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  - (71) Applicant (for all designated States except US): **CATERPILLAR INC.** [US/US]; 100 N.E. Adams Street, Peoria, IL 61629-9510 (US).
  - (72) Inventors; and
  - (75) Inventors/Applicants (for US only): **YU, Dachuan** [CN/US]; 1617 Frontier Drive, Normal, IL 61761 (US). **SIEGLE, James, David** [US/US]; 1911 Chestnut Lane, Washington, DC 61571 (US). **ILLINDALA, Mahesh, Sitararam** [IN/US]; 2114 West Liams Way, Dunlap, IL 61525 (US). **HARTMAN, Mark, Edward** [US/US]; 6551 North Cedarbrook Lane, Peoria, IL 61614 (US). **SPECKHART, Gregory, Jay** [US/US]; 228 East Oak Cliff Court, Peoria, IL 61614 (US).
  - (74) Agents: **FAHLBERG, Robin, S.** et al.; 100 N.E. Adams Street, Peoria, IL 61629-9510 (US).
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[Continued on next page]

(54) Title: UNINTERRUPTIBLE POWER SUPPLY

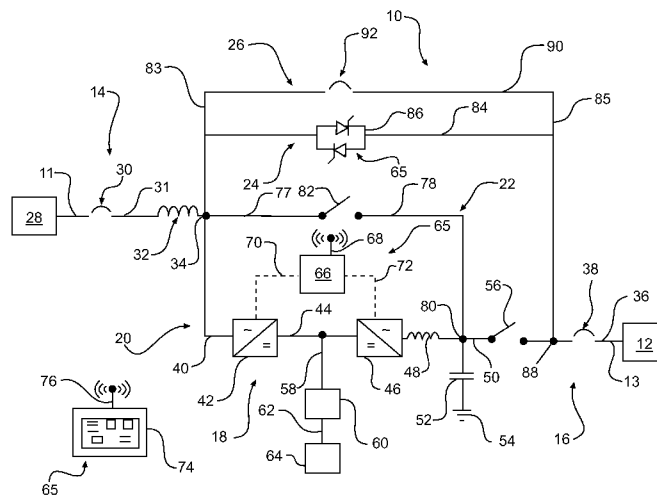


FIG. 1

(57) Abstract: An uninterruptible power supply (10) includes an input (11) and an output (13). The uninterruptible power supply may include a first power path (22) between the input and the output. The uninterruptible power supply may also include a second power path (20) between the input and the output. The second power path may include a rectifier (42) and an inverter (46). The uninterruptible power supply may also include controls (65) configured to operate the uninterruptible power supply to supply electricity to the output. In controlling the uninterruptible power supply, the controls may selectively operate in first mode by transmitting electricity from the inlet to the outlet via the first power path while operating the inverter to condition at least one characteristic of electricity at the output. The controls may also selectively operate the uninterruptible power supply in a second mode by transmitting electricity from the input to the output via the second power path.

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## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2012/043506****A. CLASSIFICATION OF SUBJECT MATTER****H02J 9/06(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 9/06; G05F 1/70; H02J 7/00; H02M 7/48; H02J 3/00

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) &amp; Keywords: uninterruptible power supply, power path, inverter, time delay

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2010-115008 A (TDK-LAMBDA CORP) 20 May 2010 See abstract, paragraphs[0014]-[0020], claims 1-6, and figures 1-3.	1-10
Y	JP 07-219660 A (FUJI ELECTRIC CO LTD) 18 August 1995 See abstract, paragraph[0007], claim 1, and figures 1,2.	1-10
A	JP 07-170678 A (JAPAN STORAGE BATTERY CO LTD) 04 July 1995 See abstract, claim 1, and figure 1.	1-10
A	JP 11-252826 A (SHIN KOBE ELECTRIC MACH CO LTD) 17 September 1999 See abstract, claim 1, and figures 1-4.	1-10
A	US 7372177 B2 (COLOMBI SILVIO et al.) 13 May 2008 See abatract, claim 1, and figures 1-7.	1-10

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be 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

"&amp;" document member of the same patent family

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Authorized officer

Kwak In Gu

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2012/043506**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2010-115008 A	20.05.2010	CN 101741131 A TW 201019570 A US 2010-0110731 A1	16.06.2010 16.05.2010 06.05.2010
JP 07-219660 A	18.08.1995	None	
JP 07-170678 A	04.07.1995	None	
JP 11-252826 A	17.09.1999	JP 3598799 B2	08.12.2004
US 7372177 B2	13.05.2008	None	