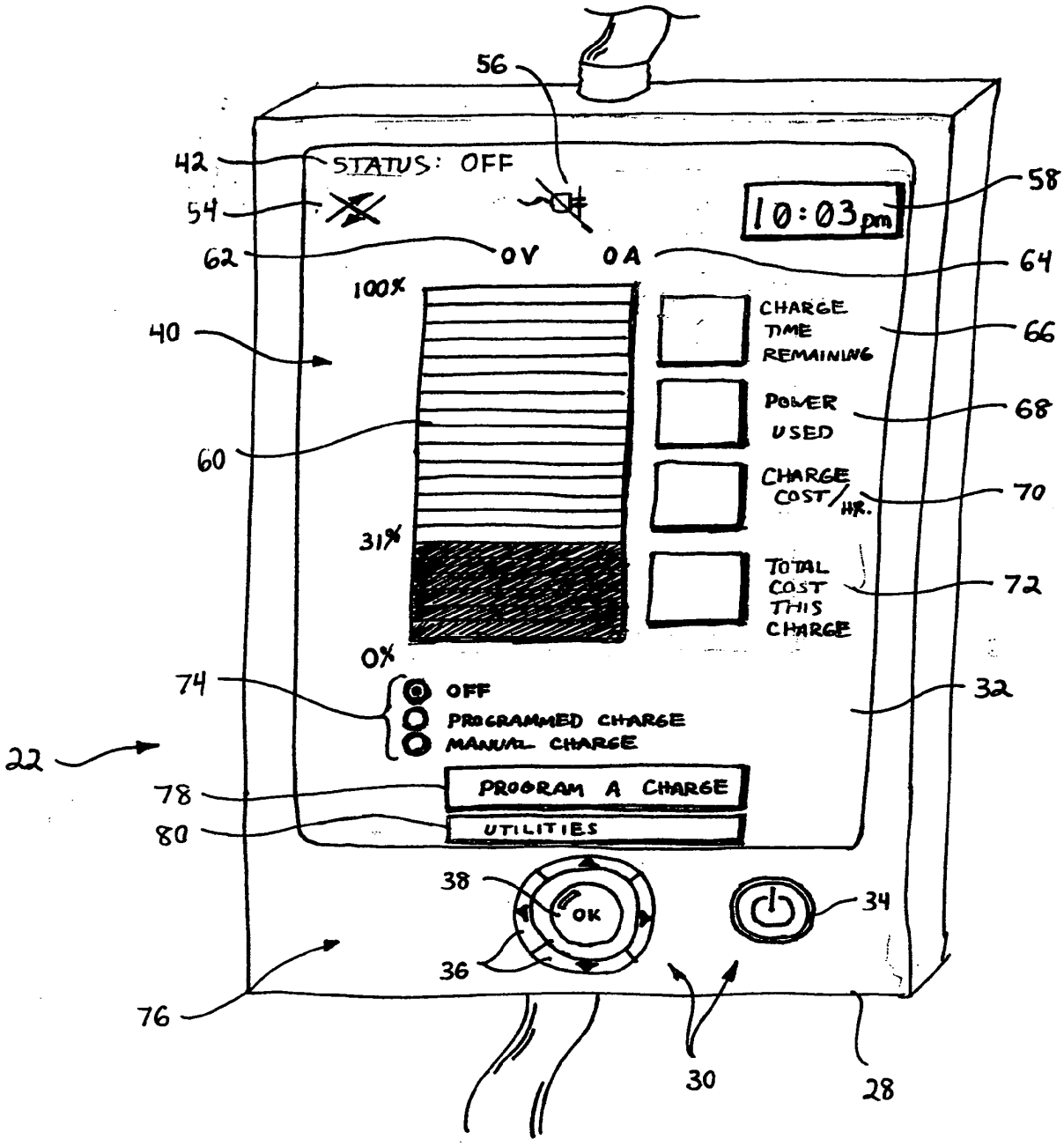

56
42
STATUS: OFF
54
58
10:03 pm
62
0V
0A
64
100%
40
CHARGE TIME REMAINING
66
POWER USED
68
60
CHARGE COST/HR.
70
31%
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
22
78
PROGRAM A CHARGE
80
UTILITIES
38
OK
34
36
76
30
28

FIG. 6

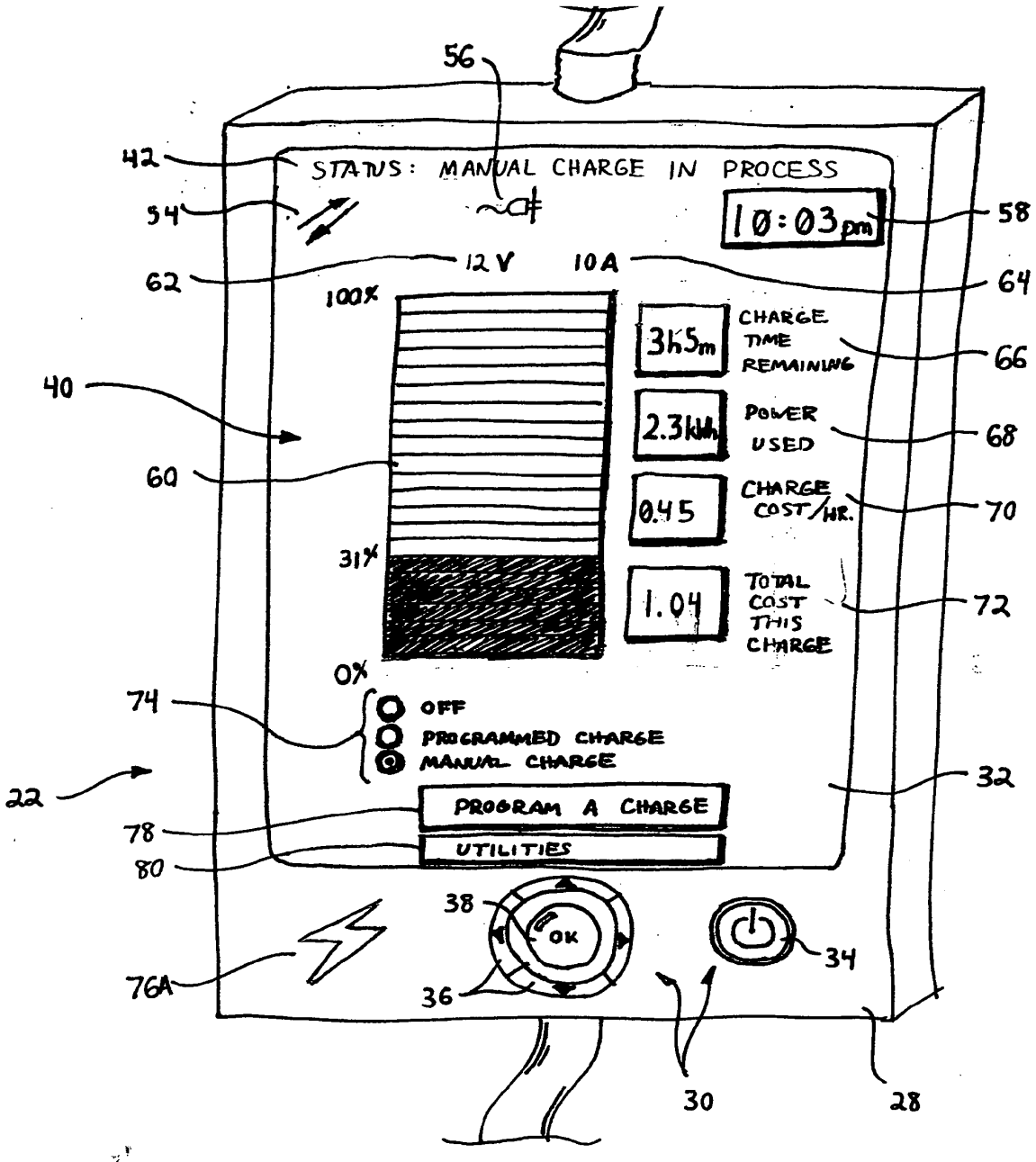

56
42
STATUS: MANUAL CHARGE IN PROCESS
54
10:03pm
58
12V
10A
62
64
100%
3h5m
CHARGE TIME REMAINING
66
40
2.3kWh
POWER USED
68
60
0.45
CHARGE COST/HR.
70
31%
1.04
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
22
32
PROGRAM A CHARGE
78
UTILITIES
80
38
OK
34
76A
36
30
28

FIG. 7

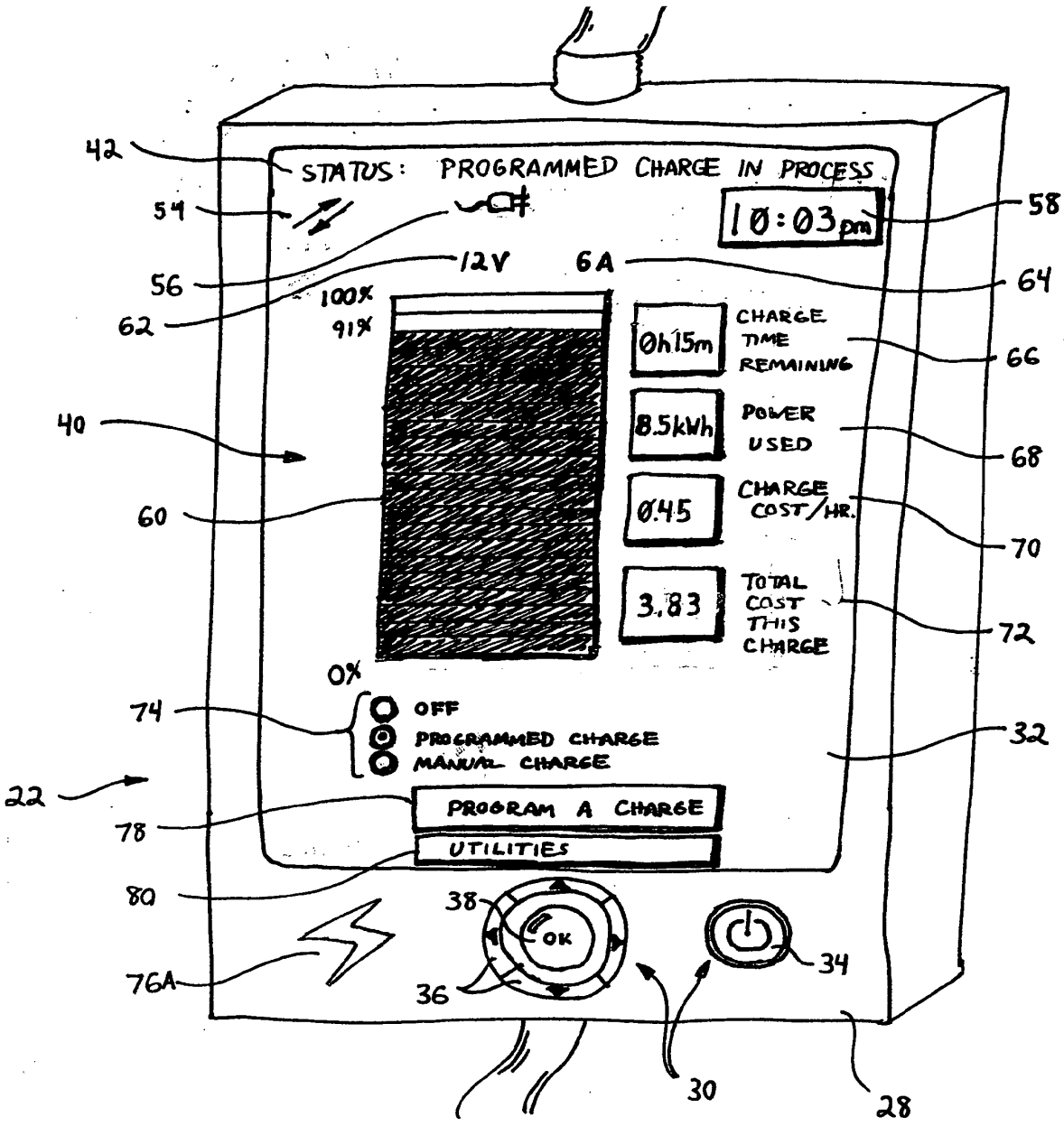

42
STATUS: PROGRAMMED CHARGE IN PROCESS
54
10:03pm
58
56
12V
6A
64
62
100%
91%
0h15m
CHARGE TIME REMAINING
66
40
8.5kWh
POWER USED
68
60
0.45
CHARGE COST/HR.
70
3.83
TOTAL COST THIS CHARGE
72
0%
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
22
78
PROGRAM A CHARGE
UTILITIES
80
38
OK
34
76A
36
30
28

FIG. 8

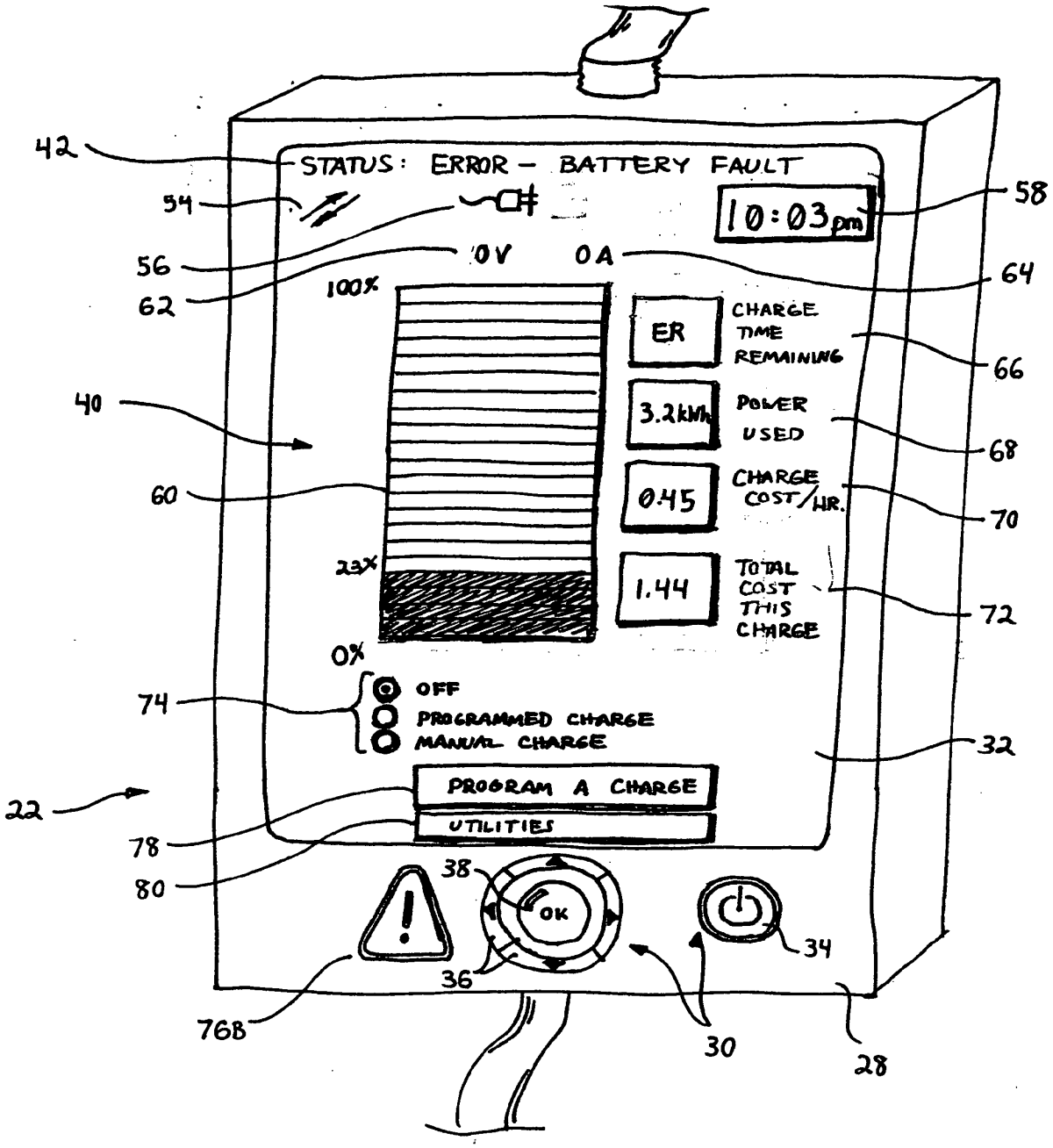

42
STATUS: ERROR – BATTERY FAULT
54
56
62
0V
0A
64
58
10:03pm
100%
40
60
23%
0%
ER
CHARGE TIME REMAINING
66
3.2kWh
POWER USED
68
0.45
CHARGE COST/HR.
70
1.44
TOTAL COST THIS CHARGE
72
74
OFF
PROGRAMMED CHARGE
MANUAL CHARGE
32
22
PROGRAM A CHARGE
UTILITIES
78
80
38
OK
34
36
76B
30
28

FIG. 9

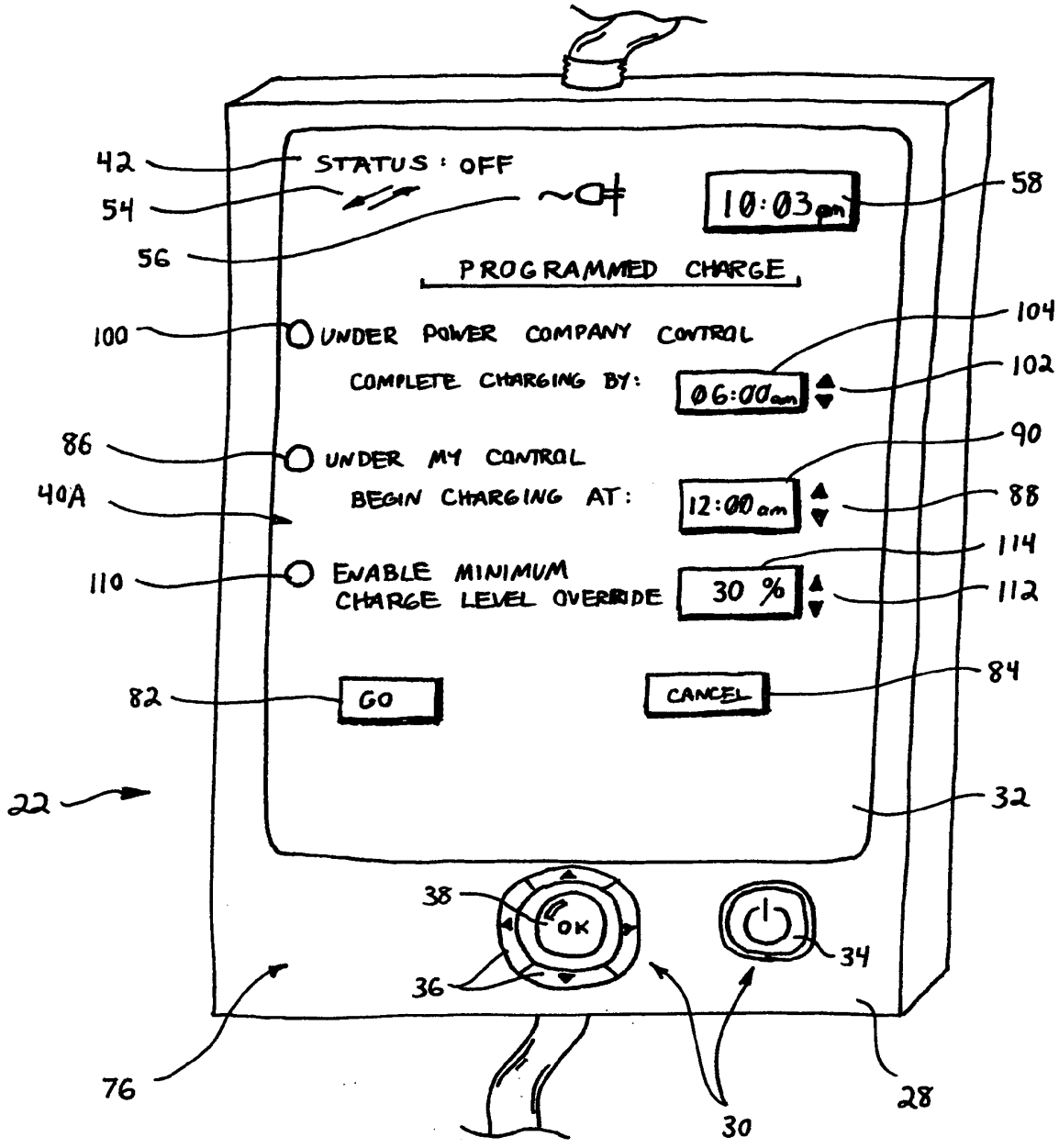

42
STATUS : OFF
54
56
10:03 pm
58
PROGRAMMED CHARGE
100
UNDER POWER COMPANY CONTROL
104
COMPLETE CHARGING BY:
06:00 am
102
86
UNDER MY CONTROL
90
40A
BEGIN CHARGING AT:
12:00 am
88
110
ENABLE MINIMUM
CHARGE LEVEL OVERRIDE
114
30 %
112
82
GO
CANCEL
84
22
32
38
OK
34
36
76
30
28

FIG. 10

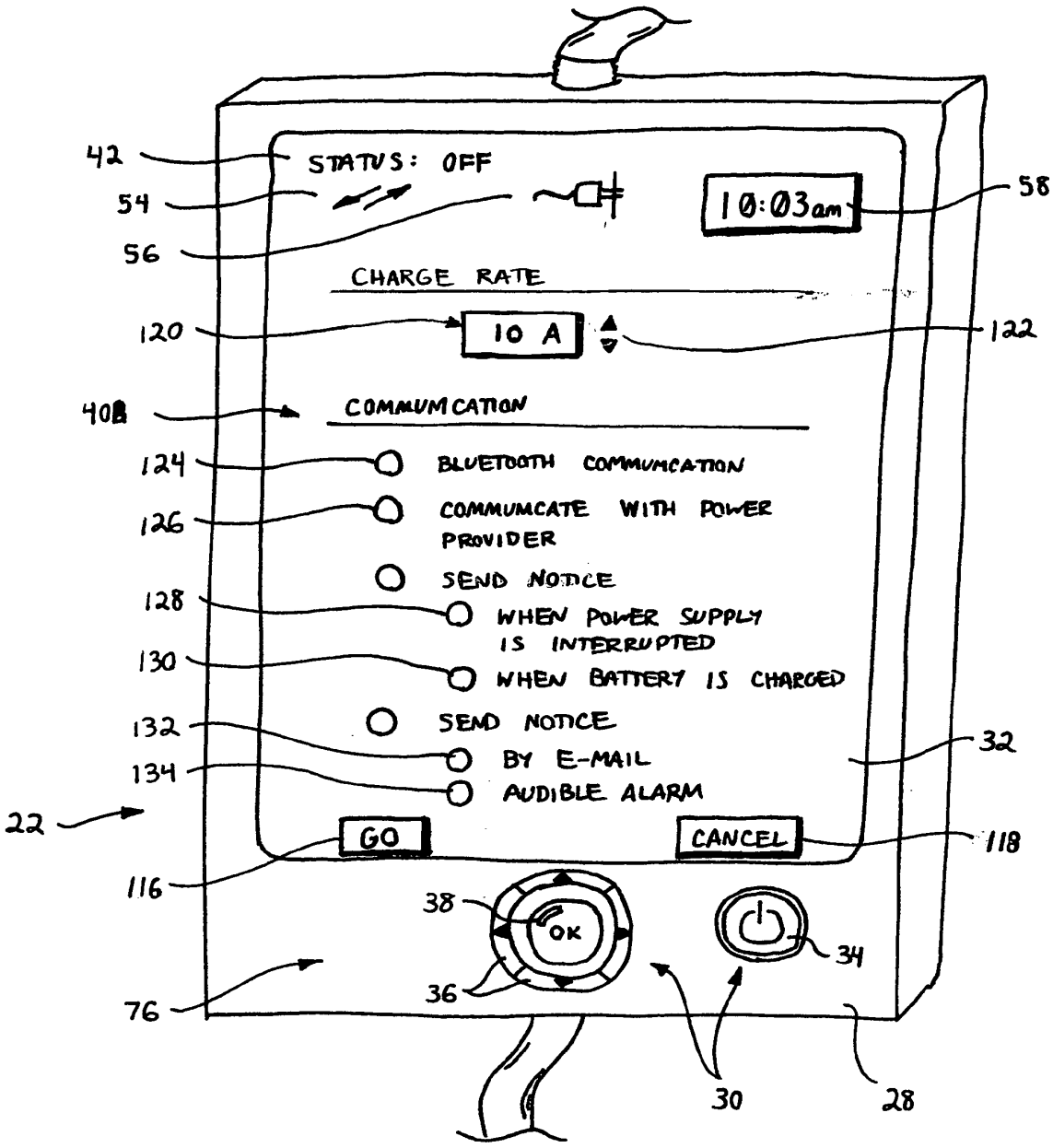

42
STATUS: OFF
54
56
10:03am
58
CHARGE RATE
120
10 A
122
40B
COMMUNICATION
124
BLUETOOTH COMMUNICATION
126
COMMUNICATE WITH POWER PROVIDER
SEND NOTICE
128
WHEN POWER SUPPLY IS INTERRUPTED
130
WHEN BATTERY IS CHARGED
132
SEND NOTICE
BY E-MAIL
134
AUDIBLE ALARM
32
22
GO
CANCEL
118
116
38
OK
34
36
76
30
28

FIG. 11

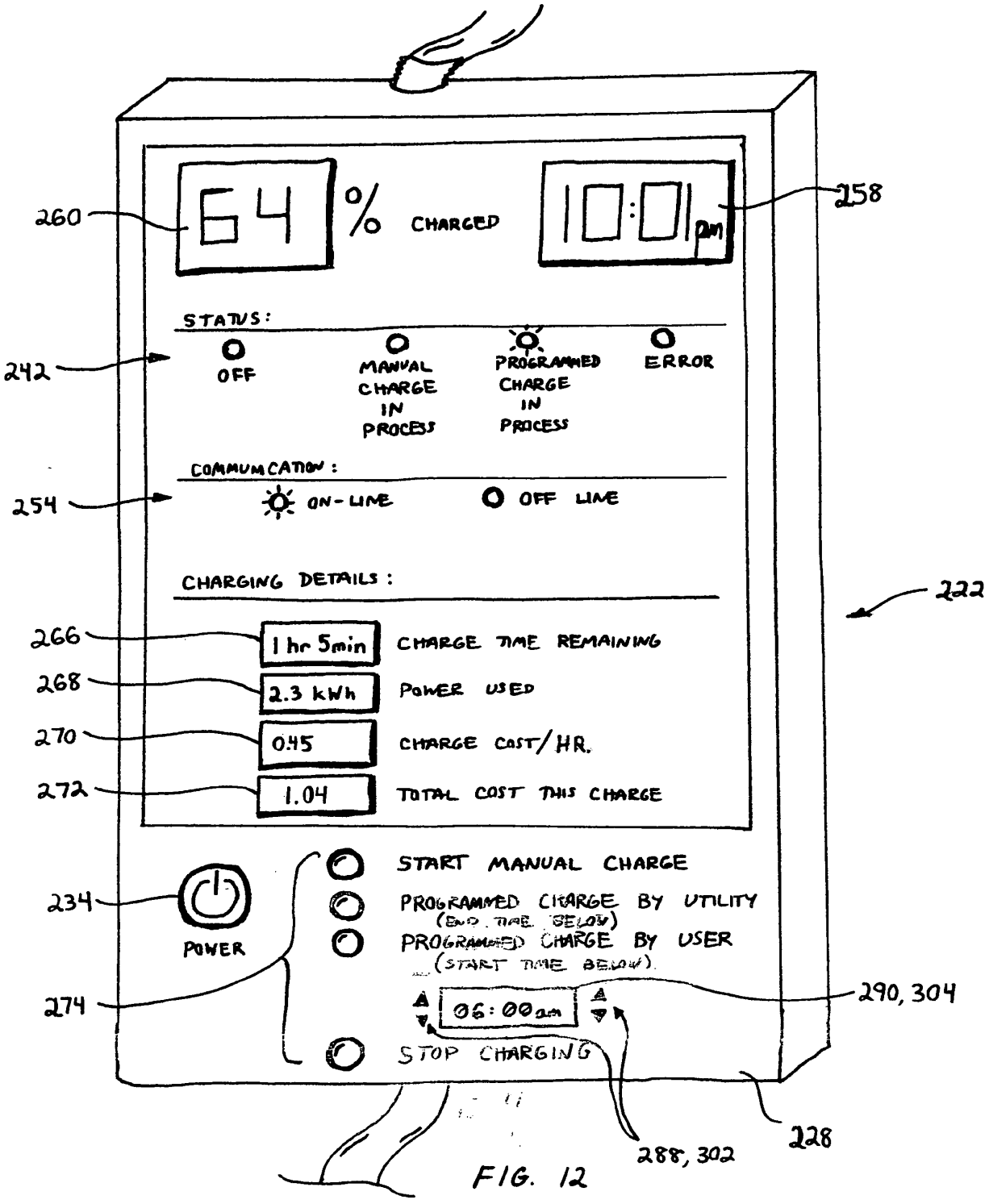

64 % CHARGED
10:01 pm
260
258
STATUS:
OFF
MANUAL CHARGE IN PROCESS
PROGRAMED CHARGE IN PROCESS
ERROR
242
COMMUNICATION:
ON-LINE
OFF LINE
254
CHARGING DETAILS:
222
1 hr 5min
CHARGE TIME REMAINING
266
2.3 kWh
POWER USED
268
0.45
CHARGE COST/HR.
270
1.04
TOTAL COST THIS CHARGE
272
POWER
234
START MANUAL CHARGE
PROGRAMED CHARGE BY UTILITY
(END TIME BELOW)
PROGRAMED CHARGE BY USER
(START TIME BELOW)
06:00 am
290, 304
274
STOP CHARGING
288, 302
228

FIG. 12

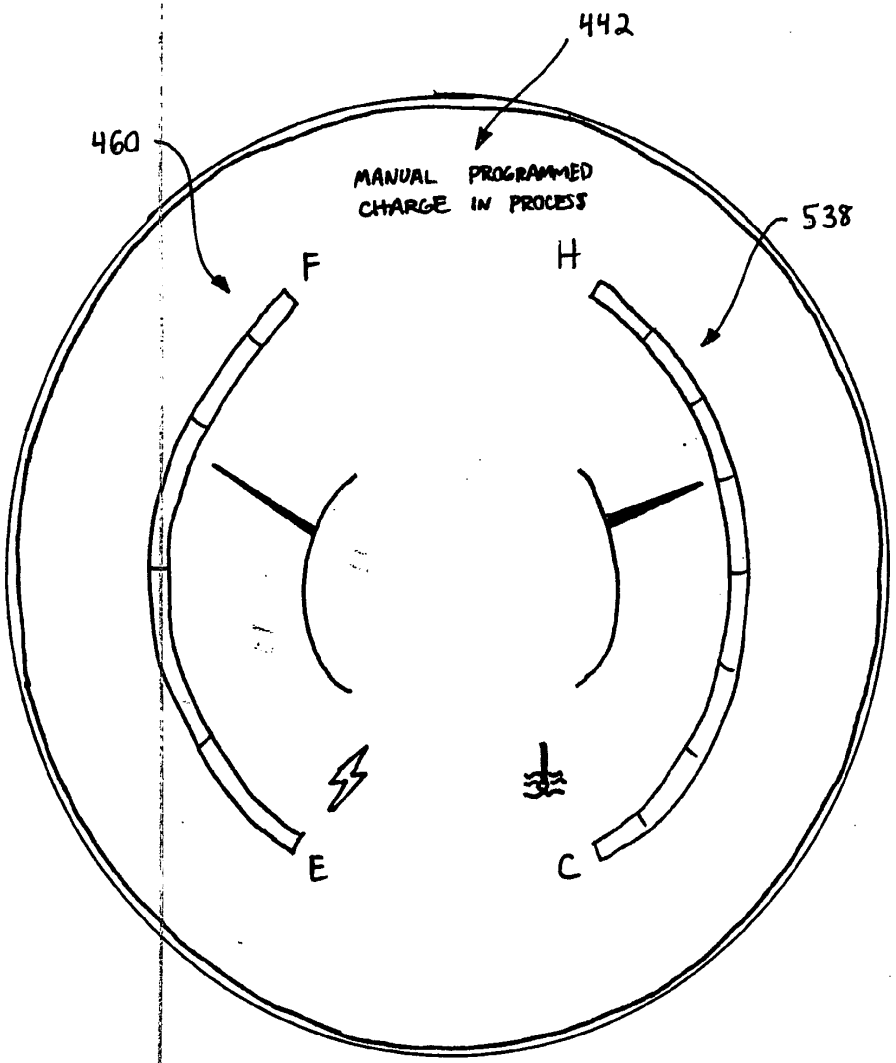


FIG. 13

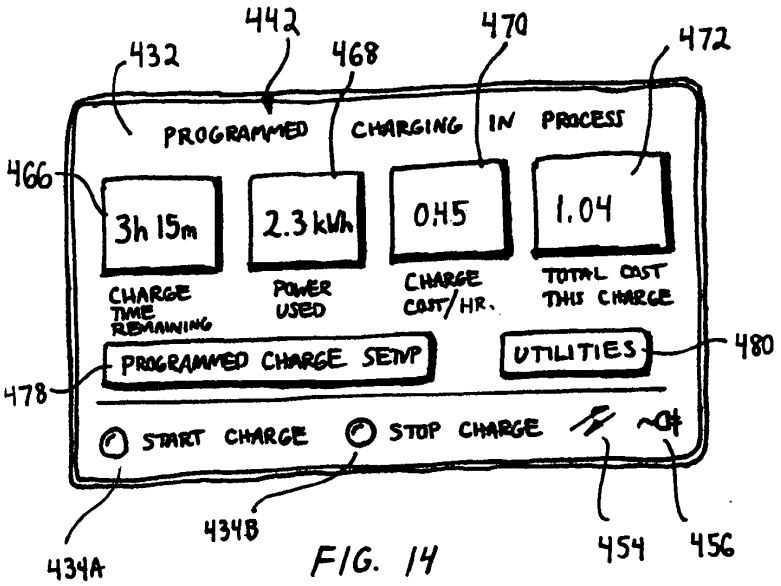


FIG. 14

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Tesla EX1002 Page 542

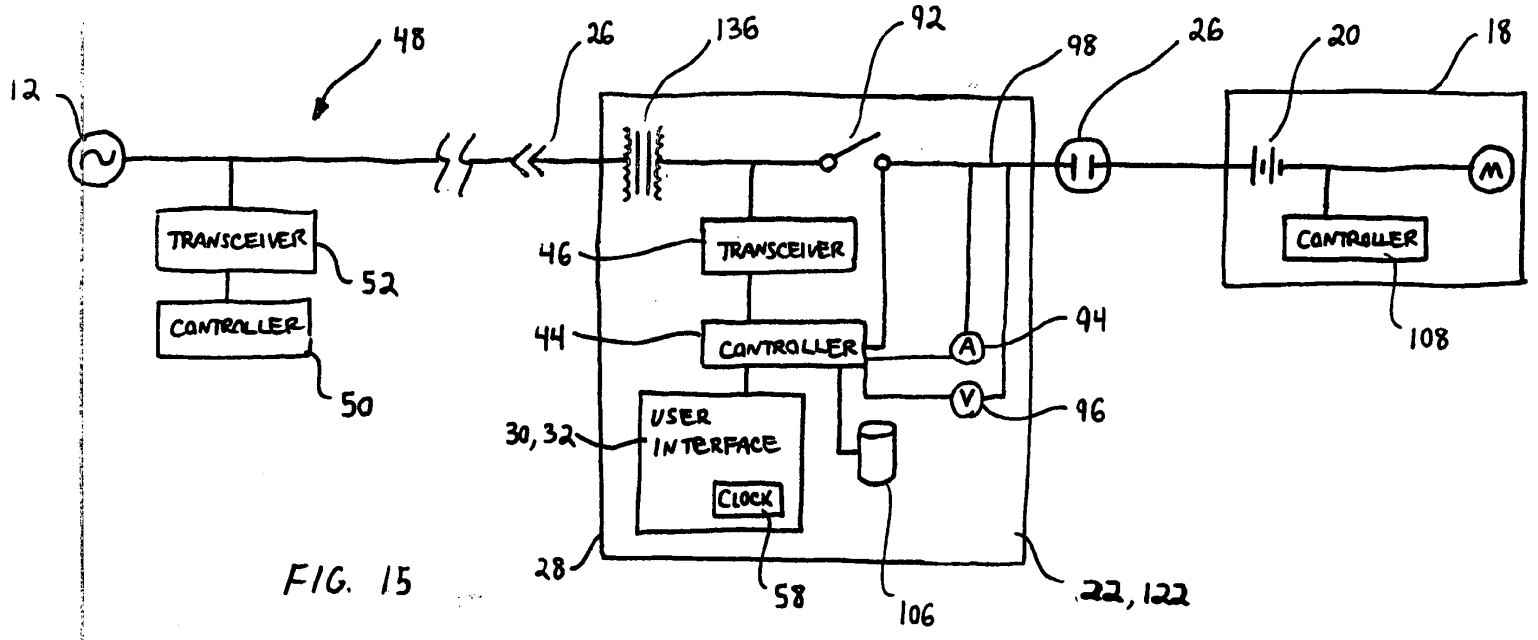


FIG. 15

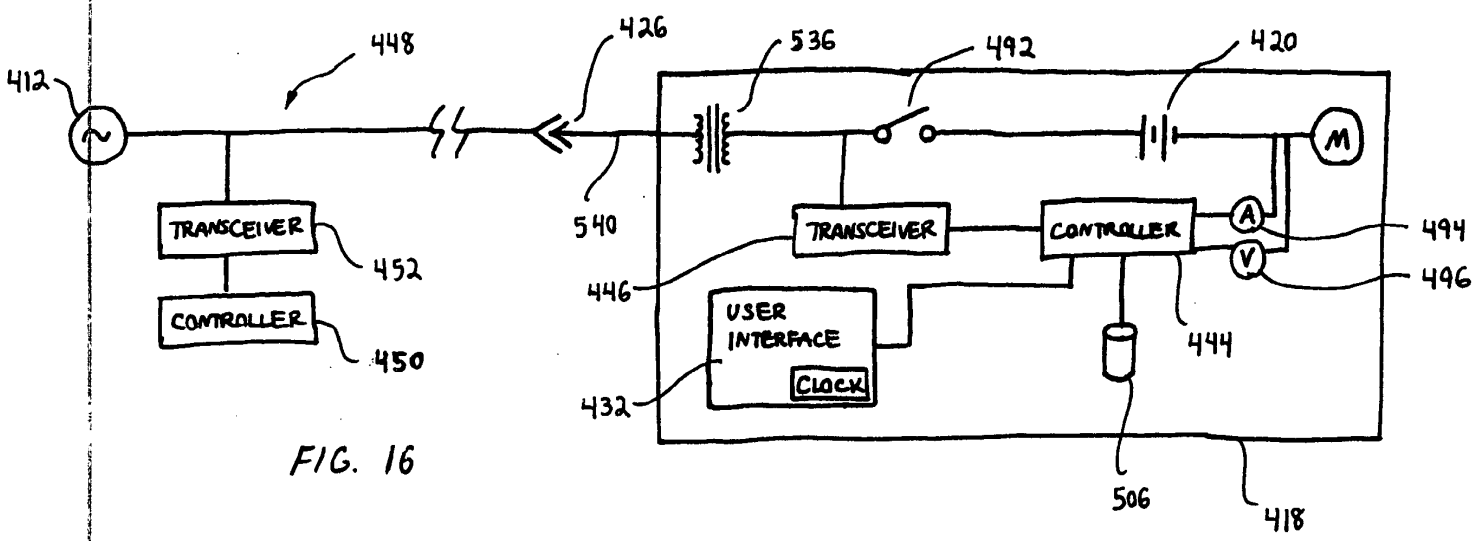


FIG. 16

IPR2026-00377
Tesla EX1002 Page 543

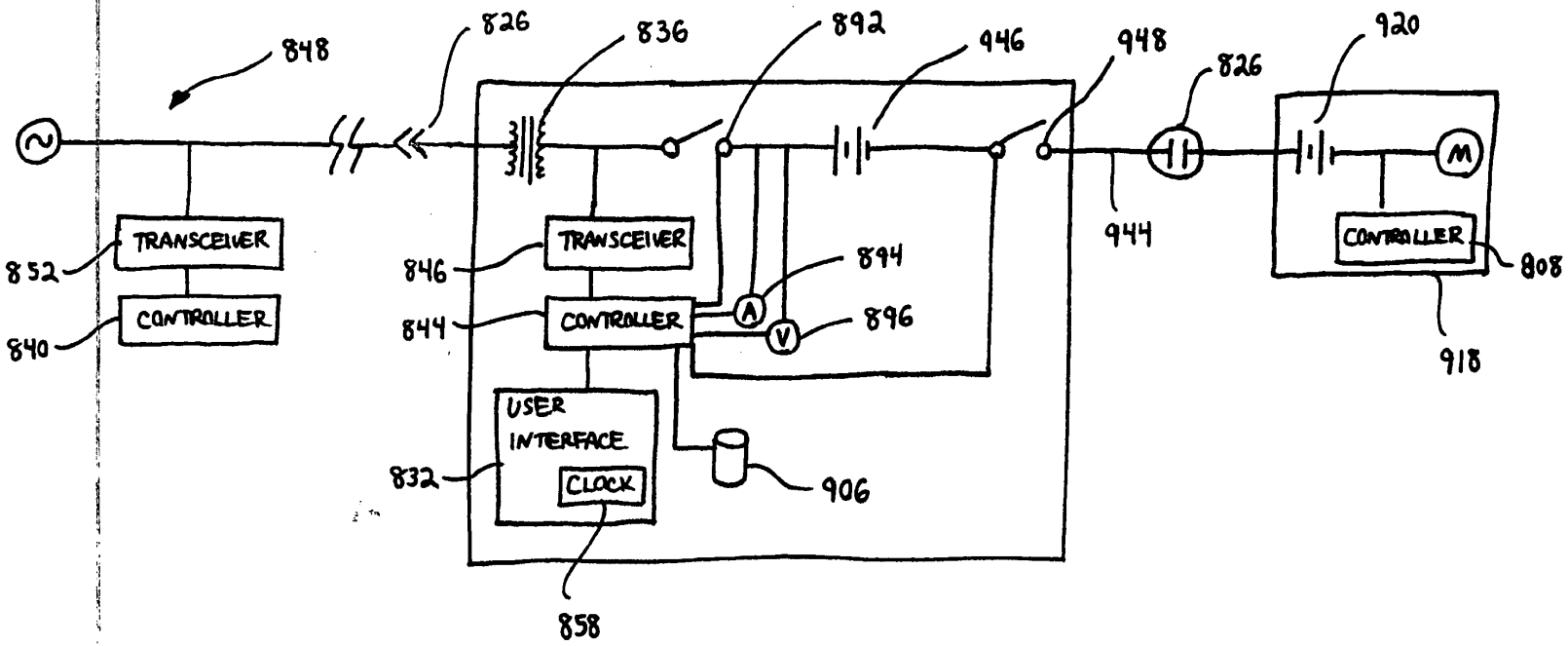


FIG. 17

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Tesla EX1002 Page 544

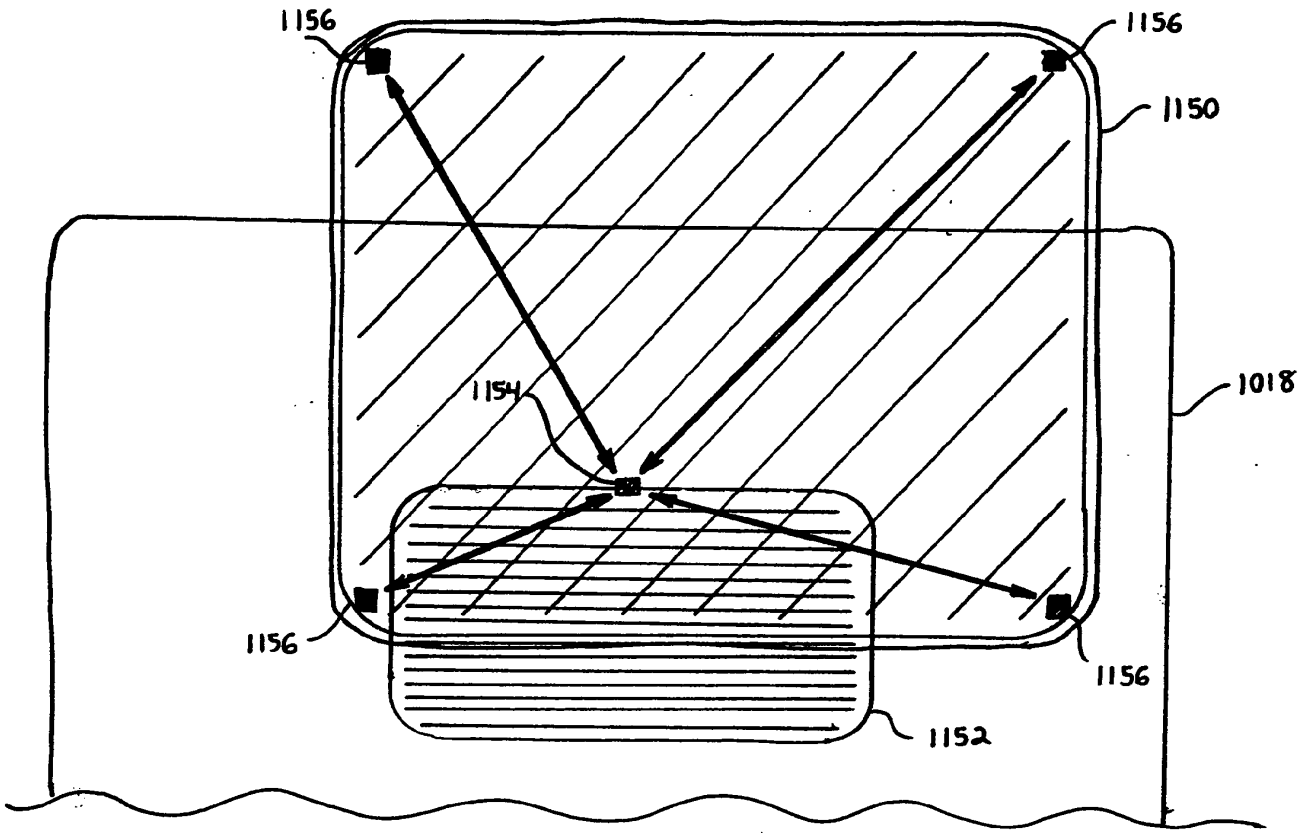

1156
1156
1150
1018
1154
1156
1156
1152

FIG. 18

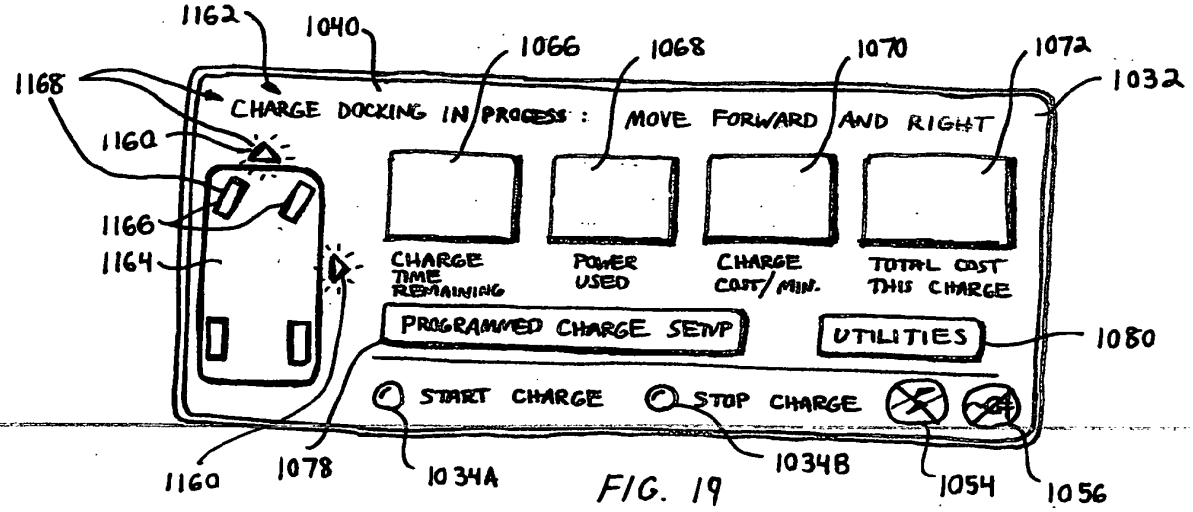

1162
1040
1066
1068
1070
1072
1032
1168
CHARGE DOCKING IN PROCESS : MOVE FORWARD AND RIGHT
1160
1166
1164
CHARGE TIME REMAINING
POWER USED
CHARGE COST/MIN.
TOTAL COST THIS CHARGE
PROGRAMMED CHARGE SETUP
UTILITIES
1080
START CHARGE
STOP CHARGE
1160
1078
1034A
1034B
1054
1056

FIG. 19

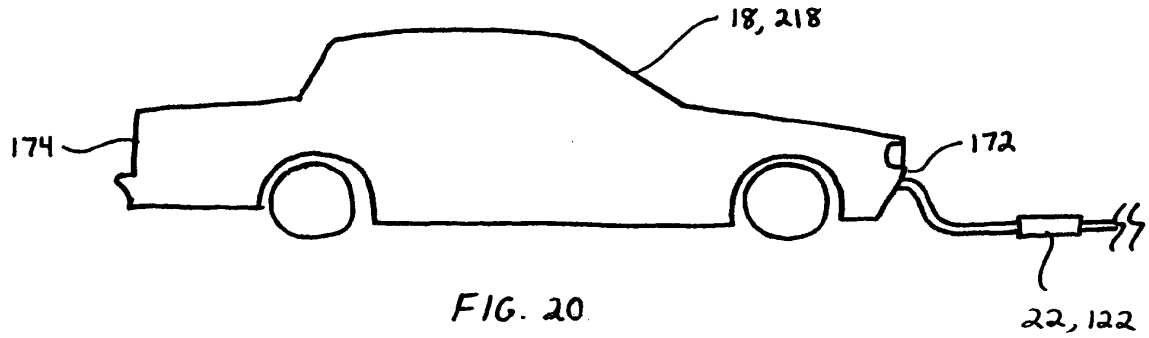


FIG. 20

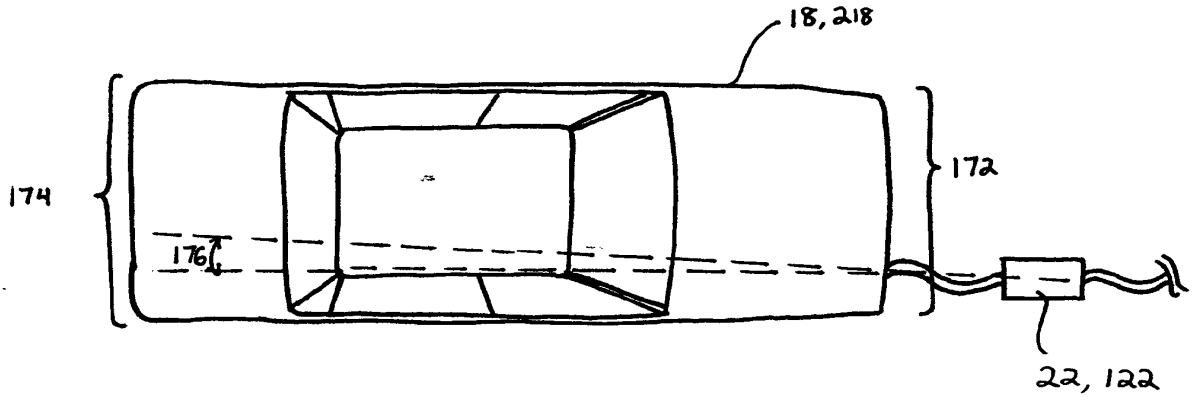


FIG. 21

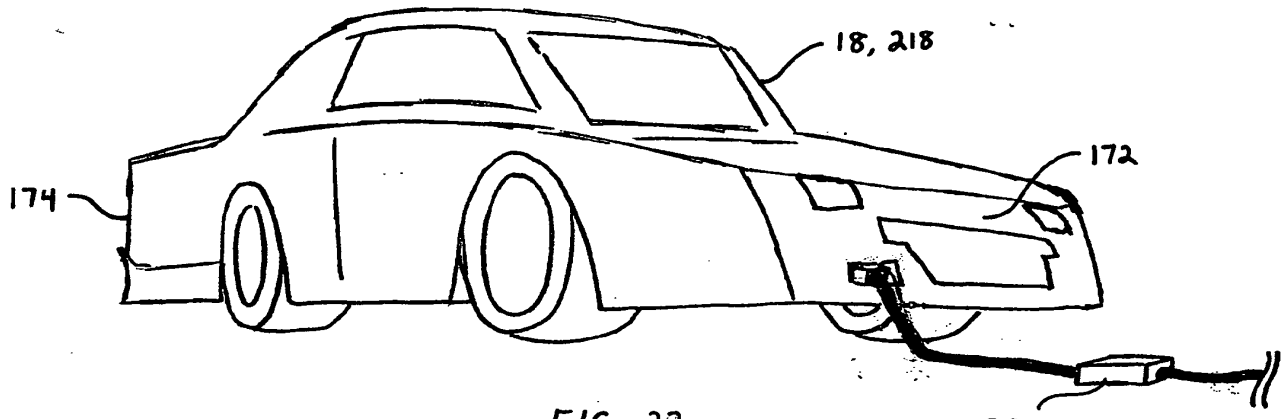


FIG. 22

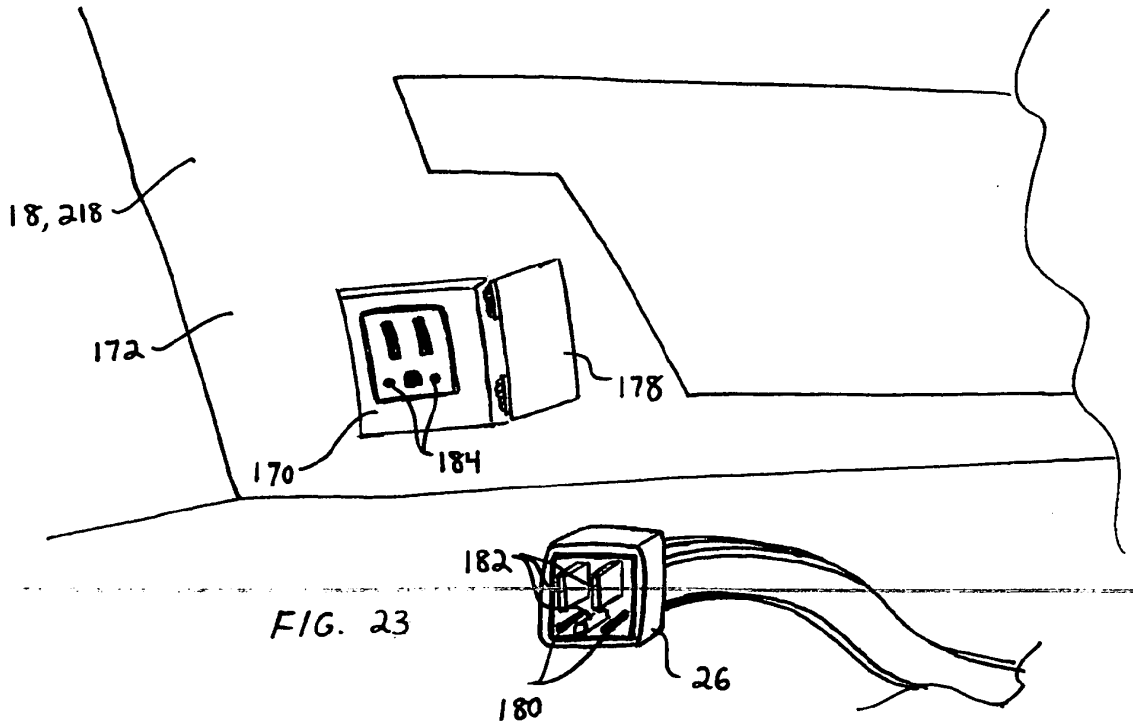


FIG. 23

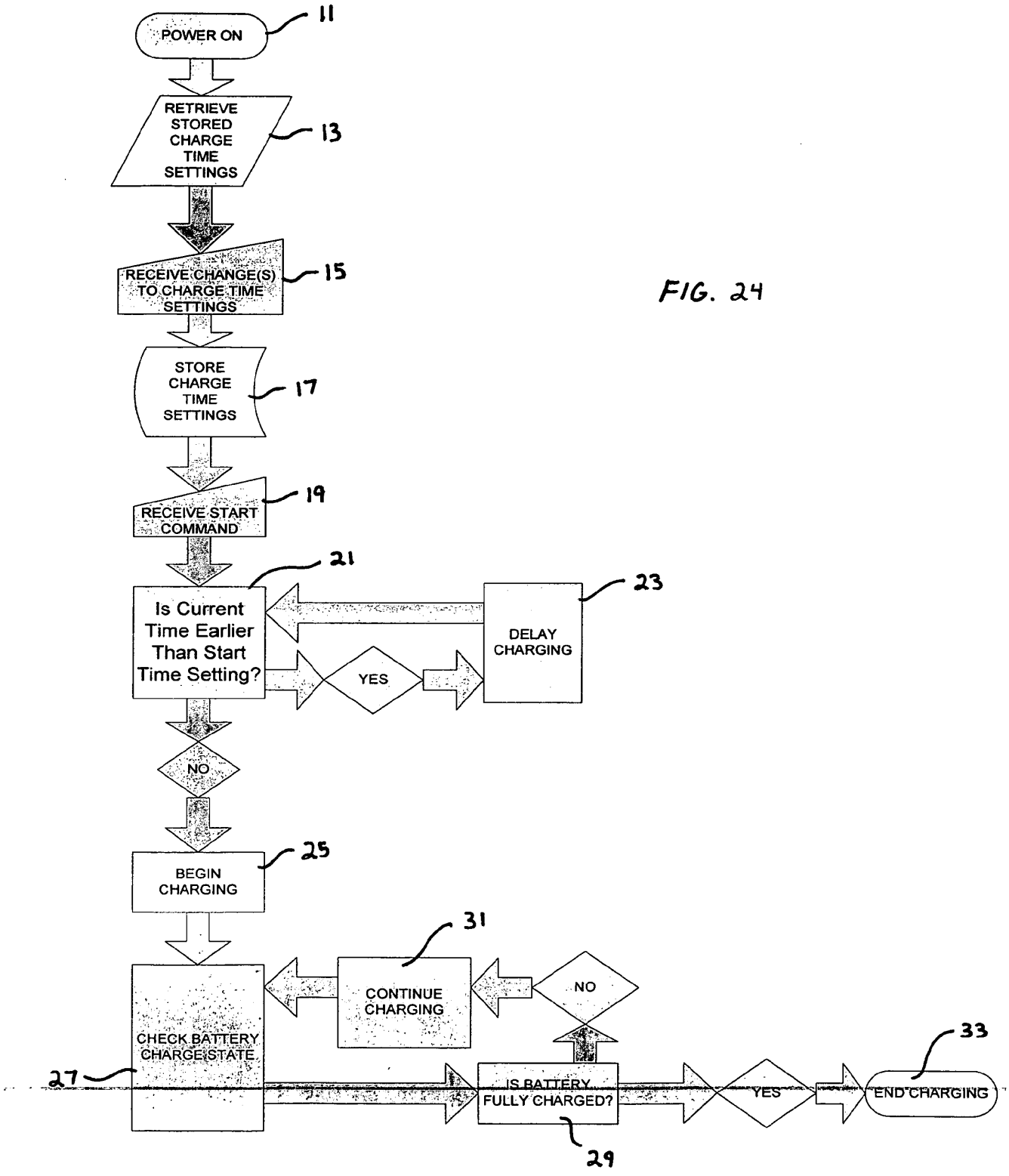

POWER ON
11
RETRIEVE STORED CHARGE TIME SETTINGS
13
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
15
STORE CHARGE TIME SETTINGS
17
RECEIVE START COMMAND
19
Is Current Time Earlier Than Start Time Setting?
21
DELAY CHARGING
23
YES
NO
BEGIN CHARGING
25
CHECK BATTERY CHARGE STATE
27
CONTINUE CHARGING
31
NO
IS BATTERY FULLY CHARGED?
29
YES
END CHARGING
33

FIG. 24

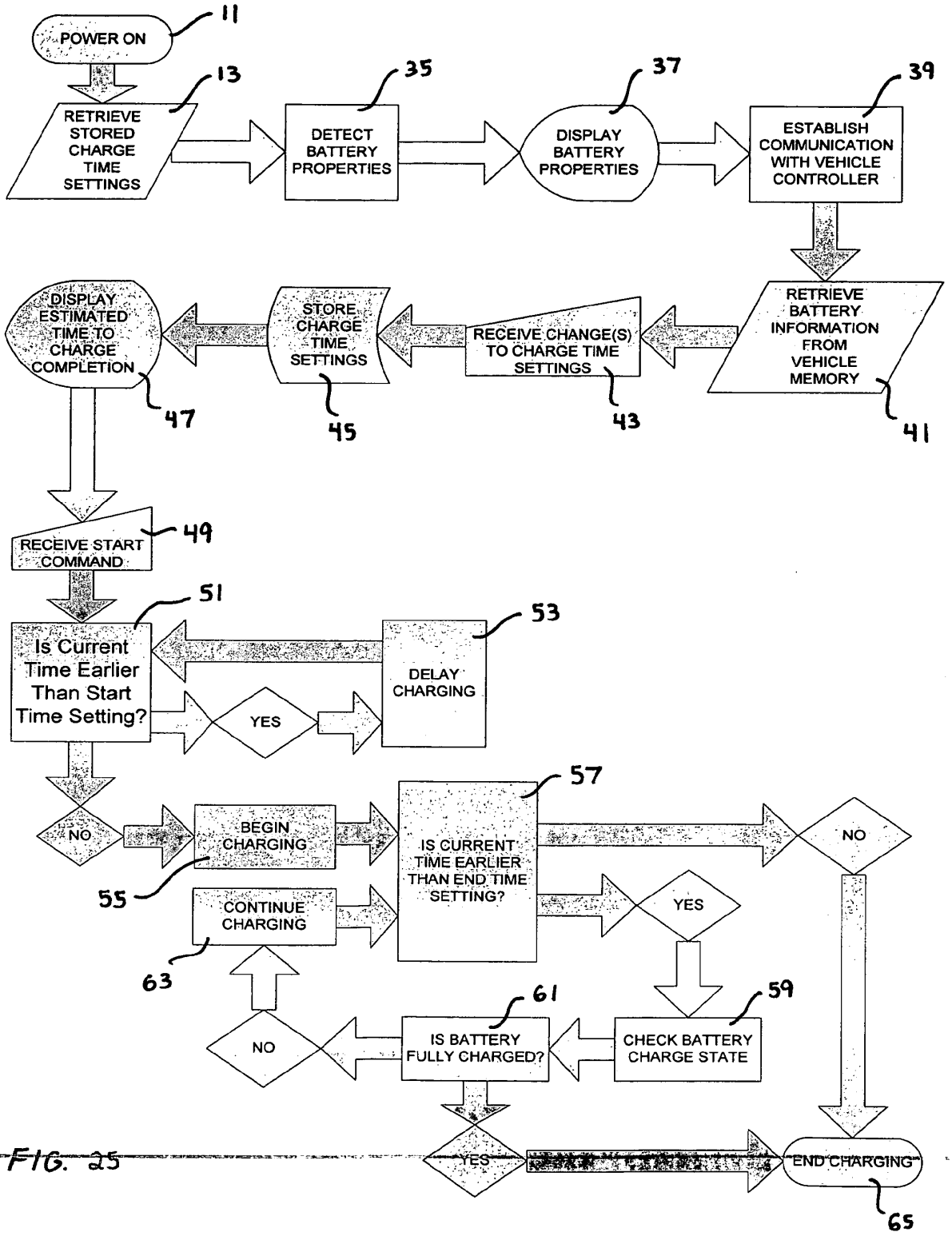

POWER ON
11
RETRIEVE STORED CHARGE TIME SETTINGS
13
DETECT BATTERY PROPERTIES
35
DISPLAY BATTERY PROPERTIES
37
ESTABLISH COMMUNICATION WITH VEHICLE CONTROLLER
39
RETRIEVE BATTERY INFORMATION FROM VEHICLE MEMORY
41
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
43
STORE CHARGE TIME SETTINGS
45
DISPLAY ESTIMATED TIME TO CHARGE COMPLETION
47
RECEIVE START COMMAND
49
Is Current Time Earlier Than Start Time Setting?
51
YES
DELAY CHARGING
53
NO
BEGIN CHARGING
55
CONTINUE CHARGING
63
IS CURRENT TIME EARLIER THAN END TIME SETTING?
57
NO
YES
CHECK BATTERY CHARGE STATE
59
IS BATTERY FULLY CHARGED?
61
NO
YES
END CHARGING
65

FIG. 25

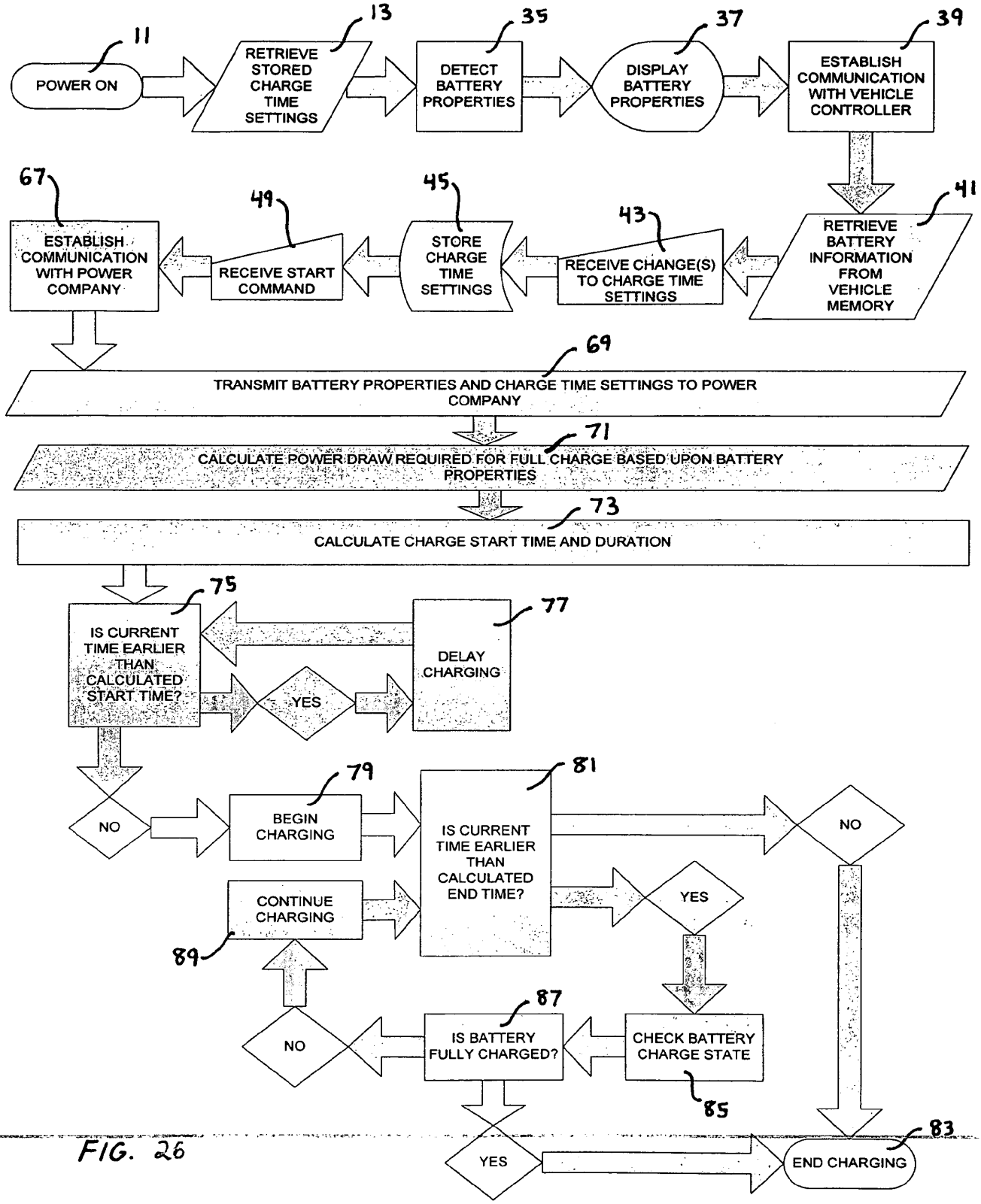

11
POWER ON
13
RETRIEVE STORED CHARGE TIME SETTINGS
35
DETECT BATTERY PROPERTIES
37
DISPLAY BATTERY PROPERTIES
39
ESTABLISH COMMUNICATION WITH VEHICLE CONTROLLER
41
RETRIEVE BATTERY INFORMATION FROM VEHICLE MEMORY
43
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
45
STORE CHARGE TIME SETTINGS
49
RECEIVE START COMMAND
67
ESTABLISH COMMUNICATION WITH POWER COMPANY
69
TRANSMIT BATTERY PROPERTIES AND CHARGE TIME SETTINGS TO POWER COMPANY
71
CALCULATE POWER DRAW REQUIRED FOR FULL CHARGE BASED UPON BATTERY PROPERTIES
73
CALCULATE CHARGE START TIME AND DURATION
75
IS CURRENT TIME EARLIER THAN CALCULATED START TIME?
YES
77
DELAY CHARGING
NO
79
BEGIN CHARGING
81
IS CURRENT TIME EARLIER THAN CALCULATED END TIME?
NO
YES
CONTINUE CHARGING
89
NO
87
IS BATTERY FULLY CHARGED?
CHECK BATTERY CHARGE STATE
85
YES
83
END CHARGING

FIG. 26

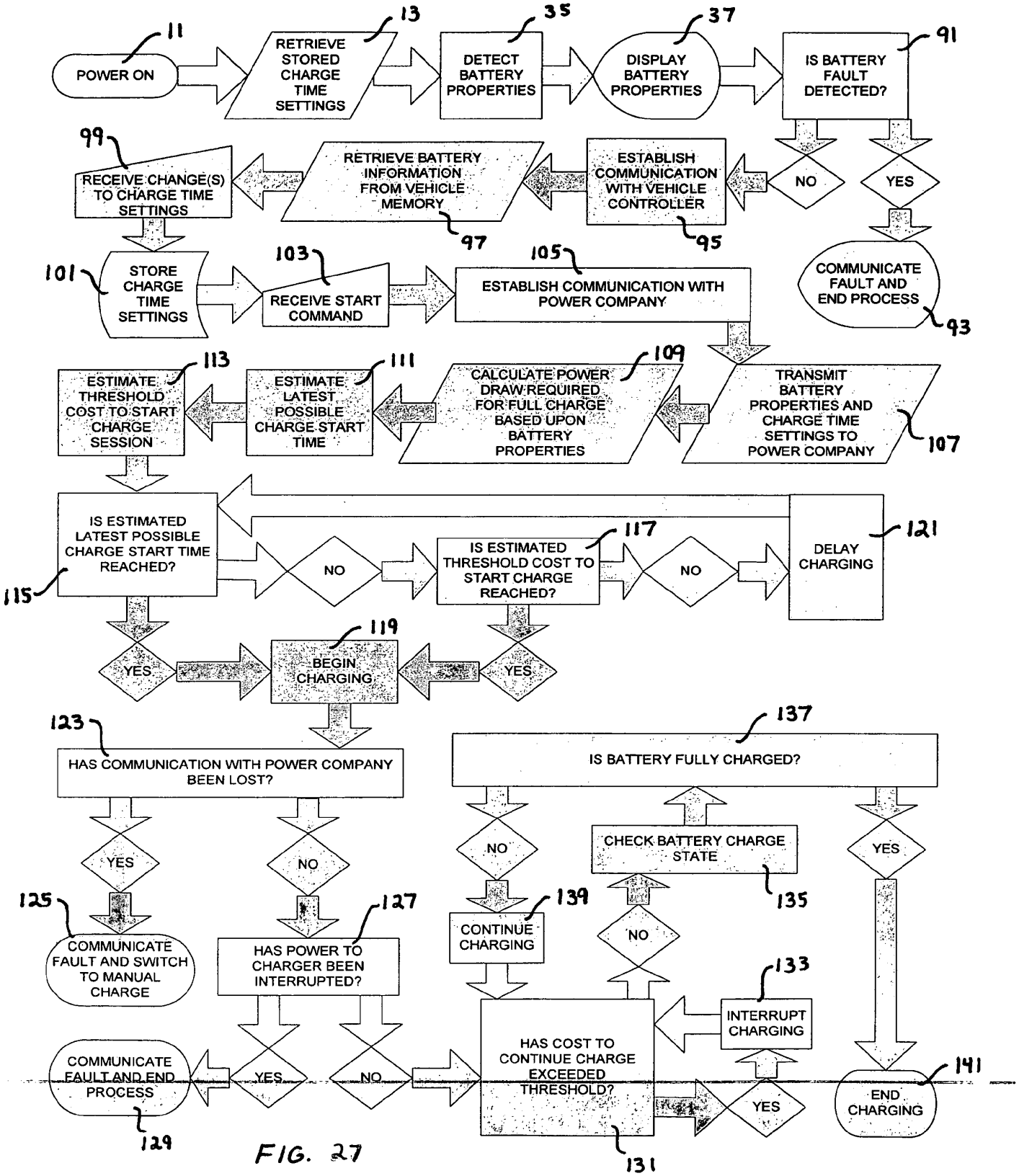
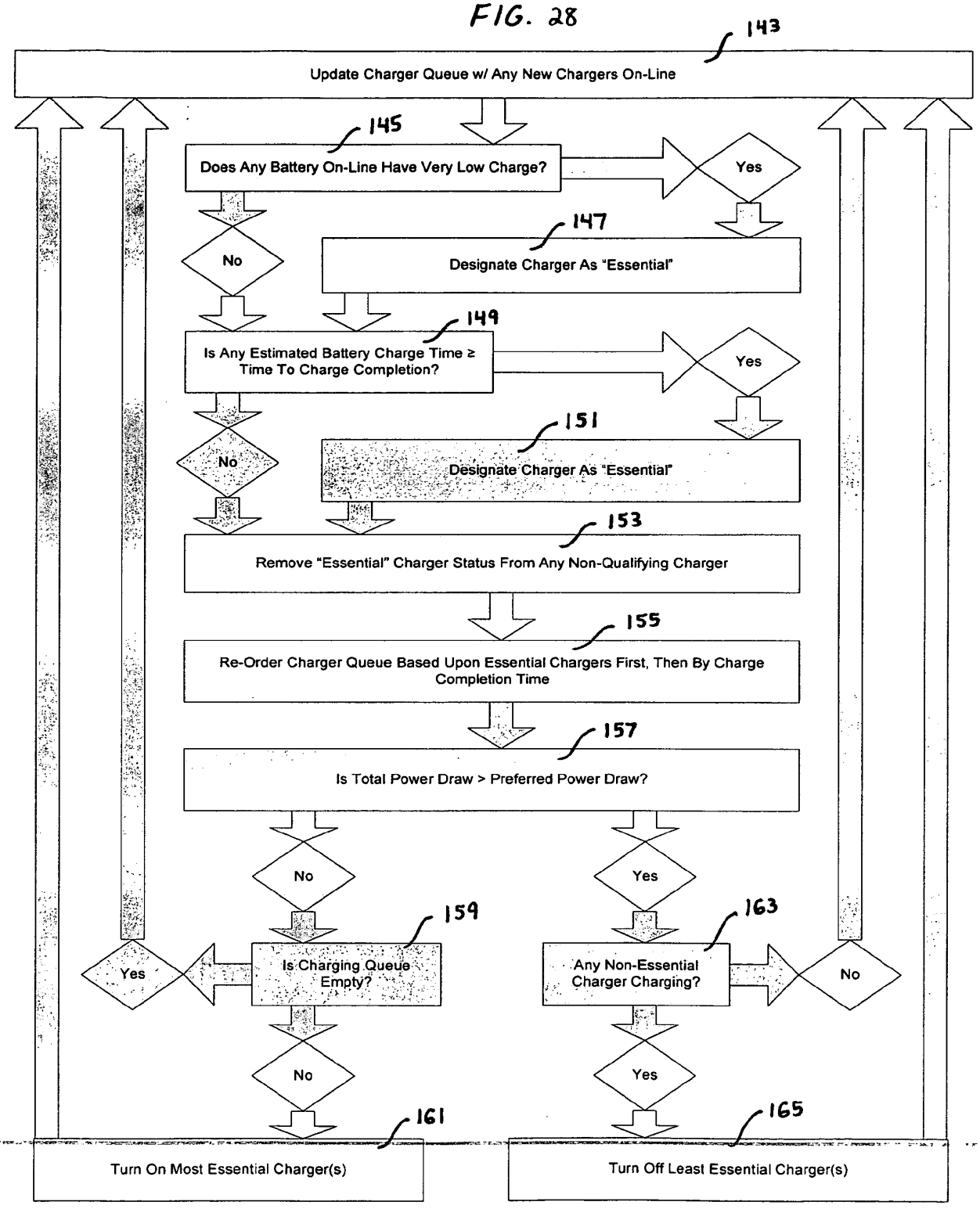

11
POWER ON
13
RETRIEVE STORED CHARGE TIME SETTINGS
35
DETECT BATTERY PROPERTIES
37
DISPLAY BATTERY PROPERTIES
91
IS BATTERY FAULT DETECTED?
NO
YES
95
ESTABLISH COMMUNICATION WITH VEHICLE CONTROLLER
97
RETRIEVE BATTERY INFORMATION FROM VEHICLE MEMORY
99
RECEIVE CHANGE(S) TO CHARGE TIME SETTINGS
101
STORE CHARGE TIME SETTINGS
103
RECEIVE START COMMAND
105
ESTABLISH COMMUNICATION WITH POWER COMPANY
93
COMMUNICATE FAULT AND END PROCESS
107
TRANSMIT BATTERY PROPERTIES AND CHARGE TIME SETTINGS TO POWER COMPANY
109
CALCULATE POWER DRAW REQUIRED FOR FULL CHARGE BASED UPON BATTERY PROPERTIES
111
ESTIMATE LATEST POSSIBLE CHARGE START TIME
113
ESTIMATE THRESHOLD COST TO START CHARGE SESSION
115
IS ESTIMATED LATEST POSSIBLE CHARGE START TIME REACHED?
NO
117
IS ESTIMATED THRESHOLD COST TO START CHARGE REACHED?
NO
121
DELAY CHARGING
YES
119
BEGIN CHARGING
YES
123
HAS COMMUNICATION WITH POWER COMPANY BEEN LOST?
YES
NO
125
COMMUNICATE FAULT AND SWITCH TO MANUAL CHARGE
127
HAS POWER TO CHARGER BEEN INTERRUPTED?
COMMUNICATE FAULT AND END PROCESS
129
YES
NO
137
IS BATTERY FULLY CHARGED?
NO
YES
CHECK BATTERY CHARGE STATE
135
139
CONTINUE CHARGING
NO
133
INTERRUPT CHARGING
HAS COST TO CONTINUE CHARGE EXCEEDED THRESHOLD?
131
YES
141
END CHARGING

FIG. 27

FIG. 28


143
Update Charger Queue w/ Any New Chargers On-Line
145
Does Any Battery On-Line Have Very Low Charge?
Yes
No
147
Designate Charger As "Essential"
149
Is Any Estimated Battery Charge Time ≥ Time To Charge Completion?
Yes
No
151
Designate Charger As "Essential"
153
Remove "Essential" Charger Status From Any Non-Qualifying Charger
155
Re-Order Charger Queue Based Upon Essential Chargers First, Then By Charge Completion Time
157
Is Total Power Draw > Preferred Power Draw?
No
Yes
159
Is Charging Queue Empty?
Yes
163
Any Non-Essential Charger Charging?
No
No
Yes
161
Turn On Most Essential Charger(s)
165
Turn Off Least Essential Charger(s)

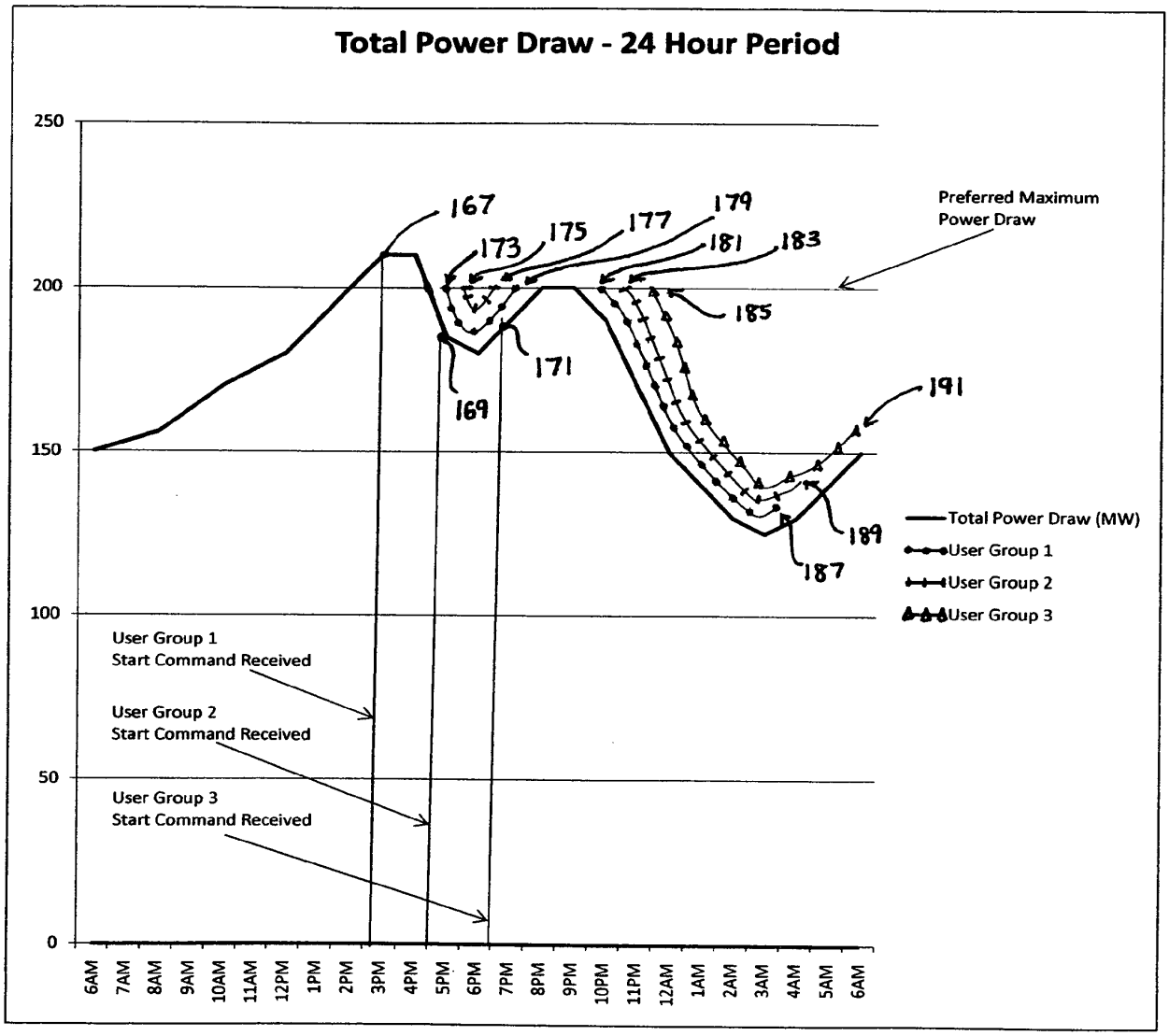

Total Power Draw - 24 Hour Period
250
200
150
100
50
0
6AM
7AM
8AM
9AM
10AM
11AM
12PM
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
9PM
10PM
11PM
12AM
1AM
2AM
3AM
4AM
5AM
6AM
167
173
175
177
179
181
183
185
171
169
191
189
187
Preferred Maximum Power Draw
Total Power Draw (MW)
User Group 1
User Group 2
User Group 3
User Group 1 Start Command Received
User Group 2 Start Command Received
User Group 3 Start Command Received

FIG. 29

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/737,803	Filing Date 02/17/2011	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☒		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	02/17/2011	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $26 =	0	OR	X $ =	
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $110 =	0	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	0	OR	TOTAL ADD'L FEE	

		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/GLORIA ANTHONY/

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.**

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