(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization

International Bureau





(10) International Publication Number WO 2014/004769 A3

(43) International Publication Date 3 January 2014 (03.01.2014)

(51) International Patent Classification:

B60L 11/18 (2006.01) B60L 3/04 (2006.01)**

B60L 3/00 (2006.01)

(21) International Application Number:

PCT/US2013/048083

(22) International Filing Date:

27 June 2013 (27.06.2013)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/665,555 28 June 2012 (28.06.2012) US 13/827,128 14 March 2013 (14.03.2013) US

- (71) Applicant: MIDTRONICS, INC. [US/US]; 7000 Monroe Street, Willowbrook, IL 60521 (US).
- (72) Inventor: BERTNESS, Kevin, I.; 1317 Mcclurg Drive, Batavia, IL 60510 (US).
- (74) Agents: CHAMPLIN, Judson K. et al.; Westman, Champlin & Kelly P.A., 900 Second Avenue South, Suite 1400, Minneapolis, MN 55402-3319 (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, BN, BR, BW, BY,

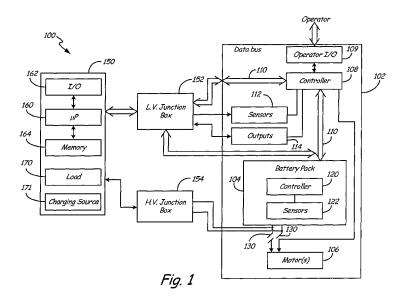
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- (88) Date of publication of the international search report: 8 May 2014

(54) Title: HYBRID AND ELECTRIC VEHICLE BATTERY PACK MAINTENANCE DEVICE



(57) Abstract: The present invention includes a battery maintenance device (100) for performing maintenance on battery packs (104) of hybrid and/or electrical vehicles (102) (referred herein generally as electric vehicles). In various embodiments, the device includes one or more loads (170) for connecting to a battery pack (104) for use in discharging the battery pack (104), and/or charging circuitry for use in charging the battery pack (104). Input/output circuitry (162) can be provided for communicating with circuitry of in the battery pack (104) and/or circuitry of the vehicle (102).



INTERNATIONAL SEARCH REPORT

International application No PCT/US2013/048083

A. CLASSIFICATION OF SUBJECT MATTER INV. B60L11/18 B60L3 B60L3/04 B60L11/18 B60L3/00 ADD. According to International Patent Classification (IPC) or to both national classification and IPC **B. FIELDS SEARCHED** Minimum documentation searched (classification system followed by classification symbols) B60L H02J Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal C. DOCUMENTS CONSIDERED TO BE RELEVANT Category* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. Χ US 2008/315830 A1 (BERTNESS KEVIN I [US]) 1 - 1925 December 2008 (2008-12-25) the whole document US 2005/057256 A1 (BERTNESS KEVIN I [US]) Χ 1 - 1917 March 2005 (2005-03-17) the whole document US 2011/309800 A1 (BERTNESS KEVIN I [US]) χ 17,18 22 December 2011 (2011-12-22) the whole document WO 2008/079062 A1 (VOLVO TECHNOLOGY CORP 18 Α [SE]; FORSLOEW DANIEL [SE]) 3 July 2008 (2008-07-03) page 8; figure 2 Х Further documents are listed in the continuation of Box C. See patent family annex. Special categories of cited documents: "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "A" document defining the general state of the art which is not considered to be of particular relevance earlier application or patent but published on or after the international "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be special reason (as specified) considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "O" document referring to an oral disclosure, use, exhibition or other document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 17 March 2014 25/03/2014 Name and mailing address of the ISA/ Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016 Vázquez del Real, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/048083

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008315830 A1	25-12-2008	NONE	
US 2005057256 A1	17-03-2005	US 2005057256 A1 US 2009160451 A1 US 2010295549 A1 US 2011208454 A1	17-03-2005 25-06-2009 25-11-2010 25-08-2011
US 2011309800 A1	22-12-2011	CN 102948002 A DE 112011102064 T5 US 2011309800 A1 WO 2011159455 A1	27-02-2013 28-03-2013 22-12-2011 22-12-2011
WO 2008079062 A1	03-07-2008	BR PI0720576 A2 CN 101626918 A EP 2097287 A1 JP 2010515406 A US 2010026242 A1 WO 2008079062 A1 WO 2008079069 A1	04-02-2014 13-01-2010 09-09-2009 06-05-2010 04-02-2010 03-07-2008 03-07-2008