(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 134 413 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
02.01.2004 Bulletin 2004/01

(43) Date of publication A2:
19.09.2001 Bulletin 2001/38

(21) Application number: **01106655.2**

(22) Date of filing: **16.03.2001**

(51) Int Cl.[7]: **F04B 27/10**

(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

(30) Priority: **17.03.2000 JP 2000075537**

(71) Applicant: **Kabushiki Kaisha Toyota Jidoshokki**
Kariya-shi, Aichi-ken (JP)

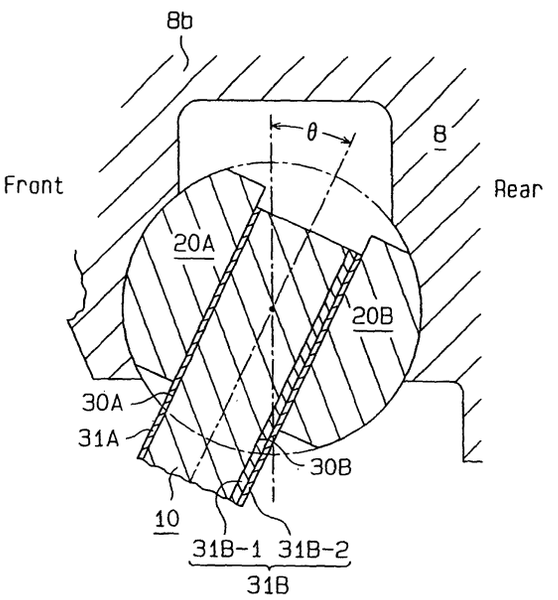
(72) Inventors:
- **Sugiura, Manabu**
  Kariya-shi, Aichi-ken (JP)
- **Iwama, Kazuaki**
  Kariya-shi, Aichi-ken (JP)
- **Isomura, Naohiko**
  Kariya-shi, Aichi-ken (JP)
- **Kawachi, Shigeki**
  Kariya-shi, Aichi-ken (JP)
- **Kayukawa, Hiroaki**
  Kariya-shi, Aichi-ken (JP)

(74) Representative: **Böckelen, Rainer**
Patentanwälte
Tiedtke-Bühling-Kinne & Partner
Bavariaring 4
80336 München (DE)

(54) Swash plate for compressor

(57) The swash plate (10) of a compressor is coated on both surfaces, the skirt side contact surface (30A) receives the skirt side shoes (20A), and the opposite head side contact surface (30B) receives the head side shoes (20B). The coating applied on the skirt side contact surface is molybdenum disulphide, tungsten disulphide, graphite, boron nitride, antimony oxide, lead oxide, indium, tin or fluorocarbon resin applied by spray coating, roll coating or screen printing processes. The coating applied on the head side contact surface consists of two layers. The first layer (31B-1) consists of aluminium silicon alloy. The second layer (31B-2) applied on the first layer consists of a solid lubricant similar to the coating of the skirt side contact surface. Additionally, the head side contact surface may be roughened by shot blasting.

Fig.2



EP 1 134 413 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 6655

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 Y	EP 0 926 340 A (TOYODA AUTOMATIC LOOM WORKS) 30 June 1999 (1999-06-30) * abstract; figures 1,4-6 * * paragraph [0017] * * paragraphs [0025],[0026] * * page 9, line 58 - page 10, line 37 * * claims 5-17 * ---	1-8 9	F04B27/10
X Y	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 12, 26 December 1996 (1996-12-26) & JP 08 199327 A (TAIHO KOGYO CO LTD;TOYOTA AUTOM LOOM WORKS LTD), 6 August 1996 (1996-08-06) * abstract * ---	1-8 9	
X A	PATENT ABSTRACTS OF JAPAN vol. 009, no. 142 (M-388), 18 June 1985 (1985-06-18) & JP 60 022080 A (TAIHOU KOGYO KK;OTHERS: 01), 4 February 1985 (1985-02-04) * abstract * ---	1-8 9	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F04B
A	WO 99 50556 A (TOYODA AUTOMATIC LOOM WORKS ;MIZUTANI HIDEKI (JP); MURAMATSU SYOGO) 7 October 1999 (1999-10-07) * abstract; claims 1,2,4 * ---	1-9	
A	US 5 655 432 A (DALKA THOMAS MICHEL ET AL) 12 August 1997 (1997-08-12) * abstract; figures 2-4 * * column 1, line 36-54 * * column 2, line 5-14 * * column 4, line 15 - column 5, line 15 * * claims * --- -/--	1-9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	4 November 2003	Richmond, R

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)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 6655

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)
A	EP 0 911 517 A (TOYODA AUTOMATIC LOOM WORKS) 28 April 1999 (1999-04-28) * abstract; figure 2 * * paragraph [0024] * * claims * -----	1-9	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	4 November 2003	Richmond, R

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 01 10 6655

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.

04-11-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0926340 A	30-06-1999	JP 11193780 A	21-07-1999
		EP 0926340 A2	30-06-1999
		US 6189434 B1	20-02-2001
JP 08199327 A	06-08-1996	NONE	
JP 60022080 A	04-02-1985	JP 2039332 C	28-03-1996
		JP 5010513 B	09-02-1993
WO 9950556 A	07-10-1999	JP 11336659 A	07-12-1999
		BR 9904916 A	20-06-2000
		CN 1272165 T	01-11-2000
		EP 0992683 A1	12-04-2000
		WO 9950556 A1	07-10-1999
		US 6344280 B1	05-02-2002
US 5655432 A	12-08-1997	NONE	
EP 0911517 A	28-04-1999	JP 10205442 A	04-08-1998
		BR 9806537 A	18-09-2001
		CN 1186166 A	01-07-1998
		EP 0911517 A2	28-04-1999
		KR 254032 B1	01-05-2000
		SG 78305 A1	20-02-2001
		US 6289785 B1	18-09-2001

EPO FORM P0459

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