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(71) Applicant (for all designated States except US): **PREMIUM POWER CORPORATION** [US/US]; 87 Concord Street, North Reading, MA 01864 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **DARCY, Dennis M.** [US/US]; 14 Gail Avenue, Tyngsboro, MA 01879 (US).

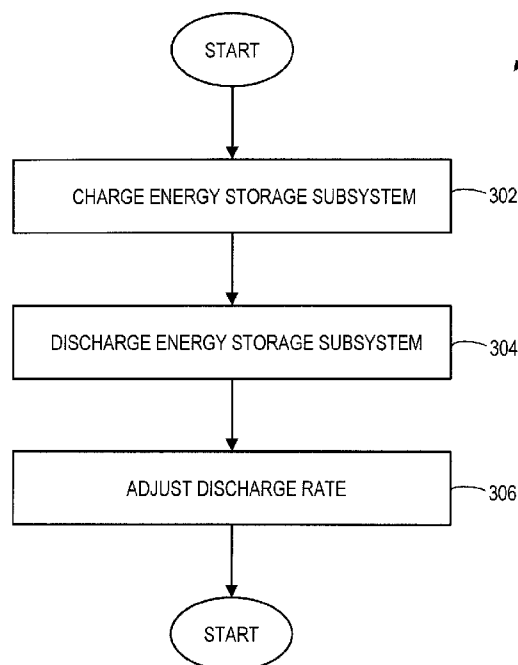
(74) Agent: **DIZEREGA, Phillip**; Lathrop & Gage LLP, 4845 Pearl East Circle, Suite 201, Boulder, CO 80301 (US).

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[Continued on next page]

(54) Title: ENERGY STORAGE SYSTEMS AND ASSOCIATED METHODS



(57) Abstract: A method for responding to a change in electric power demand includes (1) charging an energy storage subsystem from an electric power grid, (2) discharging the energy storage subsystem into the electric power grid at a discharge rate that is less than a maximum rate of discharge of the energy storage subsystem, and (3) adjusting the discharge rate in response to a signal selected from the group consisting of a signal to provide a regulation up service and a signal to provide a regulation down service. An energy storage system includes an energy storage subsystem for storing electric power, an interface for interfacing the energy storage subsystem with an electric power grid, and a controller configured to control operation of the interface in response to a signal to provide a regulation up service and a signal to provide a regulation down service.

FIG. 3



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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A. CLASSIFICATION OF SUBJECT MATTER***H02J 3/28(2006.01)i, H02J 13/00(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)

H02J 3/28; G06F 9/48; H02J 7/04; G05D 17/02; F01K 3/00; G06Q 50/00; G06Q 10/00; 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: charge, discharge, rate, adjust, price, load demand

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004-0263116 A1 (DORUK ZEYNEP B. et al.) 30 December 2004 See the abstract; paragraphs [0015], [0031]; claims 1, 6, 8-9, 11-12; figure 1.	1-9
Y	US 2008-0114499 A1 (HAKIM DAVID B. et al.) 15 May 2008 See the abstract; claims 1, 9, 16-18; figures 3, 5.	1-9
A	US 2008-0281663 A1 (HAKIM DAVID et al.) 13 November 2008 See the abstract; claims 1, 6, 12, 15, 25-26, 48; figure 1.	1-9
A	US 2008-0040263 A1 (POLLACK SETH B. et al.) 14 February 2008 See the abstract; claims 1-6; figure 1.	1-9
A	US 5541489 A (DUNSTAN; ROBERT A.) 30 July 1996 See the abstract; claims 1-2; figures 3, 8.	1-9



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

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Authorized officer

WEE Jae Woo

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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
US 2004-0263116 A1	30.12.2004	US 7385373 B2	10.06.2008
US 2008-0114499 A1	15.05.2008	CA 2672542-A1	15.05.2008
		EP 2097797 A2	09.09.2009
		US 7590472 B2	15.09.2009
		WO 2008-058284 A2	15.05.2008
		WO 2008-058284 A3	15.05.2008
US 2008-0281663 A1	13.11.2008	AU 2008-251352 A1	20.11.2008
		CA 2687037-A1	20.11.2008
		EP 2147359 A2	27.01.2010
		KR20100040275A	19.04.2010
		WO 2008-141246 A2	20.11.2008
		WO 2008-141246 A3	29.01.2009
US 2008-0040263 A1	14.02.2008	None	
US 5541489 A	30.07.1996	None	