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Declaration under Rule 4.17:

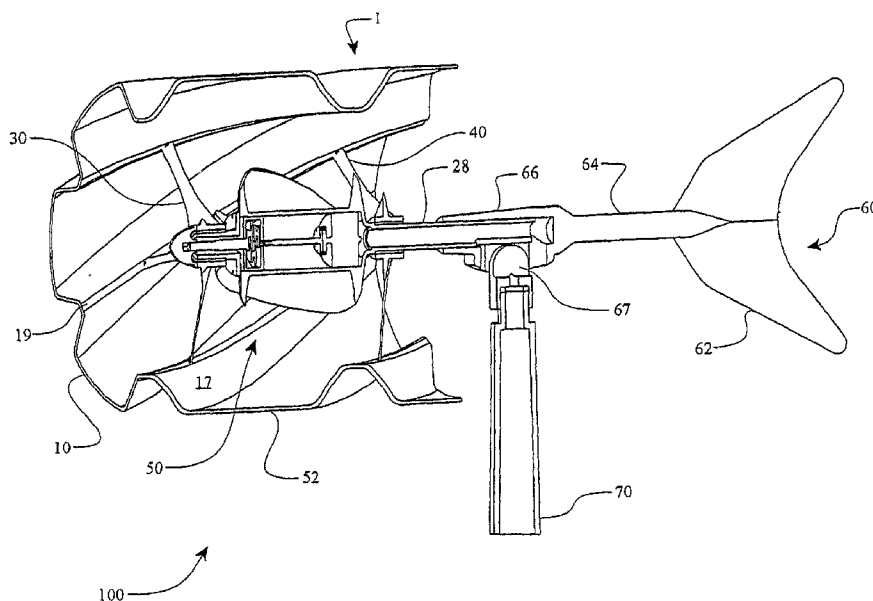
— of inventorship (Rule 4.17(iv))

Published:

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[Continued on next page]

(54) Title: FLUID ENERGY CONVERTER



(57) Abstract: The invention relates to apparatus and methods of fluid energy conversion. One embodiment relates to a tube for a fluid energy converter. The tube may include a generally cylindrical and hollow body having an interior surface, an exterior surface, and a longitudinal axis. Another embodiment relates to a fluid energy converter (100) having a longitudinal axis and a rotatable tube coaxial about the longitudinal axis. The rotor (1) can have a tube, a front set of blades (30), a back set of blades (40), a nacelle (50) with helical vanes. The tube may be provided with external and internal grooves. Furthermore, a method of operating the rotor, a method of manufacturing the tube and the structural lay-out of the tube are described.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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19 July 2007

## INTERNATIONAL SEARCH REPORT

International application No

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## A. CLASSIFICATION OF SUBJECT MATTER

INV. F03D1/06 F03B17/06 F03B5/00 F03D1/04 F03D1/02

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 practical, 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	US 4 086 026 A (TAMANINI ROBERT J) 25 April 1978 (1978-04-25)  column 2, line 37 - column 3, line 51; figures	1-5, 12, 13, 17-20, 23-25, 27, 29, 44, 45, 48, 49, 55-59, 73-75
X	US 1 631 069 A (SMITH WILLIAM M) 31 May 1927 (1927-05-31)  page 1, line 41 - line 78; figures	1-14, 17-20, 23, 24, 31, 48, 49, 73-75

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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 document 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.

\*&amp;\* document member of the same patent family

Date of the actual completion of the international search

22 January 2007

Date of mailing of the international search report

06/06/2007

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## INTERNATIONAL SEARCH REPORT

International application No

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## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 14132 A A.D. 1909 (STARKE ROBERT [GB]) 5 May 1910 (1910-05-05) figures	1-4, 24, 25
X	US 3 071 194 A (GESKE WILLIAM C) 1 January 1963 (1963-01-01) column 2, line 33 - column 3, line 5; figure 1	1, 3-5, 13
A	US 4 963 A (JAMES ARMSTRONG ET AL) 9 February 1847 (1847-02-09) the whole document	1
A	US 6 201 315 B1 (LARSSON OLLE [SE]) 13 March 2001 (2001-03-13) column 1, line 51 - line 64; figures column 2, line 34 - column 3, line 20	1-78
A	US 2 230 398 A (BENJAFIELD WALTER O) 4 February 1941 (1941-02-04) figures 3-6	1
A	DD 263 566 A1 (WARNOWWERFT WARNEMUENDE VEB [DD]) 4 January 1989 (1989-01-04) page 1, last paragraph - page 2, paragraph 3	1
A	US 5 669 758 A (WILLIAMSON LARRY D [US]) 23 September 1997 (1997-09-23) column 3, line 42 - column 4, line 52; figures 1, 2 column 5, line 40 - column 6, line 30	1, 55

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2006/032489

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-78

#### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-78

A tubular rotor for a fluid energy converter, the tube comprising a generally cylindrical body with an interior and an exterior surface, helical grooves being formed on the exterior surface of the tube.

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2. claims: 79-82

A tube section for a rotor, the tube section comprising an arcuate substantially rectangular panel, an tube section edge protruding from the edge of the panel and a tube section cut formed in the panel, the cut configured to receive a second tube section edge.

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3. claims: 83,84

A method of operating a windmill comprising a tubular rotor comprising pitching and/or yawing the rotor between 1 and 30 degrees of pitch and/or yaw relative to the flow direction of the fluid stream.

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4. claims: 85-87

A nacelle for a windmill, the nacelle comprising a hollow body having an interior and an exterior and a plurality of helical vanes coupled to the exterior.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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