



- (51) International Patent Classification:
F16C 33/38 (2006.01) F16C 33/78 (2006.01)
F16C 33/66 (2006.01)
- (21) International Application Number:
PCT/IB2011/055817
- (22) International Filing Date:
20 December 2011 (20.12.2011)
- (25) Filing Language:
Italian
- (26) Publication Language:
English
- (30) Priority Data:
TO2010A001029 21 December 2010 (21.12.2010) IT
- (71) Applicant (for all designated States except US): **AK-TIEBOLAGET SKF** [SE/SE]; SE-415 50 Göteborg (SE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MOLA, Roberto** [IT/IT]; Corso Mediterraneo 69/16, I-10129 Torino (IT). **RESTIVO, Riccardo** [IT/IT]; Via Pinelli 27, I-10144 Torino (IT). **SCALTRITI, Gianpiero** [IT/IT]; Via Valarsa 7, I-10135 Torino (IT).
- (74) Agents: **FIORAVANTI, Corrado** et al.; c/o Jacobacci & Partners S.p.A., Corso Emilia 8, I-10152 Torino (IT).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

[Continued on next page]

(54) Title: BALL BEARING CAGE AND DEEP GROOVE BALL BEARING WITH SUCH A CAGE

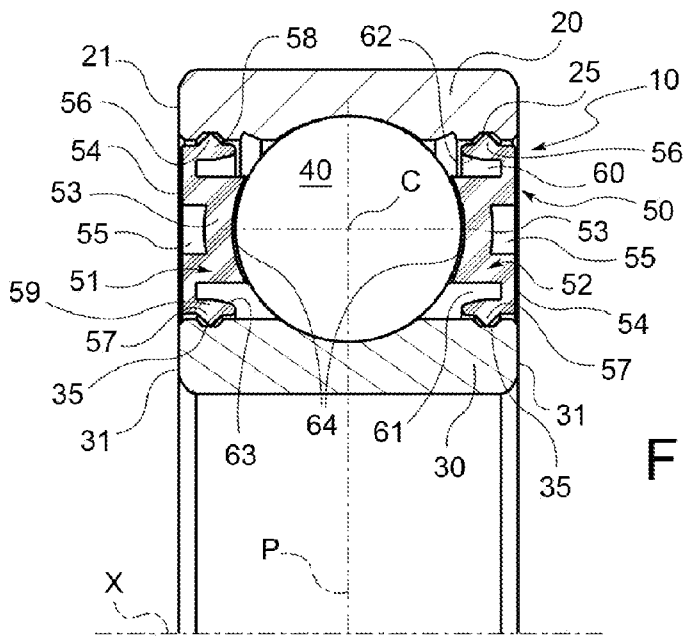


FIG. 1

(57) Abstract: A cage for a ball bearing unit comprises two half-cages (51, 52) which are connected to each other and are symmetrical about a mid-plane (P) of the bearing. Each half-cage has an annular body (53) providing two concentric and circumferentially continuous radial ridges (56, 57) extending radially in opposite directions, of which the first ridge (56) extends in a radially outward direction for sealingly engaging a groove (25) formed in the outer ring of the bearing unit, and the second ridge (57) extends in a radially inward direction for sealingly engaging a groove (35) formed in the inner ring of the bearing unit.

WO 2012/085842 A3



Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:

30 August 2012

INTERNATIONAL SEARCH REPORT

International application No PCT/IB2011/055817

A. CLASSIFICATION OF SUBJECT MATTER INV. F16C33/38 F16C33/66 F16C33/78 ADD.				
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				
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) EPO-Internal				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 5 069 560 A (NIEDERMEIER RUDOLF [DE] ET AL) 3 December 1991 (1991-12-03) the whole document -----	1, 13, 14		
X	DE 19 14 884 U (DUERKOPPWERKE AG [DE]) 29 April 1965 (1965-04-29) the whole document -----	1, 14		
A	the whole document -----	3, 4		
A	DE 10 2006 036006 A1 (SCHAEFFLER KG [DE]) 7 February 2008 (2008-02-07) paragraph [0027] - paragraph [0033]; figures 1,2 -----	1-3, 14		
X	EP 1 010 909 A1 (ROULEMENTS SOC NOUVELLE [FR]) 21 June 2000 (2000-06-21) paragraph [0017] - paragraph [0022]; figures 1-3 -----	1, 14		
----- -/--				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search	Date of mailing of the international search report			
30 May 2012	06/06/2012			
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer De Jongh, Cornelis			

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2011/055817

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 644 343 A1 (SKF IND TRADING & DEV [NL]) 22 March 1995 (1995-03-22) column 2, line 52 - column 3, line 52; figure 1 -----	1, 13
X	US 3 743 369 A (LANGSTROM H) 3 July 1973 (1973-07-03) the whole document -----	1
A	AT 382 217 B (STEYR DAIMLER PUCH AG [AT]) 26 January 1987 (1987-01-26) the whole document -----	2-4, 14
A	AT 382 217 B (STEYR DAIMLER PUCH AG [AT]) 26 January 1987 (1987-01-26) the whole document -----	1-4, 14
A	DE 70 18 423 U (SIEMENS AG [DE]) 15 October 1970 (1970-10-15) the whole document -----	2-4
X	AT 265 762 B (KREJCI CAMILLO) 25 October 1968 (1968-10-25) the whole document -----	1, 5
X	JP 2007 040383 A (NSK LTD) 15 February 2007 (2007-02-15) abstract; figures 1-5, 27-29 -----	1, 5
A	FR 2 134 913 A5 (PAULSTRA SA) 8 December 1972 (1972-12-08) page 6, line 19 - page 7, line 23; figures 5-8 -----	6-8
X	FR 2 134 913 A5 (PAULSTRA SA) 8 December 1972 (1972-12-08) page 6, line 19 - page 7, line 23; figures 5-8 -----	1, 5
A	EP 0 142 669 A2 (SKF AB [SE]) 29 May 1985 (1985-05-29) the whole document -----	6
A	EP 0 142 669 A2 (SKF AB [SE]) 29 May 1985 (1985-05-29) the whole document -----	5
A	US 3 450 449 A (SIBLEY LEWIS B ET AL) 17 June 1969 (1969-06-17) the whole document -----	5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2011/055817

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

1-8, 13, 14
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4, 13, 14

Construction of sealing portion of cage provided with seal

2. claims: 5-8

Lubricant passage through cage

3. claims: 9-12

Connecting means to connect cage halves

4. claims: 15-17

Lubrication grooves in outer ring

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2011/055817

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 5069560	A	03-12-1991	DE 8914265 U1 US 5069560 A	18-01-1990 03-12-1991
DE 1914884	U	29-04-1965	NONE	
DE 102006036006	A1	07-02-2008	DE 102006036006 A1 WO 2008014768 A2	07-02-2008 07-02-2008
EP 1010909	A1	21-06-2000	DE 69925976 D1 DE 69925976 T2 EP 1010909 A1 FR 2787530 A1	04-08-2005 11-05-2006 21-06-2000 23-06-2000
EP 0644343	A1	22-03-1995	EP 0644343 A1 JP 7180725 A NL 9301603 A	22-03-1995 18-07-1995 18-04-1995
US 3743369	A	03-07-1973	NONE	
AT 382217	B	26-01-1987	NONE	
DE 7018423	U	15-10-1970	CH 534316 A DE 7018423 U FR 2091608 A5	28-02-1973 15-10-1970 14-01-1972
AT 265762	B	25-10-1968	NONE	
JP 2007040383	A	15-02-2007	NONE	
FR 2134913	A5	08-12-1972	DE 2210820 A1 FR 2134913 A5 IT 957275 B	09-11-1972 08-12-1972 10-10-1973
EP 0142669	A2	29-05-1985	DE 3474986 D1 EP 0142669 A2 JP 1500618 C JP 60227013 A JP 63050567 B SE 8306211 A US 4558961 A	08-12-1988 29-05-1985 28-06-1989 12-11-1985 11-10-1988 12-05-1985 17-12-1985
US 3450449	A	17-06-1969	NONE	