



(43) International Publication Date
7 July 2016 (07.07.2016)

(10) International Publication Number
WO 2016/107626 A3

- (51) **International Patent Classification:**
H02K 1/20 (2006.01) *H02K 9/19* (2006.01)
- (21) **International Application Number:**
PCT/DK2015/050387
- (22) **International Filing Date:**
9 December 2015 (09.12.2015)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/097,659 30 December 2014 (30.12.2014) US
PA 2015 70152 17 March 2015 (17.03.2015) DK
- (71) **Applicant:** VESTAS WIND SYSTEMS A/S [DK/DK];
Hedeager 42, 8200 Aarhus N (DK).
- (72) **Inventor:** MONGEAU, Peter; 37 Kenwood Rd, Center
Conway, New Hampshire 03813 (US).
- (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, BN, 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, IR, IS, JP, KE, KG, KN, KP, KR,

KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, ST, 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, KM, 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:**
9 September 2016

(54) **Title:** INTEGRAL FLUID COOLING OF ELECTRICAL MACHINE FIELD OF THE INVENTION

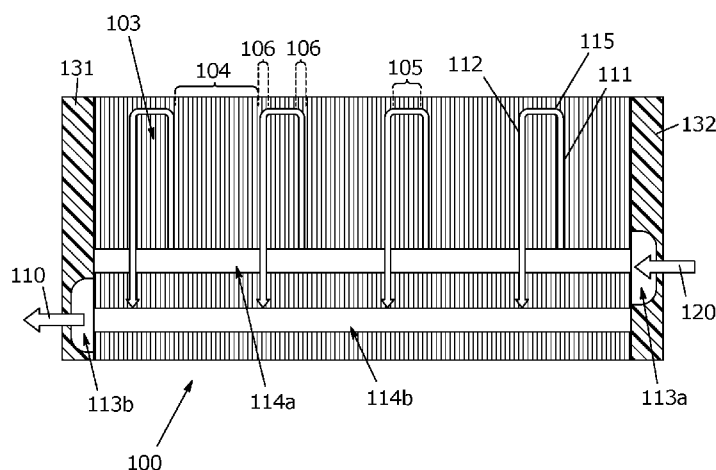


FIG. 10

(57) **Abstract:** The present invention relates to a laminated stator stack for an electric machine comprising, a plurality of stator teeth 80 and stator slots, for receiving at least one electrical conductor, at least one axial coolant duct, at least one outwards radial coolant duct 111 and at least one inwards radial coolant duct 112, wherein the ducts are arranged internally in the laminated stator stack and interconnected to form a predominantly closed flow path, the outwards and inwards radial coolant ducts 111, 112 extent into the stator teeth, for cooling of the stator teeth, and the laminated stator stack comprises a plurality of lamination sheets.

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2015/050387

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02K1/20 H02K9/19
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)
H02K

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.
X	EP 2 463 991 A2 (ANTRIEBSTECHNIK KATT HESSEN GMBH [DE]) 13 June 2012 (2012-06-13) paragraphs [0023] - [0025], [0029]; figures 1-4	1-14
X	DE 29 17 717 A1 (KRAFTWERK UNION AG) 27 November 1980 (1980-11-27) page 8, line 9 - page 8, line 21; figures 1-4	1
A	WO 2013/170883 A1 (ABB OY [FI]; KANNINEN PEKKA [FI]) 21 November 2013 (2013-11-21) page 3, line 31 - page 4, line 5; figures 1-6	1-14
	----- -/-	



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

4 July 2016

Date of mailing of the international search report

15/07/2016

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

Kugler, Daniel

INTERNATIONAL SEARCH REPORT

International application No

PCT/DK2015/050387

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 358 240 A (WILLIAM NORMAN KILNER; ASS ELECT IND) 8 October 1931 (1931-10-08) page 2, line 113 - page 3, line 29; figure 1	1-14
A	----- US 3 447 002 A (RONNEVIG CARL) 27 May 1969 (1969-05-27) column 2, lines 28-43; figure 3 -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/DK2015/050387

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2463991	A2	13-06-2012	DE 102011056007 A1	14-06-2012
			EP 2463991 A2	13-06-2012

DE 2917717	A1	27-11-1980	DE 2917717 A1	27-11-1980
			JP S55147931 A	18-11-1980

WO 2013170883	A1	21-11-2013	WO 2013170883 A1	21-11-2013
			WO 2013171262 A1	21-11-2013

GB 358240	A	08-10-1931	NONE	

US 3447002	A	27-05-1969	CH 450535 A	31-01-1968
			DE 1513734 B1	18-06-1970
			GB 1132997 A	06-11-1968
			NO 115344 B	23-09-1968
			SE 318939 B	22-12-1969
			US 3447002 A	27-05-1969
