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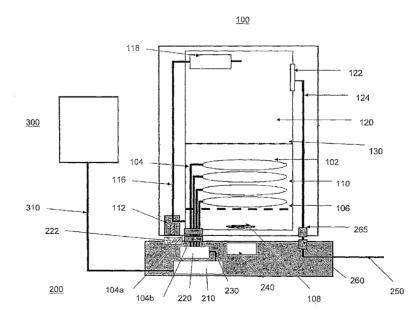
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- (54) Title: HYDROGEN FUEL CARTRIDGE AND METHODS FOR HYDROGEN GENERATION



(57) Abstract: Systems and methods are provided for generating hydrogen gas using a catalyst or reagent and a boron hydride compound. The preferred hydrogen generation system includes a fuel cartridge and a hydrogen generation system balance of plant (BOP) module. Solid fuel is stored in individual fuel packets in a fuel chamber, and converted into a fuel solution. Fuel is pumped to a reactor where it produces hydrogen and borate. The hydrogen and borate product exit the reactor and are deposited in a hydrogen separation chamber separated from the fuel chamber by a moveable partition. Hydrogen is separated by a membrane and exits the generator. As fuel is consumed, the movable partition is disposed toward the fuel chamber and the borate product is deposited on one side of the movable partition. The controls are preferably contained in the BOP module.





## INTERNATIONAL SEARCH REPORT

International application No. PCT/US 07/09014

		<u></u>	
A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - C01B 3/06 (2008.10) USPC - 423/648.1			
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)			
IPC (8) - C0 USPC - 423	D1B 3/06 (2008.10)	y classification symbols)	
Documental USPC - 423	tion searched other than minimum documentation to the e 3/658.2; 429/12; 429/13	extent that such documents are included in the	e fields searched
PUBWEST partition was	ata base consulted during the international search (name (PGPB,USPT,USOC,EPAB,JPAB) Terms - borohydrid ter-soluble polymer fuel waste water membrane drogen fuel cell bag pump borohydride; hydrogen gener	e "Millennium Cell" "fuel cell" solid reservoir	chamber tank bag pump
C. DOCUMENTS CONSIDERED TO BE RELEVANT			
Category*	Citation of document, with indication, where a	ppropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/0268555 A1 (AMENDOLA, ET AL.) 08 Dec 2 [0033], [0035], [0043]-[0044], [0057]-[0058], [0064], [0	2005 (08.12.2005), para [0007]-[0011], 1071]	1-39
Υ	US 2003/0009942 A1 (AMENDOLA, ET AL.) 16 Jan 2 [0034]	2003 (16.01.2003), para [0031], [0033],	1-39
Y	US 2003/0129464 A1 (BECERRA, ET AL.) 10 July 2003 (10.07.2003), para [0061]		10
Y	US 2003/0235724 A1 (ORD, ET AL.) 25 Dec 2003 (25	5.12.2003), para [0042]	12
Υ	US 6,534,033 B1 (AMENDOLA, ET AL.) 18 Mar 2003	(18.03.2003), col 4, ln 15-29	18-22 and 36-39
Further documents are listed in the continuation of Box C.			
* Special categories of cited documents:  "A" document defining the general state of the art which is not considered to be of particular relevance  "I" 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			
"E" earlier application or patent but published on or after the international "X" filing date "L" document which may throw doubts on priority claim(s) or which is		"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	
cited to establish the publication date of another citation or other special reason (as specified)  "O" document referring to an oral disclosure, use, exhibition or other means		"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	
"P" 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 11 Feb 2008 (11.02.2008)		Date of mailing of the international search report  1 1 MAR 2008	
Name and mailing address of the ISA/US  Mail Stop PCT, Attn: ISA/US, Commissioner for Patents  P.O. Box 1450, Alexandria, Virginia 22313-1450		Authorized officer:  Lee W. Young  PCT Helpdesk: 571-272-4300 PCT OSP: 521-272-7774	
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Form PCT/ISA/210 (second sheet) (April 2007)			

## INTERNATIONAL SEARCH REPORT

International application No. PCT/US 07/09014

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)			
This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:			
1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:			
2. Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:			
3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).			
Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)			
This International Searching Authority found multiple inventions in this international application, as follows:			
Group I: claims 1-39; Group II: claims 40-45; Group III: claims 46-50; Group III: claims 51-62.			
see extra sheet for more information			
1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.			
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.			
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:			
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  1-39			
Remark on Protest  The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.  The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.  No protest accompanied the payment of additional search fees.			