



(43) International Publication Date
16 July 2015 (16.07.2015)

- (51) International Patent Classification:
F01D 5/14 (2006.01) *F01D 5/18* (2006.01)
- (21) International Application Number:
PCT/US2014/058008
- (22) International Filing Date:
29 September 2014 (29.09.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/908,885 26 November 2013 (26.11.2013) US
- (71) Applicant: UNITED TECHNOLOGIES CORPORATION [US/US]; One Financial Plaza, Hartford, CT 06101 (US).
- (72) Inventor: ROCHE, Charles, H.; 38 Chardonay Lane, Tolland, CT 06084 (US).
- (74) Agent: MILLER, Thomas, A.; Miller, Matthias & Hull LLP, One North Franklin, Suite 2350, Chicago, IL 60606 (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:
17 September 2015

(54) Title: FAN BLADE WITH COMPOSITE COVER AND SACRIFICIAL FILLER

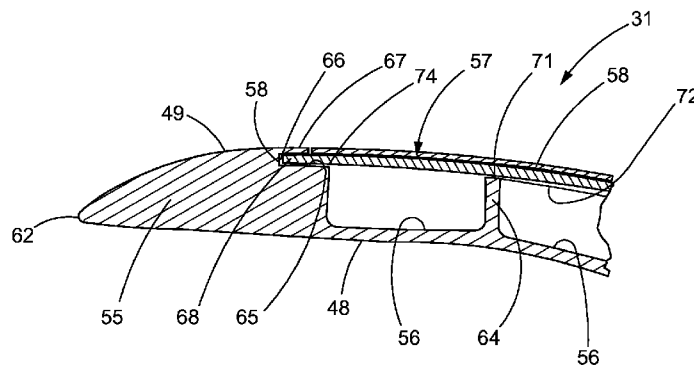
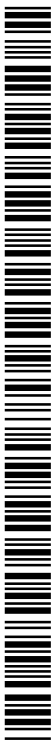


FIG. 7

(57) Abstract: A fan blade for a turbofan gas turbine engine is disclosed. The fan blade includes a body having a pressure side and a suction side and a cover. The suction side of the body includes an opening and at least one cavity for purposes of reducing the weight of the fan blade. The cover overlays the opening and includes a peripheral edge that is received in a slot defined by the body. The cavities are filled with a sacrificial material.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/058008**A. CLASSIFICATION OF SUBJECT MATTER****F01D 5/14(2006.01)i, F01D 5/18(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
F01D 5/14; B64C 11/16; B23K 5/18; F01D 5/18Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: fan blade, cover, filler, sacrificial, lip, slot, opening, cavity, and gas turbine**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6039542 A (SCHILLING et al.) 21 March 2000 See column 2, line 66 - column 4, line 13, column 5, lines 25-35, and figures 1-3.	1,3
Y		2,4-20
Y	US 2010-0329887 A1 (EIFERT, ANDY) 30 December 2010 See paragraphs [0018], [0023]-[0024] and figure 6.	2,4-20
Y	US 2013-0216395 A1 (BREGMAN et al.) 22 August 2013 See paragraphs [0032]-[0034] and figure 2.	6-7,17
A	US 2013-0142668 A1 (SNECMA) 06 June 2013 See paragraphs [0031]-[0037] and figures 3-4.	1-20
A	US 8585368 B2 (VIENS et al.) 19 November 2013 See column 3, line 1 - column 4, line 46 and figures 2-3.	1-20

 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

23 July 2015 (23.07.2015)

Date of mailing of the international search report

24 July 2015 (24.07.2015)

Name and mailing address of the ISA/KR

International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701,
Republic of Korea

Facsimile No. +82-42-472-7140

Authorized officer

LEE, Dal Kyong

Telephone No. +82-42-481-8440



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2014/058008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6039542 A	21/03/2000	EP 0926312 A2 EP 0926312 A3 JP 03440210 B2 JP 11-287197 A	30/06/1999 23/08/2000 25/08/2003 19/10/1999
US 2010-0329887 A1	30/12/2010	None	
US 2013-0216395 A1	22/08/2013	CN 103080477 A EP 2564028 A1 US 8585351 B2 WO 2011-160930 A1	01/05/2013 06/03/2013 19/11/2013 29/12/2011
US 2013-0142668 A1	06/06/2013	FR 2983517 A1 FR 2983517 B1 GB 2497420 A IE 20120525 A1	07/06/2013 20/12/2013 12/06/2013 03/07/2013
US 8585368 B2	19/11/2013	US 2013-039774 A1 US 2014-050589 A1 US 8821124 B2	14/02/2013 20/02/2014 02/09/2014