



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
08.12.2004 Bulletin 2004/50

(51) Int Cl.7: **F04D 5/00, F04D 29/02**

(43) Date of publication A2:
27.03.2002 Bulletin 2002/13

(21) Application number: **01402295.8**

(22) Date of filing: **05.09.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventors:
• **Honma, Bunji**
Ohta-shi, Gunma-ken (JP)
• **Sadakata, Nobuyasu**
Isesaki-shi, Gunma-ken (JP)
• **Hasegawa, Kiyoshi**
Ohta-shi, Gunma-ken (JP)

(30) Priority: **20.09.2000 JP 2000285182**
02.07.2001 JP 2001200637

(74) Representative: **Hud, Robert et al**
Cabinet COLLIGNON
15 rue de Surène
75008 Paris (FR)

(71) Applicant: **Mitsuba Corporation**
Kiryu-shi, Gunma-ken (JP)

(54) **Regenerative pump**

(57) The light, cheap, and high-performance regenerative pump, for pumping a methanol-water fuel of a fuel cell, is adapted to the fuel. At least one of an impeller 1 of the regenerative pump and an inner wall 2 of the pump is made of polyphenylene sulfide or polyphenylene sulfide containing a filler, and a thrust clearancer formed between the pump chamber inner wall 2 and an impeller peripheral face is set so as to be assured even in a state where the impeller 1 swells.

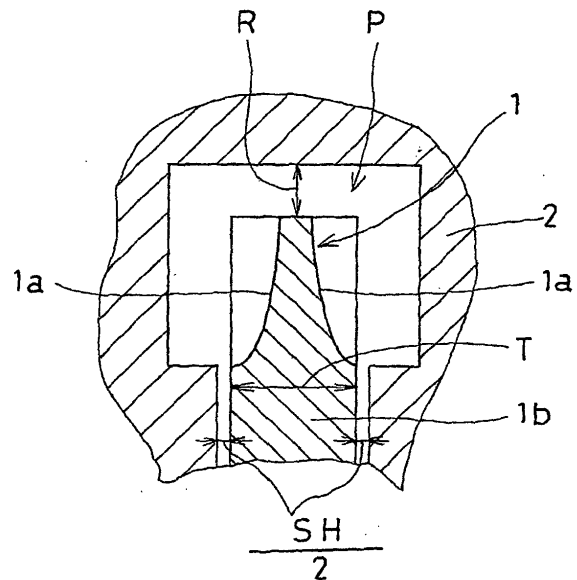


Fig. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 40 2295

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 609 877 A (NIPPON DENSO CO) 10 August 1994 (1994-08-10)	1,3	F04D5/00 F04D29/02
Y	* column 7, line 42 - column 8, line 35 * * column 9, line 10 - line 14 * * column 18, line 55 - line 58; figure 2 *	2	
Y	EP 0 828 081 A (HONDA MOTOR CO LTD) 11 March 1998 (1998-03-11) * column 9, line 24 - column 10, line 6; figures 3,4 *	2	
X	US 5 248 238 A (ISHIDA SHINJI ET AL) 28 September 1993 (1993-09-28) * column 7, line 8 - line 14 * * column 8, line 8 - line 10; figure 1 *	1,3	
X	EP 0 601 530 A (NIPPON DENSO CO) 15 June 1994 (1994-06-15) * page 6, line 22 - line 24 * * page 15, line 1 - line 2; figure 2 *	1,3	
A	US 5 702 229 A (MOSS GLENN A ET AL) 30 December 1997 (1997-12-30) * column 9, line 45 - line 66; figure 1 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F04D
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
Munich	18 October 2004	Di Giorgio, F	
CATEGORY OF CITED DOCUMENTS		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	
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			

EPO FORM 1503 03/82 (P04/C01)

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

EP 01 40 2295

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.

18-10-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0609877	A	10-08-1994	JP 3237360 B2	10-12-2001
			JP 6288381 A	11-10-1994
			DE 69405789 D1	30-10-1997
			DE 69405789 T2	26-02-1998
			EP 0609877 A1	10-08-1994
			HU 3849 A1	30-03-1998
			KR 231141 B1	15-11-1999
			US 5498124 A	12-03-1996

EP 0828081	A	11-03-1998	JP 10082395 A	31-03-1998
			CN 1186178 A ,C	01-07-1998
			DE 69720891 D1	22-05-2003
			DE 69720891 T2	26-02-2004
			EP 0828081 A1	11-03-1998
			KR 270219 B1	01-11-2000
			US 6126386 A	03-10-2000

US 5248238	A	28-09-1993	JP 2917563 B2	12-07-1999
			JP 4314996 A	06-11-1992

EP 0601530	A	15-06-1994	JP 3307019 B2	24-07-2002
			JP 6229388 A	16-08-1994
			DE 69314912 D1	04-12-1997
			DE 69314912 T2	12-03-1998
			EP 0601530 A1	15-06-1994
			HU 3856 A1	30-03-1998
			KR 267829 B1	01-11-2000
			US 5407318 A	18-04-1995

US 5702229	A	30-12-1997	BR 9704949 A	03-11-1998
			DE 19744753 A1	09-04-1998
			FR 2754318 A1	10-04-1998
			JP 10115265 A	06-05-1998
