

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 April 2010 (01.04.2010)

(10) International Publication Number
WO 2010/036745 A3

(51) International Patent Classification:
H02K 9/02 (2006.01)

(21) International Application Number:
PCT/US2009/058120

(22) International Filing Date:
23 September 2009 (23.09.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/194,098 23 September 2008 (23.09.2008) US
61/194,056 23 September 2008 (23.09.2008) US
61/194,099 23 September 2008 (23.09.2008) US

(71) Applicant (for all designated States except US):
AEROVIRONMENT, INC. [US/US]; 181 W. Hunting-
ton Drive, Suite 202, Monrovia, CA 91016 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HIBBS, Bart**
[US/US]; 2691 Daunet Avenue, Simi Valley, CA 93065
(US). **SHEPPARD, Lindsay, Aspinwall** [US/US]; 432
South Angeleno Avenue, Azusa, CA 91702 (US).

(74) Agent: **BALZAN, Christopher, R.**; 674 County Square
Drive, Suite 105, Ventura, CA 93003 (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, 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, RO, RS, RU, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,
TM), European (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, 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:
23 February 2012

(54) Title: MOTOR AIR FLOW COOLING

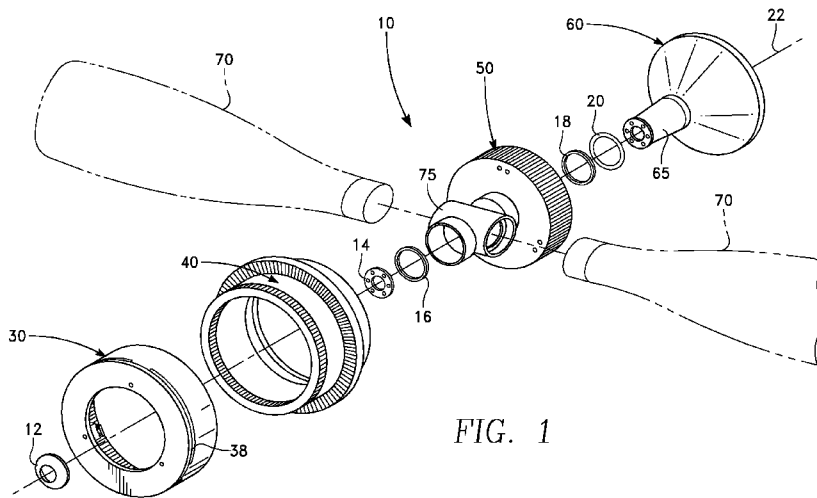


FIG. 1

(57) Abstract: In one possible embodiment, an aircraft electric motor cooling system is provided having an airflow path through a spinner which includes a first airflow path between an inner rotor and a stator, a second airflow path between an outer rotor the stator and a third airflow path along an outer surface of the outer rotor.

WO 2010/036745 A3

INTERNATIONAL SEARCH REPORT

2009/058120-23-12-2011

International application No.

PCT/US 09/58120

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H02K 9/02 (2011.01) USPC - 310/59 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) IPC(8) - H02K 9/02 (2011.01) USPC - 310/59 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC - 310/10, 16, 40R, 46, 49.02, 49.38, 49.39, 49.42, 52, 54, 58, 60R, 61, 62, 63, 60A, 64, 114, 152, 154.33, 156.01, 156.32, 156.36, 156.46 (text search - see terms below) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST(USPT,PGPB,EPAB,JPAB); Google Scholar; Google Patents Search Terms: Motor, airflow, cooling, stator, inner, outer, rotor, magnet, yoke, fins, heat, sink, surface, exterior, remove, forward, front, rear, back,... etc.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/0174194 A1 (Qu et al.) 24 July 2008 (24.07.2008), fig 3 and 4, para [0033] and [0034]	13 and 20
Y		1-12, 14-19 and 21-33
Y	US 2004/0145246 A1 (Nakano et al.) 29 July 2004 (29.07.2004), fig 6, para [0037]	1-12 and 23-33
Y	US 2006/0284511 A1 (Evon et al.) 21 December 2006 (21.12.2006), fig 2 and 3, para [0017] and [0018]	10-11, 14-19 and 32-33
Y	US 2007/0108865 A1 (Jansen et al.) 17 May 2007 (17.05.2007), para [0027]	4, 6, 21-22, 26 and 28
Y	US 2006/0091743 A (Iwasaki et al.) 04 May 2006 (04.05.2006), fig 3, para [0031]	8-10, 12 and 30-32
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 14 December 2011 (14.12.2011)		Date of mailing of the international search report 23 DEC 2011
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774