



(43) International Publication Date
9 January 2014 (09.01.2014)

- (51) International Patent Classification:
F03B 17/06 (2006.01) *F03D 1/06* (2006.01)
- (21) International Application Number:
PCT/IB2013/055239
- (22) International Filing Date:
26 June 2013 (26.06.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2012/05038 5 July 2012 (05.07.2012) ZA
- (71) Applicant: NELSON MANDELA METROPOLITAN
UNIVERSITY [ZA/ZA]; University Way, Summerstrand,
6001 Port Elizabeth (ZA).
- (72) Inventor: PHILLIPS, Russell Leslie; 52 Prospect Road,
Walmer, 6070 Port Elizabeth (ZA).
- (74) Agents: SPOOR & FISHER et al.; P O Box 454, 0001
Pretoria (ZA).
- (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, IS, JP, KE, KG, 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, PA, 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.

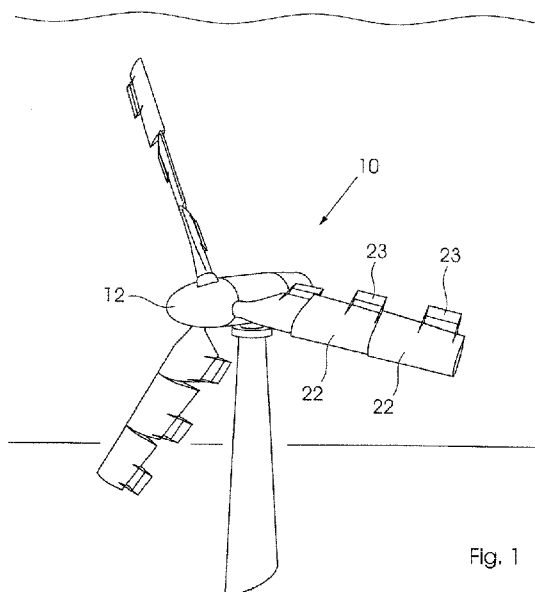
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, 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:
27 March 2014

(54) Title: TURBINE ARRANGEMENT



(57) Abstract: This invention relates to a turbine arrangement (10) and an aerofoil blade arrangement (20) for a fluid driven turbine. The aerofoil arrangement includes a primary aerofoil blade (21) which is displaceably securable relative to a hub (12) of the turbine in order for the primary aerofoil blade to be rotatable about an axis perpendicular to a rotational axis of the hub; and a secondary aerofoil blade (23) which extends from the primary aerofoil blade (21). The secondary aerofoil is securable in a fixed position relative to the primary blade, so that displacement of the secondary aerofoil blade results in rotation of the primary aerofoil blade, in order for the secondary aerofoil blade to control an angle of attack of the primary aerofoil blade to an optimum angle.



INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2013/055239

A. CLASSIFICATION OF SUBJECT MATTER
 INV. F03B17/06 F03D1/06
 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 F03B

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 0 086 076 A1 (ROSSMAN WENDELL ERNEST) 17 August 1983 (1983-08-17)	1-6, 10
Y	page 7, line 1 - page 8, line 5 page 10, line 6 - line 16 page 13, line 4 - line 25; figures 1-4, 8	7-9
Y	FR 2 864 175 A1 (AIRBUS [FR]) 24 June 2005 (2005-06-24)	7-9
	page 3, line 29 - page 6, line 8 page 11, line 19 - line 27; figures 1, 6	
X	NL 8 201 303 A (ENERGA ADVIESBUREAU VOOR ALTER) 17 October 1983 (1983-10-17)	1-4, 10
	page 1, line 1 - page 2, line 33; figures 1, 4, 5	
	----- -/--	

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

30 January 2014

Date of mailing of the international search report

11/02/2014

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

Jucker, Chava

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/055239

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CA 2 425 447 A1 (AUCLAIR MICHEL J L [CA]) 17 October 2004 (2004-10-17) page 5, line 1 - line 24; figures 1, 2 -----	1,2,4,5, 10
A	US 2011/038728 A1 (ELKIN BENJAMIN T [US] ET AL) 17 February 2011 (2011-02-17) paragraphs [0047], [0059]; figures 4, 5 -----	7-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2013/055239

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0086076	A1	17-08-1983	
		AU 564238 B2	06-08-1987
		AU 1082783 A	11-08-1983
		CA 1201982 A1	18-03-1986
		DE 3366500 D1	06-11-1986
		DK 36683 A	03-08-1983
		EP 0086076 A1	17-08-1983
		IN 158605 A1	20-12-1986
		JP S58180780 A	22-10-1983
		NZ 203146 A	08-11-1985
		US 4423333 A	27-12-1983
FR 2864175	A1	24-06-2005	
		FR 2864175 A1	24-06-2005
		WO 2005064156 A1	14-07-2005
NL 8201303	A	17-10-1983	NONE
CA 2425447	A1	17-10-2004	NONE
US 2011038728	A1	17-02-2011	NONE