

EP 1 508 693 A3 (11)

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3: 22.06.2011 Bulletin 2011/25 (51) Int Cl.: F04B 1/12 (2006.01)

F04B 27/10 (2006.01)

(43) Date of publication A2: 23.02.2005 Bulletin 2005/08

(21) Application number: 04292060.3

(22) Date of filing: 18.08.2004

(84) Designated Contracting States:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR **Designated Extension States:**

AL HR LT LV MK

(30) Priority: 18.08.2003 JP 2003294031

(71) Applicant: SENJU METAL INDUSTRY CO., LTD. Tokyo, 120-8555 (JP)

(72) Inventors:

Sato, Issaku Tokyo (JP)

· Tadokoro, Kenzo Mouka-shi Tochigi (JP)

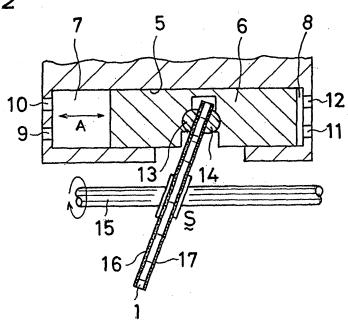
(74) Representative: Texier, Christian et al Cabinet Régimbeau 20, rue de Chazelles 75847 Paris Cedex 17 (FR)

(54)Multi layer sliding part and a method for its manufacture

A multi-layer sliding part has a Cu-plated solid lubricant uniformly dispersed in the matrix of a sintered bronze powder. The sintered alloy layer is densified by pressing, and the surface of the bearing alloy layer is coated with a resin having sliding properties. In a method of manufacturing a multi-layer sliding part, a mixture of a bronze powder and a Cu-plated solid lubricant are in-

itially sintered, and the initially sintered mass is pulverized. The pulverized powder is sintered on both sides of a backing plate. After sintering of the pulverized powder on both sides of the backing plate to form bearing alloy layers, the bearing alloy layers are pressed and densified. After densification, the bearing alloy layers are annealed, again pressed, and then coated with a resin having sliding properties.

Fig. 2



EP 1 508 693 A3



EUROPEAN SEARCH REPORT

Application Number EP 04 29 2060

	DOCUMENTS CONSIDI	ERED TO BE RELEVANT			
Category	Citation of document with in of relevant passa	dication, where appropriate, ges	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
X,P L	EP 1 391 620 A2 (SE [JP]) 25 February 2 * the whole documen		1-9	INV. F04B1/12 F04B27/10	
Υ	27 December 2001 (2 * abstract *	SATO ISSAKU [JP] ET AL) 001-12-27) - [0013], [0019] -	1-9		
Y	EP 1 236 914 A1 (TA 4 September 2002 (2 * abstract; tables * paragraphs [0034] [0041], [0042] * * claims 1,2 *	1,2 *	1-9		
Y	US 4 703 076 A (MOR 27 October 1987 (19 * abstract * * column 5, line 36 table 1 * * claims *		1-9	TECHNICAL FIELDS SEARCHED (IPC) F04B B22F	
Υ	US 4 582 368 A (FUJ AL) 15 April 1986 (* abstract * * column 3, lines 2 * claim 1 *		1-9		
A	JP 11 131107 A (MIT CO) 18 May 1999 (19 * abstract *	 SUI MINING & SMELTING 99-05-18) 	1-9		
	The present search report has b	•			
Place of search Munich		Date of completion of the search 17 May 2011	Dia	Examiner Richmond, Robin	
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 E: earlier patent doc after the filing dat er D: document cited in L: document cited fo	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		



EUROPEAN SEARCH REPORT

Application Number EP 04 29 2060

Category	Citation of document with indicatio of relevant passages	n, where appropriate,	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 926 340 A2 (TOYODA WORKS [JP] TOYOTA JIDOS 30 June 1999 (1999-06-3 * abstract; table 1 * * paragraphs [0017], [0071], [0094] *	HOKKI KK [JP]) 0)	3-5,8,9	
				TECHNICAL FIELDS SEARCHED (IPC)
	The present search report has been dr	rawn up for all claims Date of completion of the search 17 May 2011	Ric	Examiner hmond, Robin
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 princ E : earlier patent o after the filing D : document cite L : document cite	iple underlying the ir document, but publis date d in the application d for other reasons	nvention hed on, or
		& : member of the	L : document cited for other reasons & : member of the same patent family, corresponding document	

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

EP 04 29 2060

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.

17-05-2011

	Patent document ed in search report		Publication date		Patent family member(s)		Publication date
EP	1391620	A2	25-02-2004	JP JP US	3861771 2004083934 2004091732	Α	20-12-2006 18-03-2004 13-05-2004
US	2001055695	A1	27-12-2001	FR IT JP	2806765 MI20010591 2001335812	A1	28-09-2001 20-09-2002 04-12-2001
EP	1236914	A1	04-09-2002	CN WO JP JP US	1388872 0214703 4021607 2002061652 2003031389	A1 B2 A	01-01-2003 21-02-2002 12-12-2007 28-02-2002 13-02-2003
US	4703076	A	27-10-1987	DE GB JP JP JP	3616360 2177099 1807570 5008219 61266451	A C B	27-11-1986 14-01-1987 10-12-1993 01-02-1993 26-11-1986
US	4582368	Α	15-04-1986	NONE	:		
JΡ	11131107	Α	18-05-1999	JР	3765071	В2	12-04-2006
EP	0926340	A2	30-06-1999	DE DE JP US	69825406 69825406 11193780 6189434	D1 T2 A B1	09-09-2004 30-06-2005 21-07-1999 20-02-2001

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