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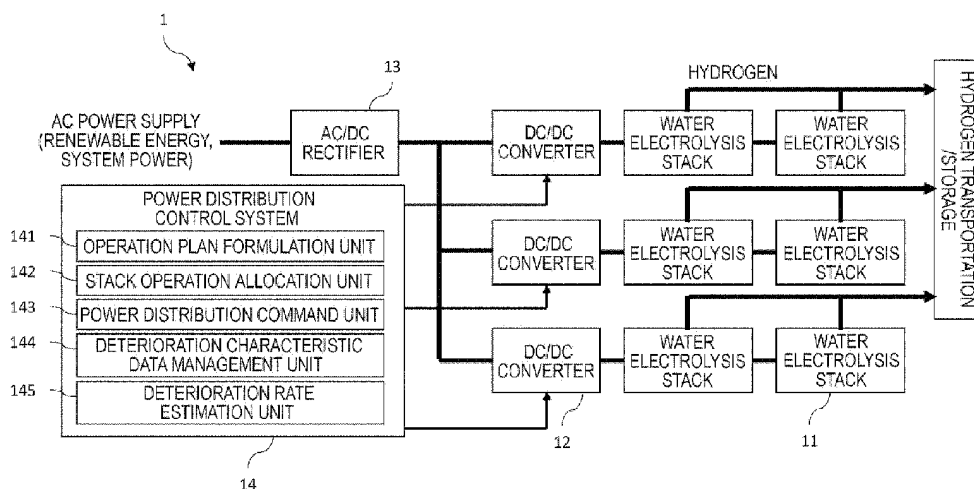
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(54) **HYDROGEN PRODUCTION SYSTEM AND HYDROGEN PRODUCTION METHOD**

(57) In a control system for a hydrogen production system that produces hydrogen using a plurality of water electrolysis stacks, a technique is provided, which is capable of effectively restraining a degradation of the water electrolysis stacks. In the control system according to the

present disclosure, any one of an operation priority stack, a stop priority stack, and an intermediate operation stack is allocated as the operation states of the water electrolysis stacks.

FIG. 1





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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	CN 112 103 994 A (UNIV TONGJI) 18 December 2020 (2020-12-18) * claim 1 * * paragraph [0075] * * paragraph [0058] * * paragraph [0128] *	1-18	INV. C25B1/04 C25B9/70 C25B15/023 C25B1/50 C25B15/00 C25B15/02
Y	WO 2018/109858 A1 (TOSHIBA KK [JP]; TOSHIBA ENERGY SYSTEMS & SOLUTIONS CORP [JP]) 21 June 2018 (2018-06-21) * paragraph [0033] *	1-18	
A	US 10 006 132 B2 (SIEMENS AG [DE]; SIEMENS AG [DE]) 26 June 2018 (2018-06-26) * the whole document *	1-18	
A	US 2018/291516 A1 (NAKAO HIROSHI [JP]) 11 October 2018 (2018-10-11) * the whole document *	1-18	
A	US 2011/155583 A1 (LI HAIMING [US]) 30 June 2011 (2011-06-30) * the whole document *	1-18	TECHNICAL FIELDS SEARCHED (IPC) C25B
E	US 11 519 089 B1 (FAURE BASTIEN [FR] ET AL) 6 December 2022 (2022-12-06) * the whole document *	1-18	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 August 2023	Examiner Thorner, Gentien
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-08-2023

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 112103994 A	18-12-2020	CN 112103994 A	18-12-2020
		DE 112021000064 T5	14-04-2022
		JP 7224608 B2	20-02-2023
		JP 2022543836 A	14-10-2022
		US 2023043165 A1	09-02-2023
		WO 2022042216 A1	03-03-2022
WO 2018109858 A1	21-06-2018	JP 6731070 B2	29-07-2020
		JP WO2018109858 A1	24-10-2019
		WO 2018109858 A1	21-06-2018
US 10006132 B2	26-06-2018	CA 2907464 A1	25-09-2014
		DK 2956572 T3	19-06-2017
		EP 2781624 A1	24-09-2014
		EP 2956572 A1	23-12-2015
		ES 2630111 T3	18-08-2017
		JP 6058205 B2	11-01-2017
		JP 2016518519 A	23-06-2016
		PT 2956572 T	26-06-2017
		US 2016281248 A1	29-09-2016
		WO 2014146885 A1	25-09-2014
US 2018291516 A1	11-10-2018	JP 6897250 B2	30-06-2021
		JP 2018178175 A	15-11-2018
		US 2018291516 A1	11-10-2018
US 2011155583 A1	30-06-2011	NONE	
US 11519089 B1	06-12-2022	US 11519089 B1	06-12-2022
		WO 2023021387 A2	23-02-2023