

(19)



(11)

EP 1 865 205 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

12.12.2007 Bulletin 2007/50

(51) Int Cl.:

F04D 27/00 (2006.01)

(21) Application number: **07109547.5**

(22) Date of filing: **04.06.2007**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE
SI SK TR**

Designated Extension States:

AL BA HR MK YU

(30) Priority: **07.06.2006 IT PD20060078 U**

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(54) **Support device for pressure sensors arranged inside the pressure chambers of centrifugal fans, particularly for ventilation hoods or fume extractors**

(57) Support device for pressure sensors capable of being arranged inside the pressure chambers (7) of centrifugal fans (1), comprising a body (11) with a mainly longitudinal development internally affected by a through-tube (12) extending along the direction of longitudinal development and open at either longitudinal end (12a, 12b), the body comprising a first part (13) for obtaining support from the fan casing and a second part (15), extending from the first part (13), capable of being immersed in the flow generated in the fan's pressure chamber (7), by means of preset positioning of the corresponding end opening of the tube inside the flow, so as to pick up, through the tube (12), a pressure signal, in which the second part (15) of the body (11) has a section that lies across the direction of longitudinal development having an airfoil-profile conformation with a low drag coefficient.

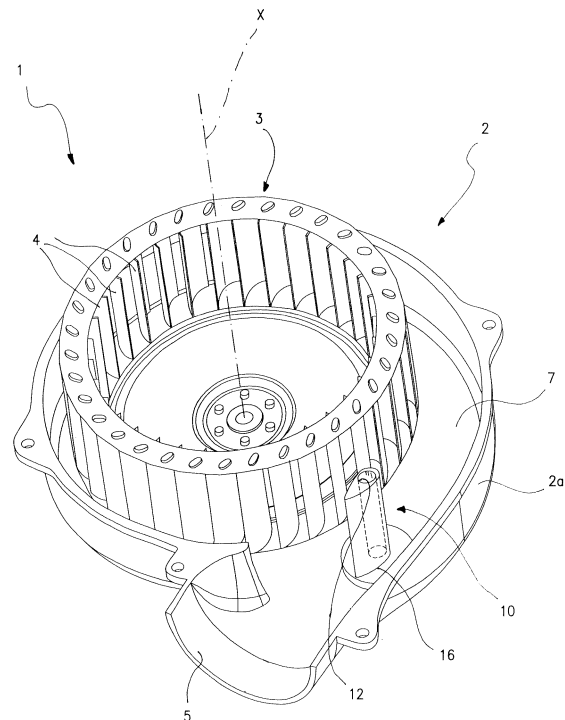


Fig. 3

Description

[0001] This invention relates to a support device for pressure sensors fitted inside centrifugal fans having the characteristics described in the precharacterising clause of main claim 1.

[0002] The invention particularly lies within the technical field of centrifugal fans designed for applications in ventilation hoods or fume extraction devices.

In this specific sector, fans of the above-mentioned type are known to be used as devices for the aspiration of vapours, combustion fumes, exhaust gases, or in all those applications requiring the extraction and conveyance, in general, of gaseous mixtures. Typical embodiments use centrifugal fans with a spiral casing having a cylindrical-drum impeller and axially-extending blades. The casings of these fans also have a side intake opening and a tangential delivery opening between which a spiral pressure chamber extends, the volume of which is defined between the casing and the impeller.

[0003] In fans of the above-mentioned type, one or more pressure pick-ups capable of picking up respective pressure signals inside the fan's pressure chamber are known to be used, these signals typically being used to calculate the fan's air flow or to send an on/off control signal to a boiler or similar appliance associated with the fan.

[0004] These pressure pick-ups normally have a tubular support passing through a hole in the fan casing, the tubular cavity of which constitutes the pressure signal pick-up tube. The support has a part that protrudes into the pressure chamber having a predetermined length and such as to enable the signal to be picked up in a set position inside the flow generated by the fan. presence of the pressure pick-up, however, causes aerodynamic resistance inside the fan which can have a negative effect on the performance thereof, consequently limiting the ventilation system's overall efficiency.

[0005] The main object of this invention is to provide a support device for pressure sensors to be positioned inside the pressure chambers of centrifugal fans, which is structurally and operationally designed to overcome the limits referred to with regard to the said known art.

[0006] This object is achieved by the invention by means of a support device for pressure sensors made according to the claims below.

Further features and advantages of the invention will emerge from the following detailed description of a preferred embodiment which is shown by way of a non-limiting example in the accompanying drawings in which:

- Figures 1 and 2 are perspective views of a support device for pressure sensors according to the invention;
- Figure 3 is a partial perspective view of a centrifugal fan fitted with a device according to the invention;
- Figures 4 and 5 are perspective views of a variant of the device according to the invention.

[0007] With reference to the above Figures, 1 shows a centrifugal fan, shown only partially, specially designed for use in ventilation hoods or fume extraction devices.

[0008] The fan 1 comprises a casing 2 with a spiral external profile, which is defined by two half-casings that can be reciprocally connected to each other, in a removable manner, of which only one, indicated by 2a, is shown in Figure 3, both half-casings being shaped with substantially mirror symmetry in relation to a median connection plane.

[0009] The casing houses a cylindrical-drum impeller 3 having an axially extending bladed section 4, the impeller being capable of rotating about an axis X. The casing also has a tangential delivery opening 5 and a second intake side opening, coaxial with axis X, made in the half-casing not shown in the Figures.

[0010] A pressure chamber 7 is defined inside the casing, around the spiral length thereof, its volume being formed between the impeller drum 3 and the internal surface profile 3a of the casing.

[0011] Inside the fan 1 is a support device 10 for a pressure sensor, made according to the invention. This device, shown in detail in Figures 1 and 2, has a body 11 with a mainly longitudinal development, which is internally affected by a through-tube 12, extending along the said direction of longitudinal development and open at either end 12a, 12b. In the body 11 is a first part 13 for obtaining support from the fan casing, which has a cylindrical surface conformation with a cross section such as to engage in a respective hole, not shown, made through the thickness of the casing. Connection part 13 is extended at one end into a plate-shaped disc base 14 or having another appropriate shape, from which is erected, in an axial extension of the first part, a second part 15. The said part 15 constitutes the portion of the device that is immersed in the flow generated in the fan's pressure chamber 7 and has a longitudinal dimension of a preselected length such as to enable preset positioning of the open end 12a of the tube 12 inside the flow, so as to pick up in this position the relative pressure signal. This pressure signal can be used to control with an on/off signal (sent to a pressure switch) a boiler or other similar appliance or used to determine, using a transducer, the flow of air generated by the fan.

[0012] According to a main characteristic of the invention, the second part 15 of the body 11 has a section that lies across the direction of longitudinal development having an airfoil-profile conformation 16 with a low drag coefficient, as clearly shown in Figure 1.

[0013] The airfoil profile 16 is preferably constant along the longitudinal direction of development of part 15 and has respective outside and inside sections 17, 18, extending between corresponding leading 19 and trailing 20 edges of the profile, as is typically the case with a transverse profile of an airfoil surface.

[0014] The airfoil profile 16 can also be made symmetrical in relation to the plane containing the airfoil chord 21, although other configurations are possible.

[0015] The airfoil profile 16 may also be chosen from standard profiles, for example chosen from profiles that are well known such as NACA profiles.

[0016] Owing to the airfoil profile conformation of part 15, a marked reduction in the drag created by the device immersed in the flow generated by the fan is achieved, resulting in an improvement in the overall performance of the ventilation system in which the fan is used. A favourable interaction with this flow is also created whereby the support device can also act as a bladed diffuser, that is, it can (if of the appropriate shape and size) deflect the flow thus reducing the speeds and increasing the pressure.

[0017] It is also possible to envisage one or more pressure pick-ups according to the device covered by this invention, so as to recover pressure or have several pressure signals.

[0018] Figures 4 and 5 show a variant of the device according to the invention in which parts similar to those shown in the previous embodiment bear the same reference numerals.

[0019] This variant differs chiefly due to the fact that at the free end 12a of the tube 12, the plane containing the airfoil profile 16 is inclined in relation to a plane perpendicular to the axis of the tube. In Figures 4 and 5 this end plane has an inclination such that the trailing edge 20 of the airfoil profile 16 is placed at a shorter distance from the base 14 than the distance of the leading edge 19 from the base 14, however it is also possible to arrange an opposite inclination of the plane containing the airfoil profile. Owing to this inclination it is possible to vary the magnitude of the pressure signal detected by the sensor, depending on the degree of inclination, such therefore as to enable greater freedom in the choice and customisation of signals to suit specific applications.

[0020] The invention thus achieves the proposed objects enabling the advantages described compared to known solutions.

[0021] In particular, these include the fact that the reduced-drag-coefficient profile used to create the pressure pick-up immersed in the air flow generated by the fan advantageously enables the action of interference and disturbance of the flow to be considerably reduced, preserving or improving the performance of the fan and the ventilation system as a whole.

the said first part (13), capable of being immersed in the flow generated in the fan's pressure chamber (7), by means of a preset positioning of the corresponding end opening of the tube inside the said flow, so as to pick up, through the tube (12), a pressure signal, **characterised in that** the second part (15) of the said body (11) has a section that lies across the said direction of longitudinal development having an airfoil-profile conformation with a low drag coefficient.

2. Device according to claim 1, wherein the said airfoil profile is constant along the direction of longitudinal development of the said second part (15).
3. Device according to either claim 1 or claim 2, wherein the said airfoil profile is symmetrical.
4. Device according to one or more of the preceding claims, wherein the said airfoil profile is chosen from standard airfoil profiles.
5. Device according to claim 4, wherein the said airfoil profile is a NACA profile.
6. Device according to one or more of the preceding claims, wherein the plane containing the airfoil profile of the free end of the said second part (15) is inclined in relation to a plane perpendicular to the direction of longitudinal development of the said tube (12).

Claims

1. Support device for pressure sensors capable of being arranged inside the pressure chambers (7) of centrifugal fans (1), comprising a body (11) with a mainly longitudinal development internally affected by a through-tube (12) extending along the said direction of longitudinal development and open at either longitudinal end (12a, 12b), the said body comprising a first part (13) for obtaining support from the fan casing and a second part (15), extending from

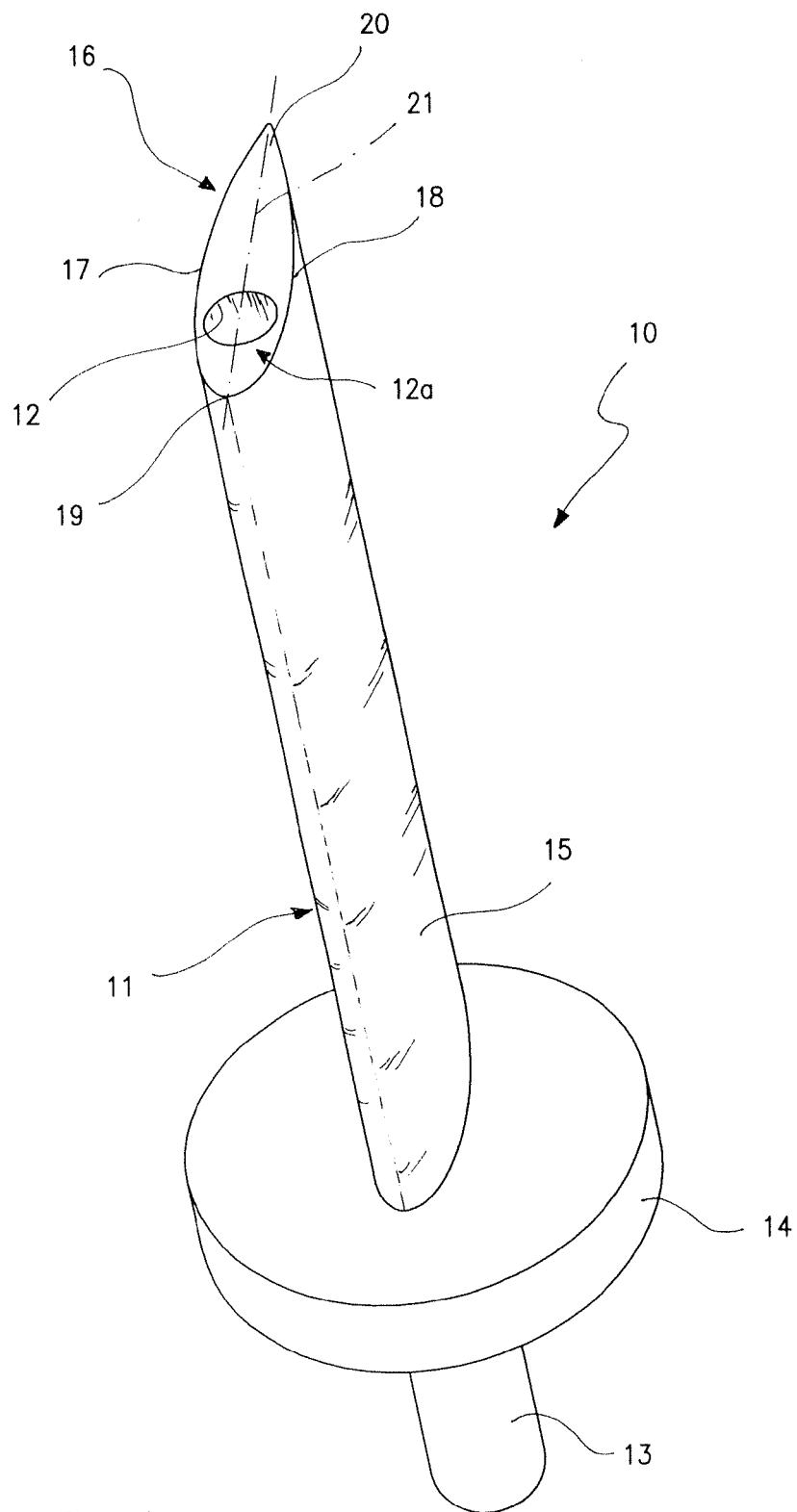


Fig. 1

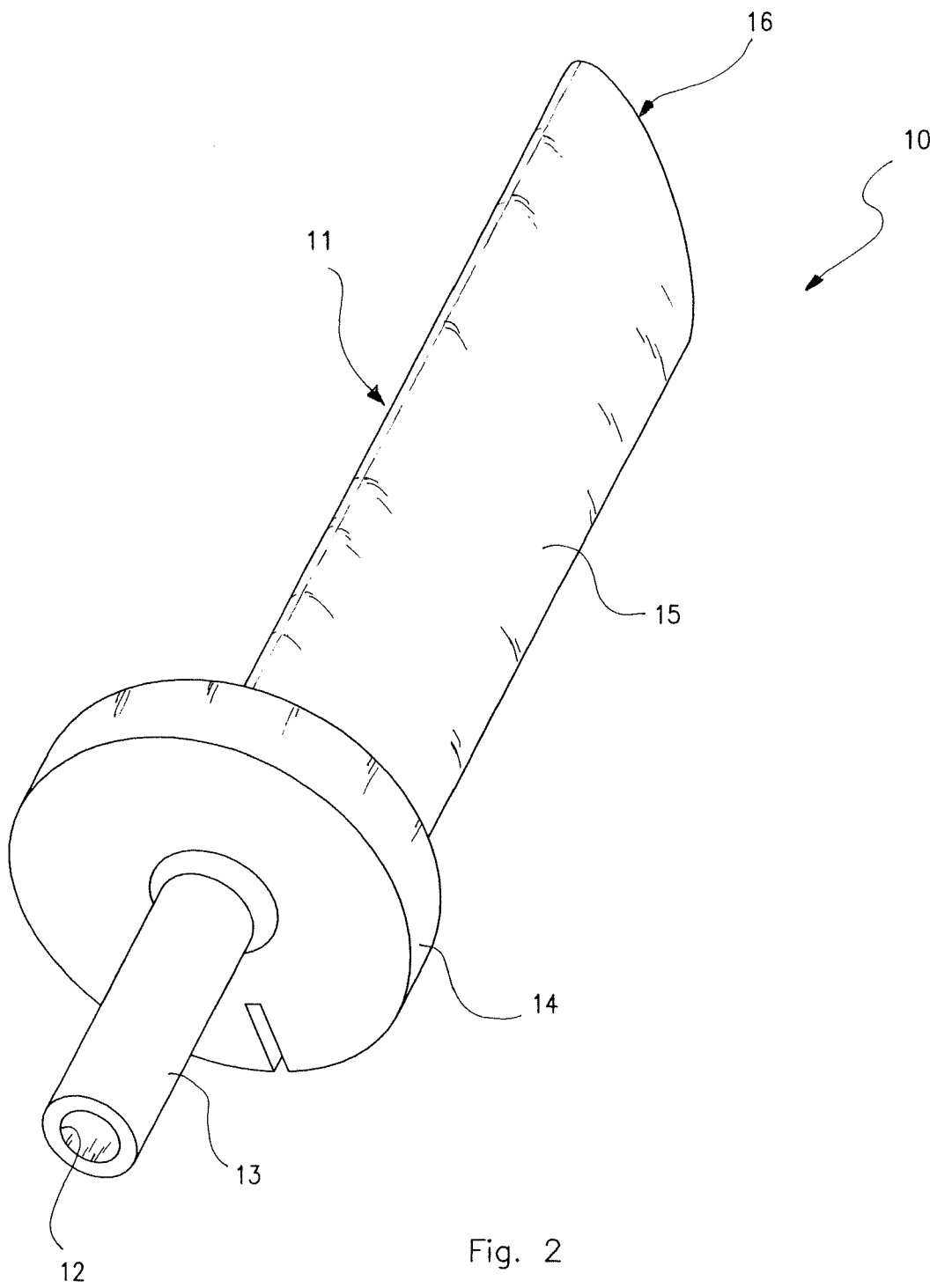


Fig. 2

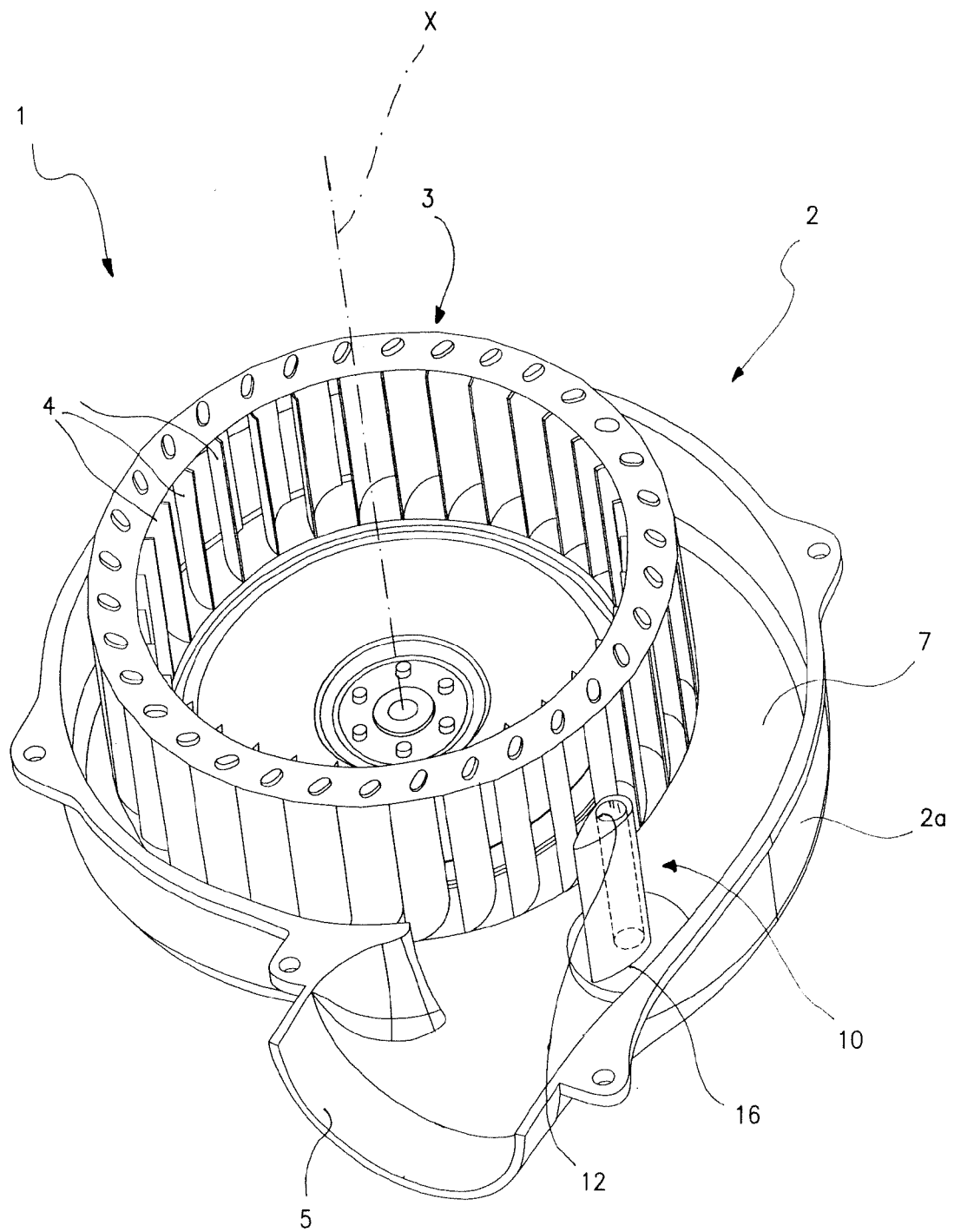


Fig. 3

