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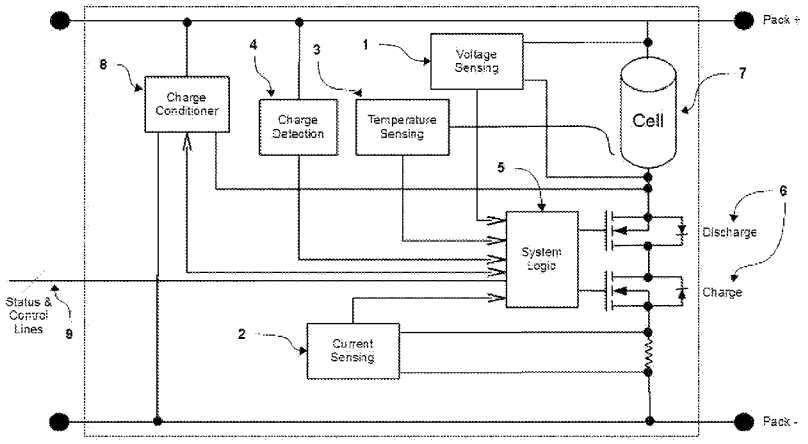

Figure 2

(57) Abstract: A type of protection and cell conditioning circuit is proposed that partly uses the typically existing hardware present in traditional cell-protection circuits and that can achieve an optimum state of charge for the individual cell independently from the actions of the external battery charger. For minimum cost, the proposed circuit and system can solve the battery-cell-balancing problem, while optimizing the performance of the battery pack and while simultaneously enhancing the safety of the battery pack. Multiple battery cells can be communicatively combined to form large batteries. Information from and commands to each of the individual battery cells can be relayed through a low-power serial bus in order to form "intelligent" and optimally managed battery systems.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

H02H 7/18(2006.01)i, H02J 7/00(2006.01)i

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)

H02H 7/18; H02J 7/04; H01M 10/46; H01M 2/10; H02J 7/00; H02J 7/02; H01M 10/44

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: battery,charger,protect,constant voltage, constant current, state, status

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008-137764 A1 (SENDYNE CORPORATION et al.) 13 November 2008 See the abstract, page 5, line 11 - line 35, claim 1, fig.4	1-42
A	JP 2008-067486 A (SHIN KOBE ELECTRIC MACH CO LTD) 21 March 2008 See tha abstract, figs.1-5	1-42
A	US 7400113 B2 (OSBORNE JEFFREY ROGER) 15 July 2008 See the abstract, column 5, line 29 - column 7, line 35, figs.1,2	1-42
A	JP 2001-217012 A (NEC MOBILE ENERGY KK) 10 August 2001 See the abstract, fig.1	1-42
A	JP 2007-335337 A (INOUE ATSUTOSHI) 27 December 2007 See the abstract, fig.1	1-42
A	US 7489106 B1 (TIKHONOV VICTOR) 10 February 2009 See the abstract, column 4, line 32 - column 5, line 57, fig.1	1-42

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 7489106 B1	10.02.2009	None	