



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
18.12.2013 Bulletin 2013/51

(51) Int Cl.:
F04D 29/36 (2006.01)

(21) Application number: **12744993.2**

(86) International application number:
PCT/BR2012/000017

(22) Date of filing: **26.01.2012**

(87) International publication number:
WO 2012/106790 (16.08.2012 Gazette 2012/33)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(72) Inventor: **Alves, José Roberto**
87083-040 Maringá-Paraná (BR)

(30) Priority: **09.02.2011 BR M9100274**

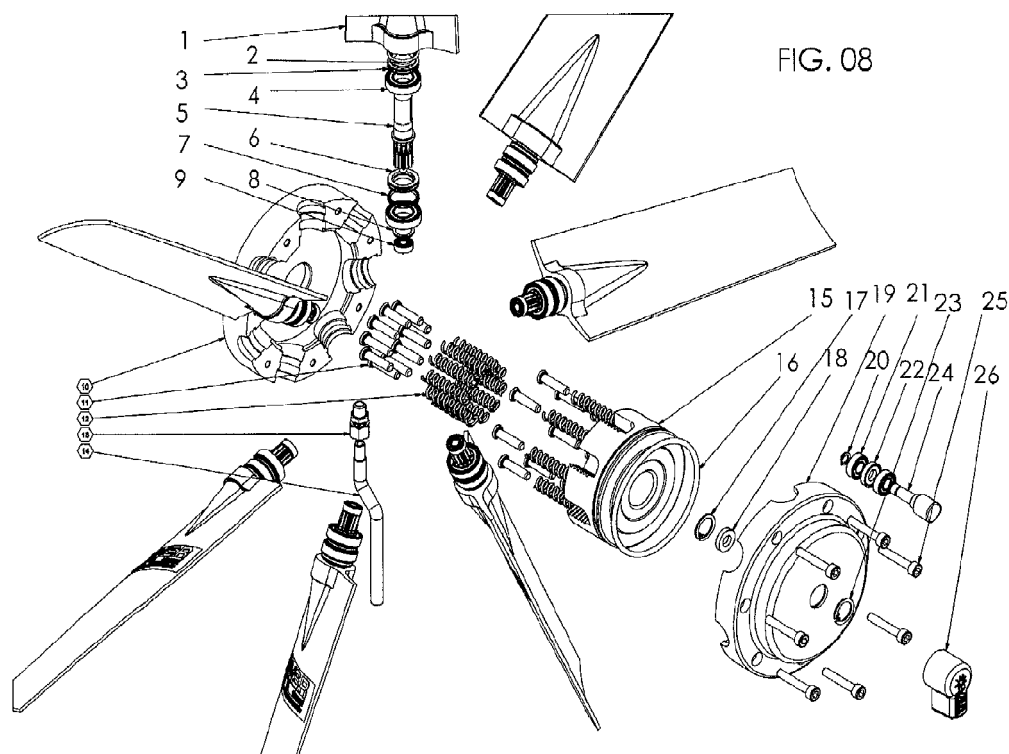
(74) Representative: **Ramos Lucas, Maria Manuel**
MarquesMarcas, Lda.
Largo de São Domingos, 1
2910-092 Setúbal (PT)

(71) Applicant: **Alves, José Roberto**
87083-040 Maringá-Paraná (BR)

(54) **VENTILATOR WITH REVERSIBLE SYSTEM FOR COOLING AND CLEANING RADIATORS**

(57) A ventilator with a reversible system for cooling and cleaning radiators can reverse the blades (1) about the shaft (5) thereof, such that forced air circulation cleans out dust, weed chaff, cereal chaff, sugarcane chaff

and other small dirt particles suspended in the air and that end up on or attached to the radiator wings and air inlet grids, thus preventing the entire engine cooling system from heating up.



Description

Field of the Invention

[0001] The present utility model relates to a ventilator with reversible system for cooling and cleaning radiators which can reverse the blades about the shaft thereof so that forced air circulation cleans out dust, weed chaff, cereal chaff, sugarcane chaff and other small dirt particles suspended in the air that accumulate or get attached to radiator wings and air inlet grids, thus preventing the entire engine cooling system from heating up.

Description of the Prior Art

[0002] Ventilators that can reverse the blades are known in the art.

[0003] The previous art can be perfectly characterized by 5 documents:

HUBER (1977) discloses a reversible ventilator in US 4,140,435.

KARADGY et al. (1998) discloses a bi-directional ventilator, having asymmetric and reversible glades in US 6, 116, 856.

DINGER (1985) discloses a reversible ventilator an elastic rubber cylinder in US 4,606,702.

STEINER (1955) discloses a ventilator tilting device and an operating mechanism in US 2,885,013.

McCALLUM (2005) discloses an industrial ventilator with reversible blades in US 7, 670, 114.

Description of the Figures

[0004] This utility model is characterized by means of representative drawings of a ventilator with reversible system for cooling and cleaning radiators in such a manner that it can be fully reproduced by adequate techniques, thus allowing the full characterization of the functionality of the claimed object.

[0005] The descriptive part of the report is based on the developed figures that express the best or preferred mode of executing the product conceived herein through consecutive reference numbers wherein it clarifies the aspects that may be implied by the adopted embodiment in order to clearly determine the protection claimed herein.

[0006] Said drawings are merely illustrative and may vary since they do not depart from what has been initially claimed herein:

Figures 1, 2, 3, 4, and 5 show the prior art; patents granted to HUBER, KARADGY, DINGER, STEINER e McCALLUM, respectively;

Fig. 6 is a longitudinal section of the ventilator, showing its actuation system.

Fig. 7 is a cross section, showing the toothed shaft in the rack piston;

Fig. 8 is an exploded perspective view of the ventilator; and

Fig. 9 is a perspective view of the assembled ventilator.

Detailed Description of the Invention

[0007] The ventilator with reversible system for cooling and cleaning radiators comprises a ventilator blade (1), an o-ring (2), a sealing ring (3) a bearing (4), a toothed shaft (5), a gasket holder (6), a gasket (7), an elastic ring (8), a bearing (9), an inner cover (10), a guide pin (11), a compression spring (12), a connecting ring (13), an air duct (14), a rack piston (15), an o-ring (16), an elastic ring (17), a retainer (18), an outer cover (19), an elastic ring (20), a bearing (21), a retainer (22), an elastic ring (23), an air pin (24), an Allen screw (25), and a protection cover (26) of the air duct.

[0008] The ventilator with reversible system for cooling and cleaning radiators (RSV) is made of aluminum for machines with a high torque engine and of highly resistant polymer for machines with a smaller torque engine. Its blades are made by means of a plastic injection system, using a highly resistant polymer.

Object of the Invention

[0009] The object of the ventilator with reversible system for cooling and cleaning radiators (RSV) through its rack piston system and toothed shafts attached to the ventilator shaft is to reverse the blades around their own shaft so that forced air circulation cleans out dust, weed chaff, cereal chaff, sugarcane chaff and other small-sized dirt particles suspended in the air that end up accumulating or getting attached to radiator wings and air inlet grids, thus preventing the entire engine cooling system of the motor from heating up.

[0010] Another object of the RSV is to cool the liquid from the cooling system of the engine by means of the forced air circulation through the radiator wings in order to keep an optimal (stable) temperature that is, within the normal cooling range determined by the machine and equipment manufacturer.

[0011] The RSV is used in most modern trucks and agricultural machines in such sectors as sugar and alcohol, civil construction, asphalt pavement, industry, mining, quarries, silviculture, and in all machines fitted with one or more radiators that need to cool the liquid from the cooling system of the motor as well as to continuously clean all kinds of dirt that accumulate in radiators and in their air inlet grids.

[0012] It can also be applied to air conditioning systems that require several air changes a day such as sheds used for breeding poultry, swine and other animals in order to change the air and condition the environment.

Detailed Description

[0013] The RSV reversing process occurs as follows: the forward and backward motion of the reversible system of the RSV ventilator is actuated automatically and programmed in seconds, minutes, and hours by an electronic/integrated circuit and compressed air control device.

[0014] Each time the wings of the radiator and its air inlet grid are cleaned, the electronic/integrated circuit control device actuates the air compressor and a solenoid valve, releasing the flow of compressed air to actuate the RSV.

[0015] The compressed air reverses the ventilator and can be generated by a 12/24 volt electrical mini-compressor installed in the power-generating unit of the machine or equipment or can be drawn from a compressed air tank filled by an air compressor attached to the motor of the machine or equipment.

[0016] Actuating the forward motion of the ventilator reversible system. The compressed air released by the valve flows through pneumatic hoses to the RSV, goes through the air duct (14) and the air pin (24) and into the sleeve of the rack piston (15), which is formed by joining the inner cover (10) and the outer cover (19). The compressed air exerts pressure inside the RSV housing, making the rack piston (15) move, rotating the toothed shafts (5) attached to the ventilator blades (1) around their own axes, making the ventilator blow or exhaust air according to need for cooling and cleaning the radiator of each machine or equipment.

[0017] Actuating the backward motion of the ventilator reversible system. When the solenoid valve allows the compressed air inside the RSV housing to return, the compression springs (12) arranged in the upper part of the rack piston (15) exert a mechanical force, making the rack piston return to the actuation position, rotating the toothed shafts (5) attached to the ventilator blades (1) around their own axes, making the ventilator blow or exhaust air according to need for cooling and cleaning of the radiator of each machine or equipment.

Advantages

[0018]

- The system keeps radiators and their air inlet grids clean, preventing the engine, transmission and the entire hydraulic system from overheating, thus reducing interruptions at work.
- The system allows radiators and their air inlet grades to be cleaned without needing to stop the machine

(motor), which is very important in places with particles suspended in the air, thus increasing the productivity and the useful life of the motor of the machine.

- Greater output and fuel economy due to the continuous radiator and air inlet grid cleaning system.
- The cleaning is done automatically through an electronic control system with no need for manual actuation.
- There are flanges for adapting the ventilator to all models of machines and equipment.
- Easy to install.
- Reduced maintenance and repairs of the air conditioning components.
- Built with a light material highly resistant to impacts and temperature oscillations.
- Low part replacement cost.
- Compressed-air actuation system.
- The system of rack piston and toothed shafts attached to the blades and incorporated into the ventilator provide robustness and quality to the product.
- One of the main characteristics of the RSV is its system of rack piston and toothed shafts attached to the blades and incorporated into it, which makes the entire system lighter and more robust at the moment reversing the RSV blades.

Claims

1. Ventilator with reversible system for cooling and cleaning radiators which can reverse the blades (1) around their own shaft (5), comprising: a set of blades (1), each one of them having a toothed shaft (5) that extends into the blades and can be properly rotated to the position of ventilation or exhaustion due to the rack piston (15) into which the teeth of the shaft (5) of said piston (15) fit; said rotation also being achieved through two large bearings (4) which are arranged in the cylindrical part of the shaft (5) and contain a gasket holder (6) and a gasket (7), containing an o-ring (2) and a sealing ring (3) above the upper bearing, and an elastic ring (8) and a smaller bearing (9) below the lower bearing; the ventilator comprising an inner cover (10) and an outer cover (19) properly joined by a set of screws (25) that fasten the covers one to another, thus keeping closed a set of guide pins (11) arranged in a circular fashion, each

of said pins containing a compression spring (12);
said ventilator being able to receive compressed air
through a n air duct (14) and an air pin (24), said pin
containing bearings (21), an elastic ring (20-23) and
a retainer (22) wherein said air duct (14) is properly
fastened to the connecting ring (13) and protected
by a protection cover (26), also containing an o-ring
(16) that attaches the piston (15) to the outer cover
(19), and an elastic ring (17) and a retainer (18).

10

15

20

25

30

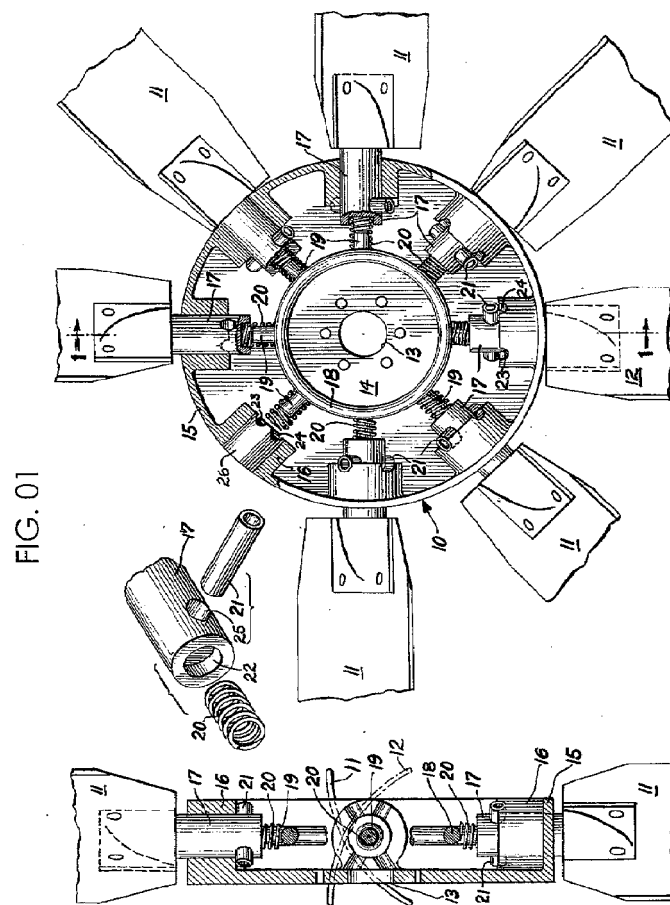
35

40

45

50

55



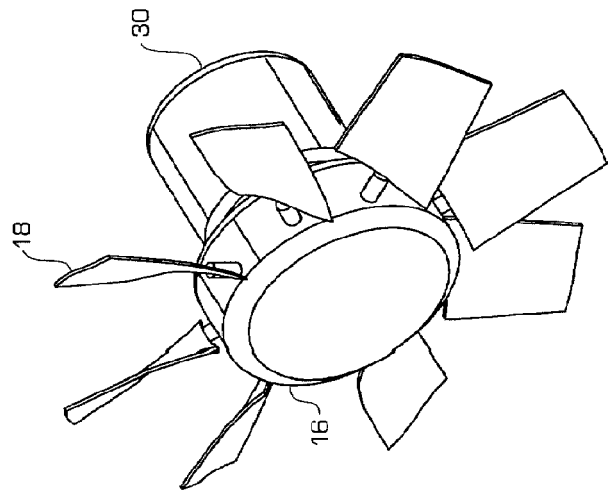


FIG. 02

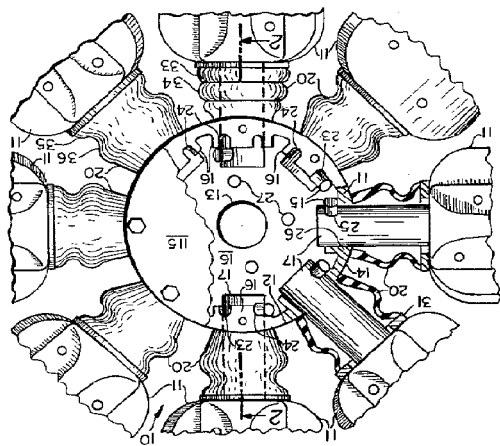


FIG. 03

FIG. 04

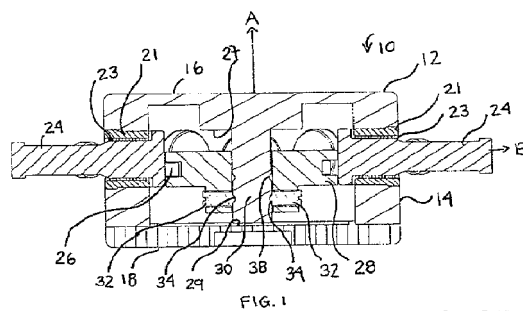
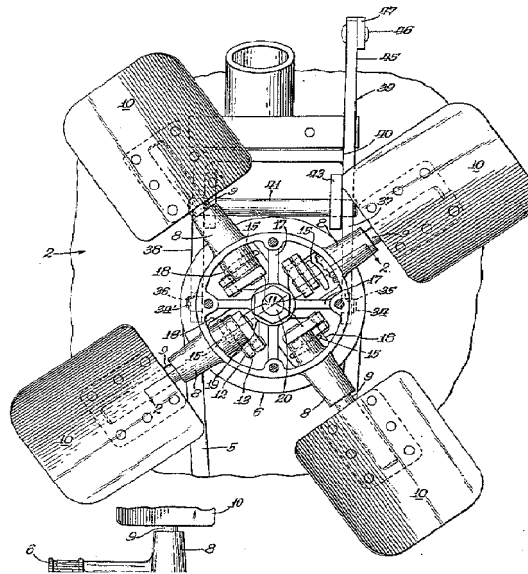
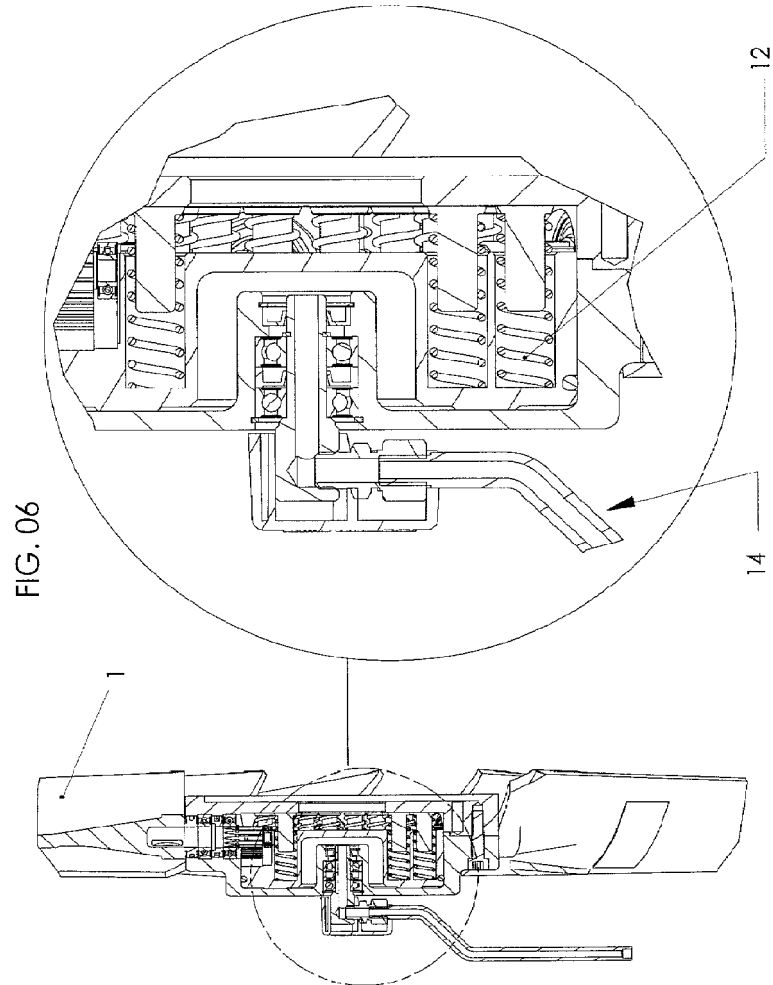
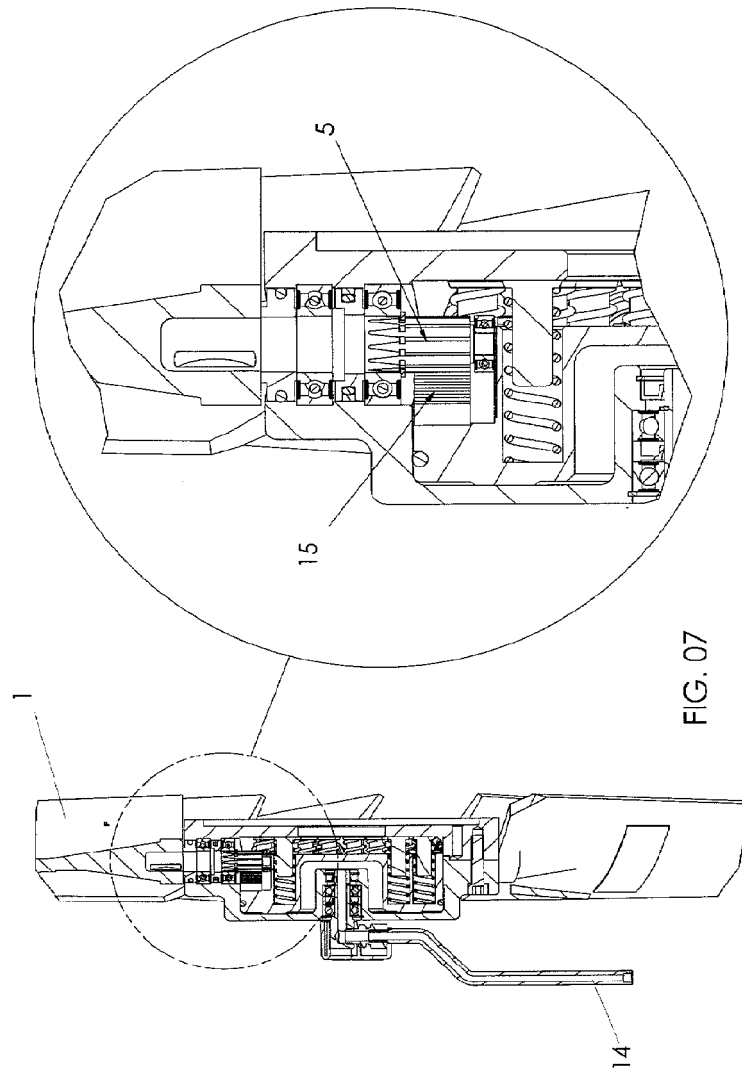


FIG. 05





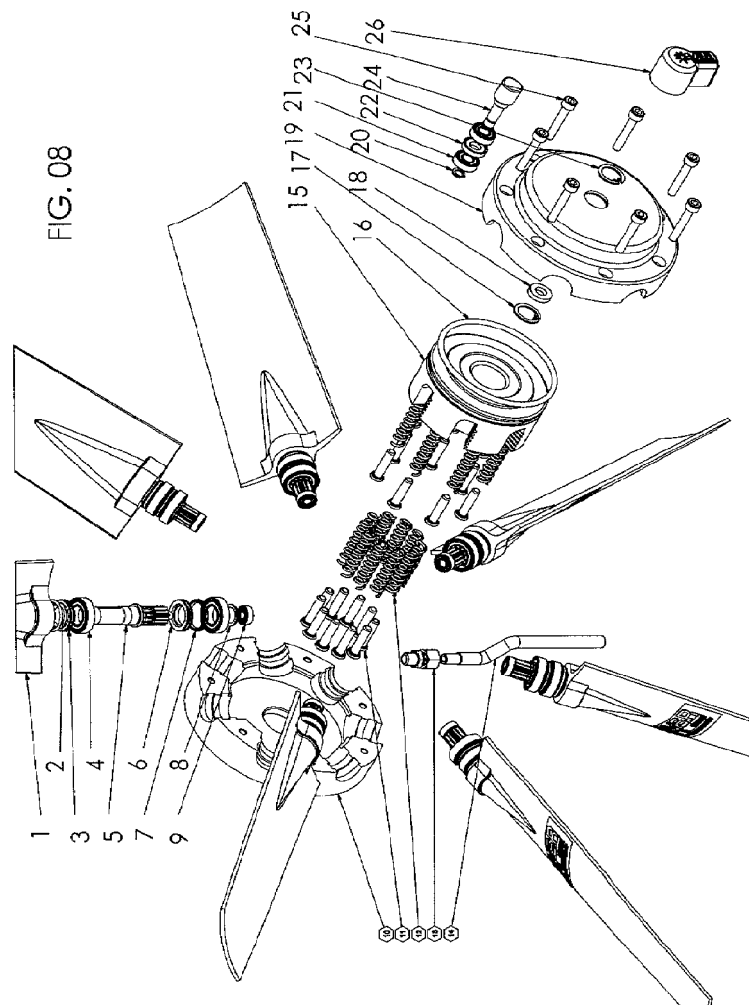
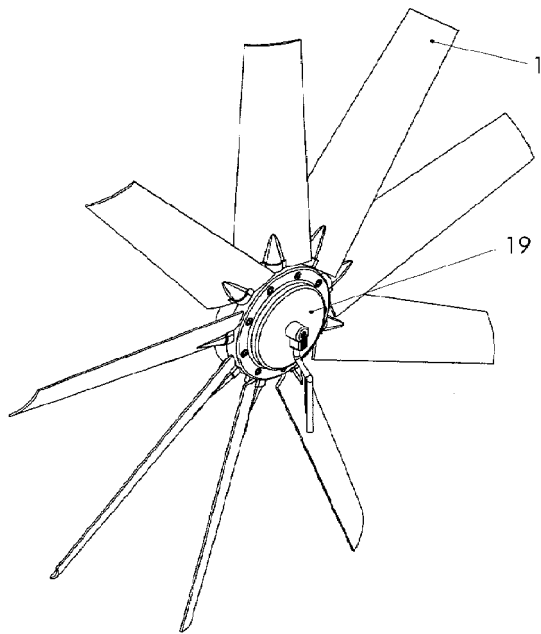


FIG. 09



INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR2012/000017

A. CLASSIFICATION OF SUBJECT MATTER F04D29/36 (2006.01) 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 (2006.01) F04D; F02M; F28F; F01D; F24F; B63H; B64C. Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched GOOGLE PATENTS Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) BR-INPI; EPODOC.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BR PI0605450 A (FERREIRA CLAUDIO FELICIANO DAS [BR]) 15 July 2008 (15-07-2008) The whole document	1
A	BR 9400750 A (GRAF JOAO ARTUR [BR]) 17 October 1995 (17-10-1995) The whole document	1
A	BR 0203998 A (DENSO CORP [JP]) 11 February 2003 (11-02-2003) The whole document	1
A	BR 8904999 A (OVERLAND MANUFACTURING LTD [CA]) 08 May 1990 (08-05-1990) The whole document	1
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 05 March 2012		Date of mailing of the international search report 09.03.12
Name and mailing address of the ISA/ INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL Rua Mayrink Veiga nº 9, 18º andar cep: 20090-050, Centro - Rio de Janeiro/RJ +55 21 3037-3663 Facsimile No.		Authorized officer Joaquim Aderito Correia de Moura Telephone No. +55 21 3037-3493/3742

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR2012/000017

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to claim No.
A, P	BR MU8900519 U2 (ALVES JOSE ROBERTO [BR]) 31 May 2011 (31-05-2011) The whole document	1
A	US 7670114 B2 (FLEXFAIRE MFG [CA]) 02 March 2010 (02-03-2010) The whole document	1
A	US 6116856 A (PATTERSON TECH INC [US]) 12 September 2000 (12-09-2000) Figures	1
A	US 4606702 A (HUBER REVERSIBLE FAN INC [US]) 19 August 1986 (19-08-1986) Figures	1
A	US 4140435 A (HUBER HERMAN L) 20 February 1979 (20-02-1979) Figures	1

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/BR2012/000017

BR PI0605450 A	2008-07-15	NONE	
BR 9400750 A	1995-10-17	NONE	
BR 0203998 A	2003-02-11	BR 0203998 B1	2010-11-16
		DE 60220248 D1	2007-07-05
		EP 1359327 A1	2003-11-05
		JP 2002310097 A	2002-10-23
		JP 4120228 B2	2008-07-16
		US 2003031561 A1	2003-02-13
		US 6659724 B2	2003-12-09
		WO 02063172 A1	2002-08-15
BR 8904999 A	1990-05-08	AU 627504 B2	1992-08-27
		AU 4252289 A	1990-04-05
		CA 1328433 C	1994-04-12
		DE 68907682 D1	1993-08-26
		EP 0361982 A2	1990-04-04
		JP 2140496 A	1990-05-30
		JP 2745236 B2	1998-04-28
		US 5022821 A	1991-06-11
		US 5122034 A	1992-06-16
BR MU8900519 U2	2011-05-31	NONE	
US 7670114 B2	2010-03-02	CA 2510157 A1	2006-12-10
		DE 112006001513 T5	2008-05-15
		GB 0800379 D0	2008-02-20
		GB 2442167 A	2008-03-26
		US 2006280608 A1	2006-12-14
		WO 2006130987 A1	2006-12-14
US 6116856 A	2000-09-12	NONE	
US 4606702 A	1986-08-19	NONE	
US 4140435 A	1979-02-20	CA 1074748 A1	1980-04-01

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4140435 A [0003]
- US 6116856 A [0003]
- US 4606702 A [0003]
- US 2885013 A [0003]
- US 7670114 B [0003]