



(51) International Patent Classification:

F03D 1/06 (2006.01) *F03D 7/02* (2006.01)
F03D 11/00 (2006.01)

(21) International Application Number:

PCT/EP2012/057780

(22) International Filing Date:

27 April 2012 (27.04.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

PCT/EP2011/002112 27 April 2011 (27.04.2011) EP

(71) Applicant (for all designated States except US): **AK-TIEBOLAGET SKF** [SE/SE]; S-41550 Göteborg (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BLOM, Johannes** [NL/NL]; c/o SKF B.V., Kelvinbaan 16, NL-3439MT Nieuwegein (NL). **VAN POMMEREN, Jascha** [NL/NL];

c/o SKF B.V., Kelvinbaan 16, NL-3439MT Nieuwegein (NL). **VERVOORN, Dennis** [NL/NL]; Oudenoord 456, NL-3513EX Utrecht (NL). **WELLING, Koos** [NL/NL]; Furkabaan 810, NL-3524 ZM Utrecht (NL). **KLEIN-MEULEMAN, Peter** [NL/NL]; Pelikaanstraat 9, NL-5912 TA Venlo (NL).

(74) Agents: **BURO, Sven Peter** et al.; SKF B.V., Kelvinbaan 16, NL-3439MT Nieuwegein (NL).

(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.

[Continued on next page]

(54) Title: ROTATIONAL SUPPORT OF A WIND TURBINE BLADE

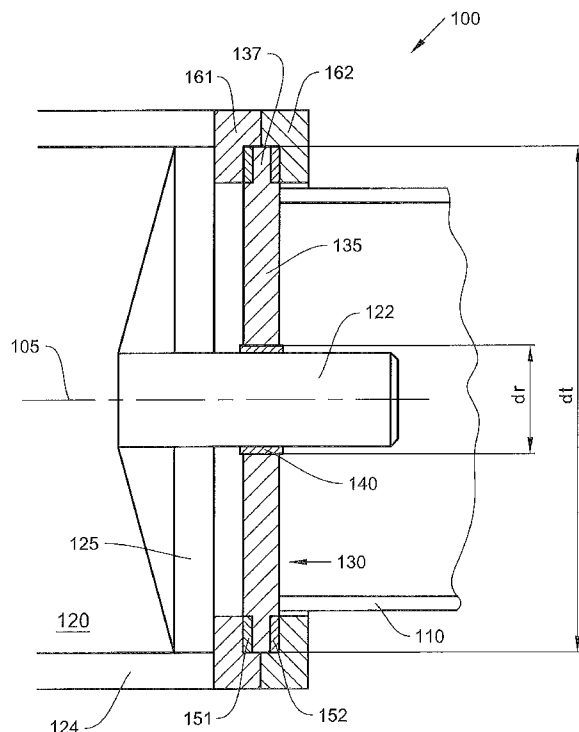


Fig. 1a

(57) Abstract: The invention resides in an assembly for rotationally supporting a wind turbine blade (110) relative to a wind turbine hub (120). The assembly comprises an intermediate ring (130) having an inner annular portion and an outer annular portion provided with means for attaching the turbine blade. The intermediate ring is rotatably mounted to the hub via a first bearing arrangement. According to the invention, the first bearing arrangement comprises a radial bearing (140) and a thrust bearing, whereby the inner annular portion is mounted to the hub via the radial bearing and the outer annular portion is mounted to the hub via the thrust bearing. The thrust bearing is a plain bearing comprising first and second sliding surfaces (151, 152) which are clamped to the hub between first and second clamping members (161, 162).



(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, 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).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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

4 April 2013

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/057780

A. CLASSIFICATION OF SUBJECT MATTER
INV. F03D1/06 F03D11/00 F03D7/02
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)
F03D

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 660 527 A (DEERING KENNETH J [US] ET AL) 26 August 1997 (1997-08-26) column 3, line 29 - columns 4-14; figures 6-12A -----	1-16
A	US 5 173 023 A (PAWLOWSKI JOSEPH W [US] ET AL) 22 December 1992 (1992-12-22) column 3, line 57 - column 5, line 33; figures -----	1-16
A	WO 2007/112748 A2 (VESTAS WIND SYS AS [DK]; BECH ANTON [DK]; MADDEN GERRY [GB]) 11 October 2007 (2007-10-11) cited in the application the whole document ----- -/-	1-16



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"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

6 February 2013

Date of mailing of the international search report

19/02/2013

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

Di Renzo, Raffaele

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/057780

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 44 32 986 A1 (IMO IND MOMENTENLAGER STOLL & [DE]) 23 November 1995 (1995-11-23) column 2, line 50 - column 4, line 14; figures -----	1-16
A	FR 811 726 A (R. WAUTHIER ET M. MARCHAL) 21 April 1937 (1937-04-21) figures -----	1-16

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/057780

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5660527	A	26-08-1997	NONE
US 5173023	A	22-12-1992	NONE
WO 2007112748	A2	11-10-2007	CN 101410616 A 15-04-2009 EP 2002118 A2 17-12-2008 US 2009022442 A1 22-01-2009 WO 2007112748 A2 11-10-2007
DE 4432986	A1	23-11-1995	NONE
FR 811726	A	21-04-1937	NONE