

# Europäisches Patentamt European Patent Office Office européen des brevets



(11) **EP 1 335 111 A3** 

(12)

#### **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3: **05.11.2003 Bulletin 2003/45** 

(51) Int Cl.<sup>7</sup>: **F01D 5/08** 

(43) Date of publication A2: 13.08.2003 Bulletin 2003/33

(21) Application number: 03004315.2

(22) Date of filing: 29.11.1996

(84) Designated Contracting States: **DE FR GB** 

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC: 96940152.0 / 0 965 726

(71) Applicant: Hitachi, Ltd. Chiyoda-ku, Tokyo 101 (JP)

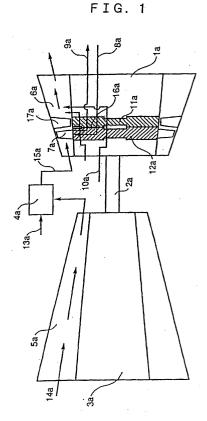
(72) Inventors:

- Marushima, Shinya
   Hitachinaka-shi, Ibaraki 312-0057 (JP)
- Matsumoto, Manabu Higashiibaraki-gun, Ibaraki 311-3116 (JP)

- Kawaike, Kazuhiko Hitachinaka-shi, Ibaraki 312-0012 (JP)
- Ikeguchi, Takashi Hitachi-shi, Ibaraki 316-0014 (JP)
- Machida, Takashi Tsuchiura-shi, Ibaraki 300-0065 (JP)
- Sekihara, Masaru, Sanhiruta Omika Room 303 Ibaraki, 319-1221 (JP)
- (74) Representative: Hano, Christian, Dipl.-Ing. et al v. Füner Ebbinghaus Finck Hano Mariahilfplatz 2 & 3 81541 München (DE)

#### (54) Coolant recovery type gas turbine

A gas turbine includes a rotor shaft comprising (57)a plurality of discs (8, 9, 10, 11, 12a). Each disc (8, 9, 10, 11, 12a) has a plurality of moving blades (4, 5, 6, 7, 7a) driven by combustion gas and arranged annularly on the peripheral portion. Spacers (11a, 13, 14, 15) are arranged between the discs (8, 9, 10, 11, 12a), the respective discs (8, 9, 10, 11, 12a) and the spacers (11a, 13, 14, 15) being arranged in the axial direction. The moving blades (4, 5, 6, 7, 7a) are provided with flow paths (8a, 9a) for introducing coolant for cooling and discharging the coolant heated by the combustion gas. Contact surfaces (16a, 31, 32, 33, 34, 35, 36) contacting both the discs (8, 9, 10, 11, 12a) in rotor peripheral side regions and adjacent spacers (11a, 13, 14, 15) are formed therebetween. A supply flow path (8a) passes through the discs (8, 9, 10, 11, 12a) and the spacers (11a, 13, 14, 15) in the regions forming the contact surfaces (16a, 31, 32, 33, 34, 35, 36) and supply the coolant for cooling the moving blades (4, 5, 6, 7, 7a). A recovery flow path (9a) recovers the coolant which is heated by the moving blades (4, 5, 6, 7, 7a).



Printed by Jouve, 75001 PARIS (FR)



## **EUROPEAN SEARCH REPORT**

Application Number EP 03 00 4315

Category	Citation of document with ind of relevant passa		Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
X	EP 0 735 238 A (GEN 2 October 1996 (1996 * abstract; figure 1	ELECTRIC) -10-02)	1,3	F01D5/08
X	US 5 558 496 A (WOOD AL) 24 September 199 * figures 1,2,5 *		1,3	
E	PATENT ABSTRACTS OF vol. 1998, no. 01, 30 January 1998 (199 & JP 09 242563 A (HI 16 September 1997 (1 * abstract; figures	8-01-30) TACHI LTD), 997-09-16)	1,2	
E	PATENT ABSTRACTS OF vol. 1997, no. 11, 28 November 1997 (19 & JP 09 195702 A (HI 29 July 1997 (1997-0	97-11-28) TACHI LTD), 7-29)	1,2	
	* abstract; figures_	1,3,4 *		TECHNICAL FIELDS SEARCHED (Int.CI.7)
				F01D
	The present search report has be		<u> </u>	
	Place of search THE HAGUE	Date of completion of the search  11 September 20	33 Arg	Examiner Jentini, A
X : part Y : part doct	ATEGORY OF CITED DOCUMENTS icularly relevant if taken alone icularly relevant if combined with anothe ument of the same category inological background	T : theory or princi E : earlier patent o after the filling o or D : document cite L : document cite	ple underlying the locument, but publicate in the application	invention ished on, or

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

EP 03 00 4315

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.

11-09-2003

	document earch report	Publicatio date	n	Patent fam member(s		Publication date
EP 07352	38 A	02-10-199	6 US DE DE EP JP	5593274 69618492 69618492 0735238 9013902	D1 T2 A1	14-01-1997 21-02-2002 26-09-2002 02-10-1996 14-01-1997
US 55584	96 A	24-09-199	6 NONE			
JP 09242	563 A	16-09-199	7 NONE			
JP 09195	702 A	29-07-199	7 CN US	1133936 5695319	A ,B A	23-10-1996 09-12-1997

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