



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
14.06.2017 Bulletin 2017/24

(51) Int Cl.:
F01K 7/34 (2006.01) *F01K 13/02* (2006.01)
F22D 1/28 (2006.01) *F01D 21/14* (2006.01)
F01D 1/28 (2006.01) *F01D 21/20* (2006.01)

(43) Date of publication A2:
27.07.2011 Bulletin 2011/30

(21) Application number: **10173147.9**

(22) Date of filing: **18.08.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO SE SI SK SM TR
 Designated Extension States:
BA ME RS

- Sudo, Mitsuru
Tokyo 100-8220 (JP)
- Hiraga, Ichiro
Tokyo 100-8220 (JP)
- Teranishi, Tsugutomo
Ibaraki (JP)

(30) Priority: 18.08.2009 JP 2009189423

(74) Representative: **MERH-IP Matias Erny Reichl Hoffmann**
Patentanwälte PartG mbB
Paul-Heyse-Strasse 29
80336 München (DE)

(71) Applicant: **Mitsubishi Hitachi Power Systems, Ltd.**
Yokohama 220-8401 (JP)

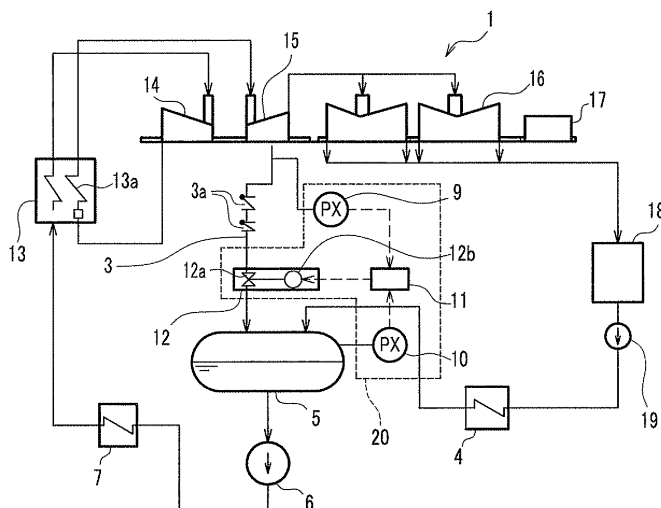
(72) Inventors:
• **Hirakawa, Yosuke**
Tokyo 100-8220 (JP)

(54) Turbine protection device and method for controlling a steam turbine

(57) An object of the present invention is to provide a turbine protection device which can interrupt steam flowing backward from a deaerator (5) to a turbine (2) completely even if a check valve (3a) provided between the deaerator (5) and the turbine (2) can not interrupt the steam flowing between the deaerator (5) and the turbine (2) completely. In order to achieve the above object, a control unit (11) sends commands to a shutdown valve

device (12) so as to close the shutdown valve device (12) when a differential pressure resulted from subtracting a pressure of an extraction steam from a pressure within the deaerator (5) becomes equal to or greater than a first predetermined value. As a result, the steam flowing backward from the deaerator (5) to the turbine (2) is interrupted by a stop valve of the shutdown valve device (12).

FIG.1





EUROPEAN SEARCH REPORT

Application Number
EP 10 17 3147

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 819 436 A (AHNER DAVID J [US] ET AL) 11 April 1989 (1989-04-11) * columns 2-5; figures 1-2 * -----	1-6	INV. F01K7/34 F01K13/02 F22D1/28 F01D21/14 F01D1/28 F01D21/20
X	DE 971 506 C (BROWN) 5 February 1959 (1959-02-05) * pages 1-5; figure 2 * -----	1-6	
A	JP H08 210107 A (FUJI ELECTRIC CO LTD) 20 August 1996 (1996-08-20) * paragraph [0024]; figure 1 * -----	1,4	
			TECHNICAL FIELDS SEARCHED (IPC)
			F01K
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 May 2017	Examiner Lepers, Joachim
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			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 17 3147

5 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.

05-05-2017

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 4819436	A	11-04-1989	NONE
	DE 971506	C	05-02-1959	NONE
15	JP H08210107	A	20-08-1996	NONE
20				
25				
30				
35				
40				
45				
50				
55				

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82