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(71) Applicants *(for all designated States except US)*: **KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY** [KR/KR]; 373-1, Gusung-dong, Yusong-gu, Daejeon 305-701 (KR). **SAMSUNG HEAVY IND. CO., LTD.** [KR/KR]; 647-9, Yeoksam 1-dong, Gangnam-gu, Seoul 135-080 (KR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **LEE, Dai Gil** [KR/KR]; 501-904 EXPO APT., 464-1 Jeonmin-dong, Yusong-gu, Daejeon 305-762 (KR). **KIM, Hyoung Geun** [KR/KR]; 108-103 Daelim Durae APT., Shinsung-dong, Yusong-gu, Daejeon 305-720 (KR). **KIM, Seong Su** [KR/KR]; 28 Sangseo, Simok-ri, Dundeok-myeon, Geoje-si, Gyeongsangnam-do 656-871 (KR). **BANG, Kyung Kun** [KR/KR]; 404-301 Hwaseo Joogong APT., 650 Hwaseo-dong Jangan-gu, Suwon-si, Gyeonggi-do 440-150 (KR).

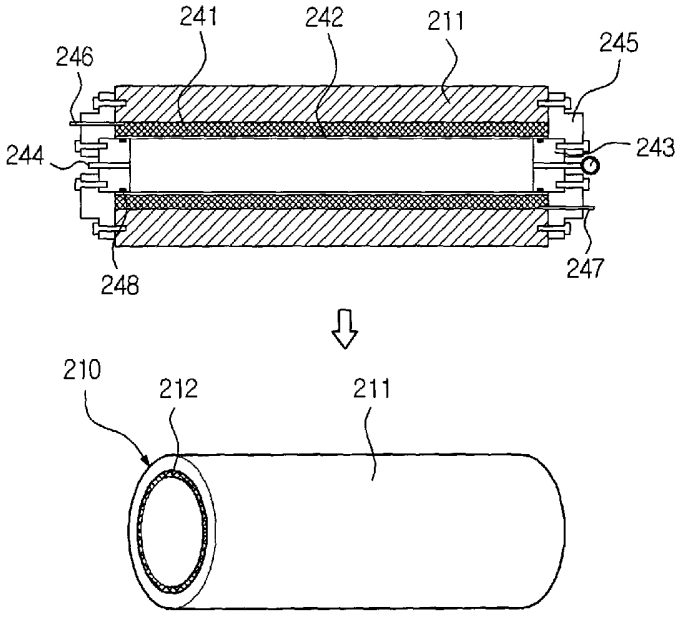
(74) Agent: **JEON, Young-Il**; KWTC P.O. Box 243, #4202, Trade Tower, World Trade Center Samsung-dong, Kangnam-gu, Seoul 135-729 (KR).

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(54) Title: HYBRID COMPOSITE JOURNAL BEARING AND MANUFACTURING METHOD THEREOF



(57) Abstract: A composite liner (212) made of carbon fiber reinforced phenol resin is laminated to an inner surface of a metal housing (211) of a plain bearing so as to minimize friction netween journal and bearing. Preferably the metal housing (211) is made of aluminium. Several methods for the laminating of the metal housing (211) are proposed including on the one hand methods using a composite prepreg (222) wound around a mandrel (225), an autoclave and eventually a vacuum bag (223), and on the other hand using a fiber preform (241) impregnated and fastened to the metal housing (211) by injection moulding.

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F16C, B29C, B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPODOC, WPI, PAJ, TXTUS0, TXTUS1, TXTUS2, TXTUS3, TXTEP1, TXTGB1, TXTWO1

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 236 102 A (RAILKO LIMITED) 23 June 1971 (23.06.1971) *Page 1 lines 53-80, page 3 lines 2-26, 53, claims 1, 11, 12*	1-3, 6
Y A	*claim 5*	4, 5, 7 8-11
	--	
Y	US 4 717 268 A (ORKIN) 5 January 1988 (05.01.1988) *Fig. 1a, 1b, column 2 line 52 - column 3 line 66*	4, 7
	--	
Y	JP 59 - 3 071 A (MITSUBISHI) 9 January 1984 (09.01.1984) (abstract). [online] [retrieved on 2004-08-16]. Retrieved from: EPOQUE PAJ Database	5
A		7
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
17 August 2004 (17.08.2004)	10 September 2004 (10.09.2004)
Name and mailing address of the ISA/ AT **Austrian Patent Office** Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24 / 535	Authorized officer EHRENDORFER K. Telephone No. +43 / 1 / 534 24 / 367

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1 532 357 A (MIBA GLEITLAGER AG) 15 November 1978 (15.11.1978) *Fig. 2, page 2 lines 34 - 54, claim 2* --	1-3, 5
X	DE 2 016 746 A (VANDERVELL PRODUCTS) 22 October 1970 (22.10.1970) *Fig. 3, claims 1, 3, 10, page 5 last paragraph, page 6 paragraphs 1, 2*	1, 2, 7
A	--	10
A	US 4 853 172 A (JACARUSO ET AL.) 1 August 1989 (01.08.1989) *Fig. 1, column 1 lines 17 - 20, column 2 line 21 - column 3 line 9* --	8
A	GB 2 381 492 A (TRYSOME LTD) 7 May 2003 (07.05.2003) *Fig. 1, 3a, 3b, page 1 last paragraph - page 2 paragraph 2, claims 1-6* ----	9, 10

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
DE	A	2016746	1970-10-22	GB	A	1311847	1973-03-28
				FR	A	2043082	1971-02-12
GB	A	1236102	1971-06-23			none	
GB	A	1532357	1978-11-15	AT	A	719576	1977-10-15
				AT	B	343963B	1978-06-26
				DE	A	2742536	1978-03-30
GB	A	2381492	2003-05-07			none	
JP	A	593071A2				none	
US	A	4717268	1988-01-05	IT	B	1210477	1989-09-14
				US	A	5137374	1992-08-11
				US	A	5110221	1992-05-05
				US	A	4842424	1989-06-27
				GB	A	2097486	1982-11-03
US	A	4853172				none	