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(54) **SELF-OPENING AIR EXTRACTOR**

SELBSTÖFFNENDE LUFTABSAUGVORRICHTUNG

EXTRACTEUR D'AIR A OUVERTURE AUTOMATIQUE

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- **PATENT ABSTRACTS OF JAPAN & JP 61 246 532
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- **PATENT ABSTRACTS OF JAPAN & JP 57 065 528
A (HITACHI LTD) 21 April 1982**

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Description

OBJECT OF THE INVENTION

[0001] The present invention refers to an air extractor of the type comprising a cylindrical configuration support casing inside which an electromotor, a fan and regulation and control means are housed.

[0002] The object of the invention consists in providing the air extractor with an automatic opening front cover, closing the passage of air in the inoperative position, as well as the corresponding actuation means for opening thereof.

BACKGROUND OF THE INVENTION

[0003] Several types of air extractors are already known on the market, mainly applicable to rooms with scarce ventilation, such as bathrooms, pantries, wine-cellars, etc.

[0004] Said air extractors present a series of drawbacks in relation to conservation and maintenance, due to the technical safety requirements they must comply with.

[0005] For the purpose of preventing accidental access to the moving or active parts of the extractor, the suction opening is provided with a fixed front cover provided with a window protected with a grid, through which suction is carried out. Said window always remains open, even when the extractor is inoperative, for which reason the return of air coming from the exterior may be produced.

[0006] Besides being unaesthetic and complicated for the user to remove, the cover is an area where dirt is accumulated in the form of dust, which, added to the large amount of humidity existing in bathrooms, causes a somewhat unpleasant appearance a short time after being installed.

[0007] Documents GB A 814398 and US A 3942422 disclose automatic opening air extractors that are able to move their front covers between a closed position, where they are placed against the intake mouth, and an open position where they are separated from said intake mouth so as to allow the air to flow into it.

DESCRIPTION OF THE INVENTION

[0008] The air extractor proposed by the invention solves the drawbacks set forth above since it is provided with a design facilitating its maintenance and conservation, as well as an automatic opening front cover blocking the passage of air in the inoperative position, all this complying with the corresponding safety standards.

[0009] Therefore, and more specifically, the air extractor comprises a cylindrical configuration support casing finished off on the suction side with a perimetral rim, inside which an electromotor, a fan and regulation and control means are housed. The casing has a front cover as-

sembled in correspondence with its perimetral rim and is connected to an axial movement device, located inside the support casing between the cover and the electromotor, which is able to move said cover between a closed position, in which it is placed against the contour of the intake mouth, and an open position, in which it is separated from said contour, remaining in front of it and at a certain distance therefrom.

[0010] To facilitate cleaning thereof, the front cover and supports are connected by means of a movable connection allowing their separation.

[0011] The casing partially houses an approximately semi-oval shaped dome, in correspondence with a central hole the front cover is provided with, which dome covers the axial movement device.

[0012] In one of its embodiments, said device consists of a shape memory spring, expandable with temperature increase, an electric resistance causing heating thereof, a retraction spring for recovering the inoperative position and a guided plunger actuated by the shape memory spring, which transmits axial movement to the front cover through connection supports.

[0013] In another embodiment, the axial movement device consists of a two-way rotational electromotor, the shaft of which extends into a threaded stem meshing with the axial shaft of a drive ring transmitting its axial movement through connection supports connecting it to said front cover.

[0014] In another embodiment, the axial movement device consists of a thermal actuator comprising a wax-filled cylinder which, when heated by means of a resistance placed against it, makes the plunger move pushing the end of a hinged lever, the opposite end of which axially moves a piston, which in turn moves a drive ring to which are fixed the connection supports of the front cover.

DESCRIPTION OF THE DRAWINGS

[0015] To complement the description being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description, which, with an illustrative and non-limiting character, shows the following:

Figure 1 shows an exploded perspective view of the automatic opening air extractor carried out according to the object of the present invention, in which all the elements integrating it can be seen.

Figure 2 shows a longitudinal sectional view of the extractor duly assembled and in an inoperative state. Figure 3 shows a profile view of the connection supports.

Figure 4 shows a plan view of the connection supports of the previous figure in which the connection system can be seen.

Figure 5 shows an exploded perspective view of the axial movement device in which the different ele-

ments composing it can be seen.

Figure 6 shows a perspective view of the assembled axial movement device, in an inoperative position, corresponding to the closed front cover.

Figure 7 shows a perspective view of the assembled axial movement device, in an operative position, corresponding to the closed front cover.

Figure 8 shows an exploded perspective view of the automatic opening air extractor carried out with respect to the object of the present invention, according to the second embodiment in which the axial movement device consists of an electromotor.

Figure 9 shows an exploded perspective view of the automatic opening air extractor carried out with respect to the object of the present invention, according to the third embodiment in which the axial movement device consists of a thermal actuator.

Figure 10 shows a longitudinal sectional view of the extractor with the front cover opened, and in which the arrangement of the thermal actuator and of the hinged lever, according to the third embodiment, can be seen.

PREFERRED EMBODIMENT OF THE INVENTION

[0016] It can be observed, at sight of described figures, how the air extractor proposed by the invention consists of a cylindrical configuration support casing (1), finished off on the suction side with a perimetral rim (2). Said casing (1) holds the different components integrating the extractor, such as the electromotor (3) and the fan (4).

[0017] The object of the invention consists of providing the air extractor with a front cover (6) in correspondence with the perimetral opening of the casing (1) which blocks the passage of air in an inoperative position, and which is automatically actuated with the start-up of the extractor as a result of an axial movement device, able to move the front cover (6) between a closed position, in which it is placed against the contour of the intake mouth or perimetral rim (2).

[0018] Said axial movement device is located inside the support casing (1), between the cover (6) and the electromotor, and is provided with a shape memory spring (7) expandable with temperature increase.

[0019] The shape memory springs are constituted on the basis of metal alloys, the internal structure of which varies according to temperature. Said variation in the structure is manifested in a variation of its mechanical properties. In the case at hand, in an expansion of the spring, which recovers its shape or original length when the temperature decreases, figure 5.

[0020] As previously indicated, the axial movement device is provided with a shape memory spring (7) aided by an electric resistance (8) causing heating of the spring, and therefore causing its axial expansion.

[0021] The shape memory spring (7) transmits said axial expansion to a plunger (9), axially moving it through a fixed casing (10) guiding it along its trajectory, as can

be seen in figures 5, 6 and 7.

[0022] In its axial movement, the plunger (9) moves the front cover (6) through the connection supports (11).

[0023] To facilitate closing the cover (6) and return thereof to the inoperative position once the extractor has been turned off, the axial movement device is provided with a retraction spring (12) moving the plunger (9) to its initial position.

[0024] Therefore, in order for the axial movement device to carry out its function, an intensity is circulated through the resistor (8) which will heat the shape memory spring (7). When heated, the latter axially expands, overcoming the force of the spring (12) and moving the plunger (9) to the end of the trajectory, and accordingly moving the front cover (6).

[0025] The electric resistor (8) functions as a thermistor, such that when the shape form spring (7) has reached the desired working temperature, it cuts off the passage of current so as to prevent overheatings. When the intensity is cut off, the shape memory spring (7) starts to cool down, it thereby contracts, overcome by the force of the retraction spring (12), moving the plunger (9) to its initial position.

[0026] Another embodiment of the axial movement device, according to figure 8, consists of the arrangement of a two-way rotational electromotor (30) located inside the casing (1) between the cover (6) and the main electromotor (3), the rotating shaft of which has a threaded stem (31) assembled thereto meshing with a threaded axial borehole (32) made on the drive ring (33), which transmits its axial movement to the front cover (6) through the connection supports (11) connecting it to said cover (6).

[0027] When the electromotor (30) starts to operate and its shaft rotates in a clockwise direction, the threaded stem (31) coupled to the shaft will axially move the drive ring (33), and accordingly the front cover (6), outwards. When the shaft rotates in a counterclockwise direction, the threaded stem (31) will axially move the drive ring (33) outwards and will close the cover (6).

[0028] Another embodiment of the axial movement device, according to figures 9 and 10, consists of the arrangement of a thermal actuator comprising a wax-filled cylinder (41) which, when heated by means of a resistor placed against it, makes the plunger (42) move, pushing the ending of the hinged lever (43) on point (44). The opposite end of the hinged lever (43) is connected to a piston (45) which in turn moves the drive ring (33) on which the connection supports (11) of the front cover (6) are fixed.

[0029] A helical spring (46) assembled under pressure on the hinged lever (43) is arranged in order to facilitate closing the front cover (6) when the resistor is no longer operating and the wax contained in the cylinder (41) cools down.

[0030] The hinging point (44) is located near the end of the plunger (42) for multiplying the movement of the opposite end to which the piston (45) is attached.

[0031] When the extractor starts to operate, the front cover (6) automatically moves as a result of the axial movement device, suction of the air being carried out through the central hole (13) of the front cover (6), as well as through the side opening derived from the movement of the front cover (6) with regard to the perimetral rim (2) of the casing (1).

[0032] To facilitate cleaning tasks, the front cover (6) is extractible, allowing its separation with regard to the connection supports (11). Therefore, the front cover (6) is provided on its internal side with a series of tabs (18) coupled in the grooves (19) made on the ring (20) topping off the connection supports (11).

[0033] Finally, the axial movement device is covered by an approximately semi-oval shaped dome (21), in correspondence with the central hole (13) with which the front cover (6) is provided, and which partially projects through said central hole (13) in an inoperative position.

Claims

1. An automatic opening air extractor, of the type comprising a cylindrical configuration support casing (1) inside which an electromotor (3), a fan (4) and regulation and control means are housed, the air extractor further comprises a front cover (6) in correspondence with the intake mouth, which is connected to an axial movement device, located inside the casing (1) between the front cover (6) and the electromotor, and which is able to move said cover (6) between a closed position, in which it is placed against the contour of the intake mouth, and an opened position, in which it is separated from said contour, remains in front of it and at a certain distance therefrom, **characterized in that** the front cover (6) and the supports are connected by means of a movable connection allowing their separation and that the casing (1) partially houses an approximately semi-oval shaped dome in correspondence with a central hole the front cover (6) is provided with, which dome covers the axial movement device.
2. An automatic opening air extractor according to claim 1, **characterized in that** the axial movement device consists of a shape memory spring (7), expandable with temperature increase, an electric resistor causing heating thereof, a retraction spring (12) for recovering its inoperative position and a guided plunger (9) actuated by the shape memory spring (7), transmitting axial movement to the front cover (6) through several connection supports.
3. An automatic opening air extractor according to claim 1, **characterized in that** the axial movement device consists of a two-way rotational electromotor (30), the shaft of which extends into a threaded stem (31) meshing with the axial shaft of a drive ring (33)

transmitting its axial movement to the cover (6) through connection supports connected to said front cover (6).

4. An automatic opening air extractor according to claim 1, **characterized in that** the axial movement device consists of a thermal actuator comprising a wax-filled cylinder (41) which, when heated by means of a resistor placed against it, makes the plunger (42) move pushing the end of a hinged lever (43), the opposite end of which axially moves a piston (45), which in turn moves a drive ring (33) to which are fixed the connection supports (11) of the front cover (6).

Patentansprüche

1. Selbstöffnende Luftabsaugvorrichtung, die ein Trägergehäuse
(1) von zylindrischer Gestalt aufweist, in dem ein Elektromotor (3), ein Ventilator (4) und Regel- und Steuermittel aufgenommen sind, wobei die Luftabsaugvorrichtung weiterhin über eine vorderseitige Abdeckung (6) passend zu der Einlassmündung verfügt, die mit einer axialen Bewegungseinrichtung verbunden ist, welche innerhalb des Gehäuses (1) zwischen der vorderseitigen Abdeckung (6) sowie dem Elektromotor angeordnet und dazu eingerichtet ist, die Abdeckung (6) zwischen einer geschlossenen Stellung, in der sie gegen die Konturierung der Einlassmündung liegt, und einer geöffneten Stellung bewegbar ist, in der sie in einem Abstand von der Konturierung ist sowie vorderseitig sowie in einem bestimmten Abstand von ihr verbleibt, **dadurch gekennzeichnet, dass** die vorderseitige Abdeckung (6) und die Träger über ein bewegbares Verbindungsteil miteinander verbunden sind, das ihre Trennung gestattet, und dass das Gehäuse (1) teilweise ein in etwa eine in Gestalt eines halben Ovals ausgebildete Kuppel aufnimmt, zu der passend die stirnseitige Abdeckung (6) mit einem mittigen Loch ausgebildet ist, wobei die Kuppel die axiale Bewegungseinheit abdeckt.
2. Selbstöffnende Luftabsaugvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die axiale Bewegungseinheit aus einer Feder (7) mit Formgedächtnis, die bei Temperaturanstieg ausdehnbar ist, aus einem elektrischen Widerstand, der eine Erwärmung derselben verursacht, aus einer Rückzugsfeder (12) zum Wiederherstellen ihrer nicht betriebsbereiten Stellung und aus einem geführten Kolben (9) besteht, der durch die Feder (7) mit Formgedächtnis betätigt wird und die axiale Bewegung

der vorderseitigen Abdeckung (6) über mehrere Verbindungsträger vermittelt.

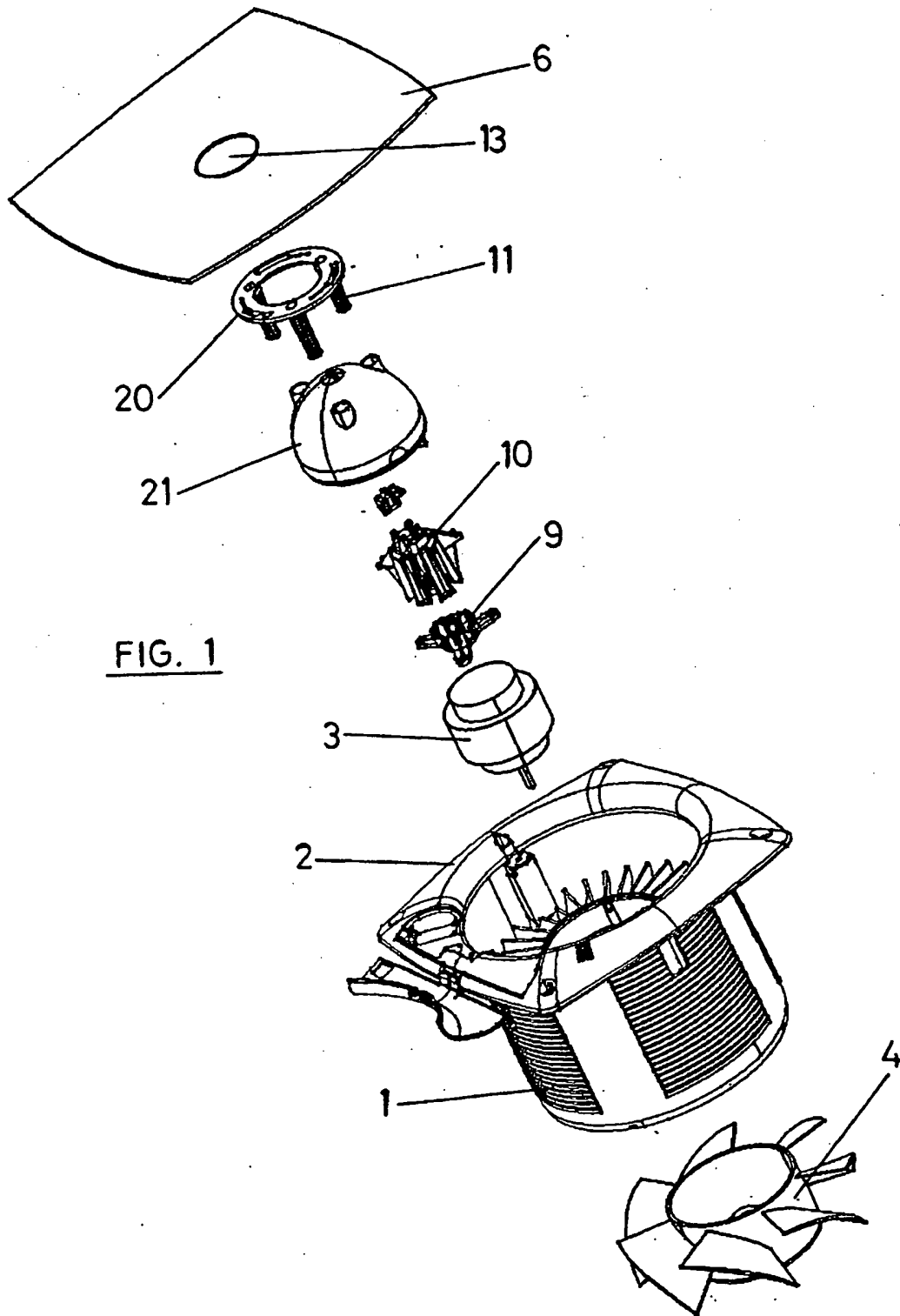
3. Selbstöffnende Luftabsaugvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die axiale Bewegungseinheit aus einem Elektromotor (30) mit zwei Drehrichtungen besteht, dessen Welle sich in ein mit einem Gewinde versehenes Stielteil (31) fortsetzt, das mit der axialen Welle eines Antriebsringes (33) in Eingriff ist, der seine axiale Bewegung über mit der vorderseitigen Abdeckung (6) verbundene Verbindungsträger an die Abdeckung (6) vermittelt.
4. Selbstöffnende Luftabsaugvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die axiale Bewegungseinheit aus einem thermischen Betätigungsglied besteht, das über einen mit Wachs gefüllten Zylinder (41) verfügt, der, wenn er über einen an ihn anliegenden Widerstand erwärmt wird, eine Bewegung des Kolbens (42) derart verursacht, dass das Ende eines gelenkig gelagerten Hebels (43) betätigt wird, dessen gegenüberliegendes Ende einen Kolben (45) in axialer Richtung bewegt, der wiederum einen Antriebsring (33) bewegt, an dem die Verbindungsträger (11) und die vorderseitige Abdeckung (6) angebracht sind.

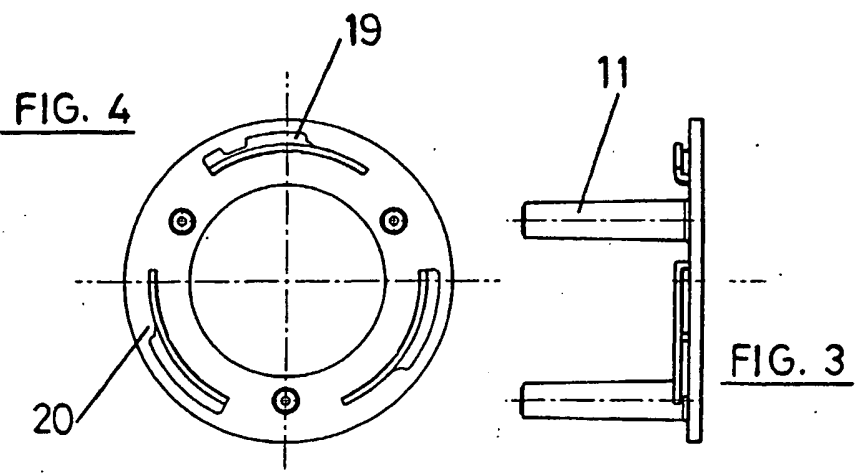
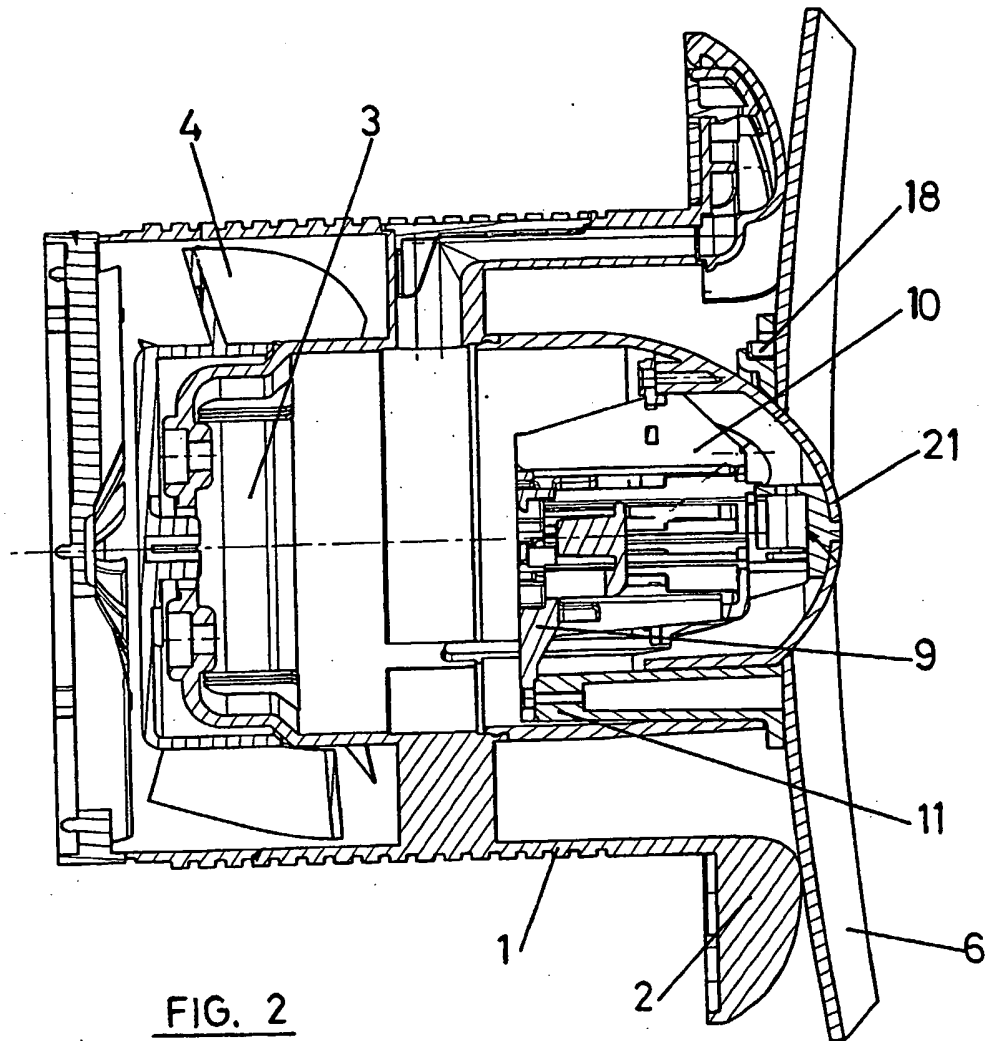
Revendications

1. Ventilateur d'extraction à ouverture automatique, du type comprenant un boîtier de support de configuration cylindrique (1) à l'intérieur duquel sont logés un moteur électrique (3), un ventilateur (4) et des moyens de régulation et de commande, le ventilateur d'extraction comprenant en outre un couvercle frontal (6) en correspondance avec la bouche d'entrée, qui est raccordé à un dispositif à mouvement axial, situé à l'intérieur du boîtier (1) entre le couvercle frontal (6) et le moteur électrique, et qui est apte à déplacer ledit couvercle (6) entre une position de fermeture, dans laquelle il est placé contre le contour de la bouche d'entrée, et une position d'ouverture, dans laquelle il est séparé dudit contour, reste devant lui et à une certaine distance de celui-ci, **caractérisé en ce que** le couvercle frontal (6) et les supports sont raccordés au moyen d'un raccordement mobile permettant leur séparation et **en ce que** le boîtier (1) loge partiellement un dôme de forme approximativement semi ovale en correspondance avec un orifice central dont est muni le couvercle frontal (6), lequel dôme couvre le dispositif à mouvement axial.
2. Ventilateur d'extraction à ouverture automatique selon la revendication 1, **caractérisé en ce que** le dispositif à mouvement axial consiste en un ressort à

mémoire de forme (7), expansible par augmentation de température, une résistance électrique provoquant le chauffage de celui-ci, un ressort de rappel (12) destiné à revenir à sa position inactive et un piston guidé (9) actionné par le ressort à mémoire de forme (7), transmettant un mouvement axial au couvercle frontal (6) par plusieurs supports de raccordement.

3. Ventilateur d'extraction à ouverture automatique selon la revendication 1, **caractérisé en ce que** le dispositif à mouvement axial consiste en un moteur électrique rotatif à deux voies (30), dont l'arbre s'étend à l'intérieur d'une tige filetée (31) s'engrenant avec l'arbre axial d'un anneau d'entraînement (33) transmettant son mouvement axial au couvercle (6) par les supports de raccordement raccordés audit couvercle frontal (6).
4. Ventilateur d'extraction à ouverture automatique selon la revendication 1, **caractérisé en ce que** le dispositif à mouvement axial consiste en un actionneur thermique comprenant un cylindre rempli de cire (41) qui, lorsqu'il est chauffé au moyen d'une résistance placée contre lui, déplace le piston (42) pour qu'il pousse l'extrémité d'un levier articulé (43), dont l'extrémité opposée déplace axialement un piston (45), qui déplace à son tour un anneau d'entraînement (33) auquel sont fixés les supports de raccordement (11) du couvercle frontal (6).





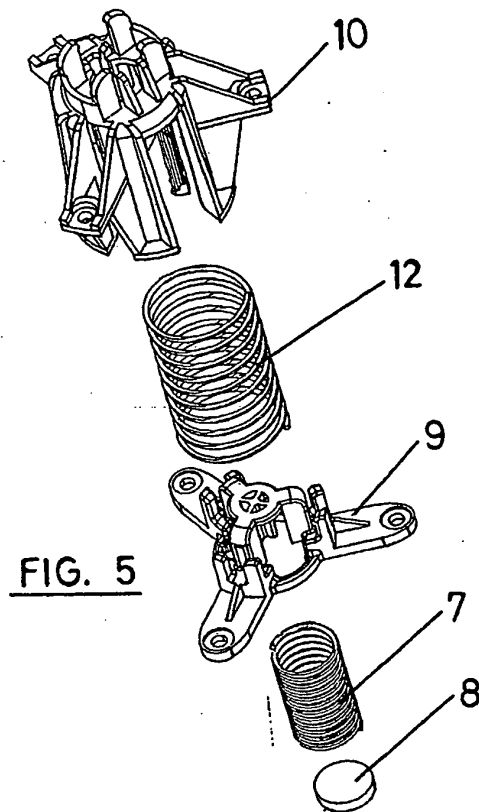


FIG. 5

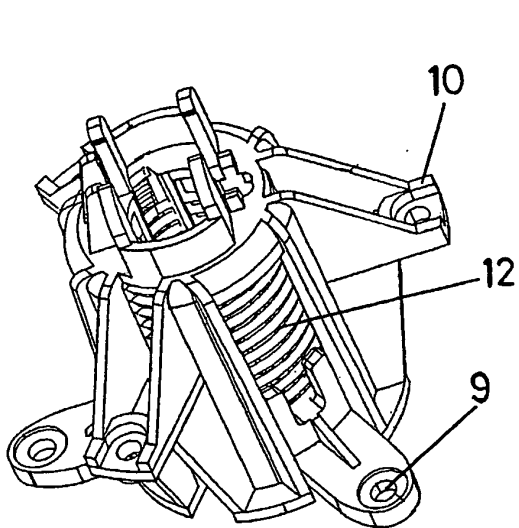


FIG. 6

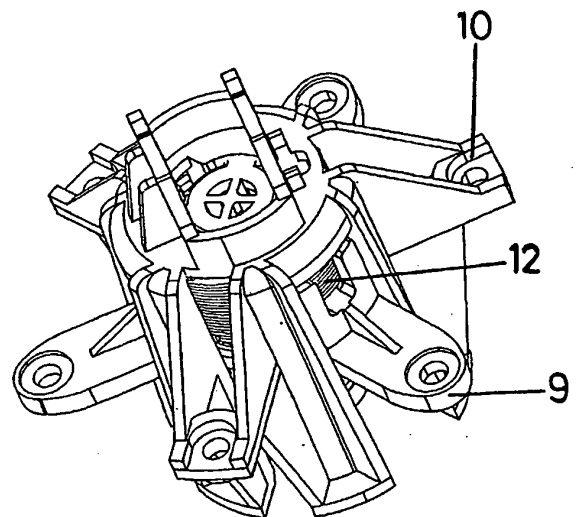


FIG. 7

FIG. 8

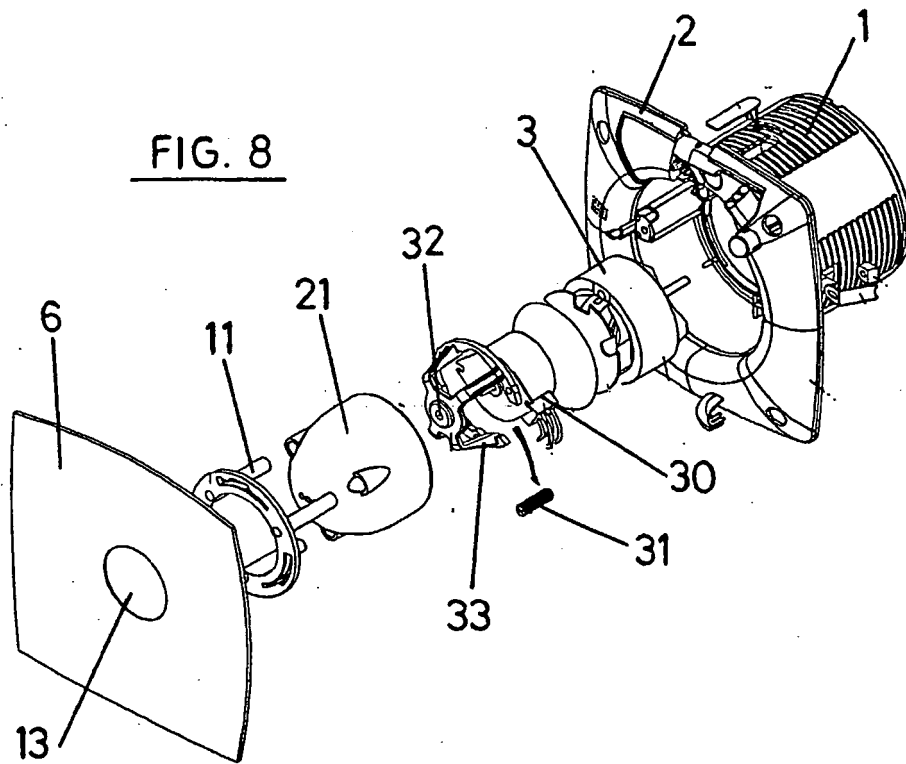
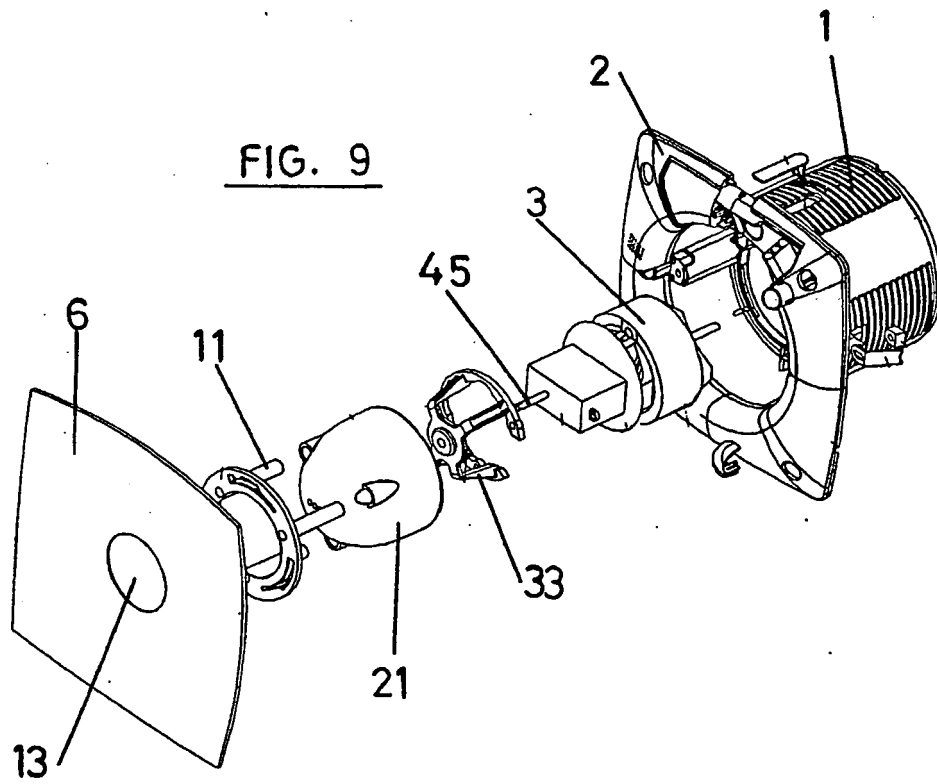


FIG. 9



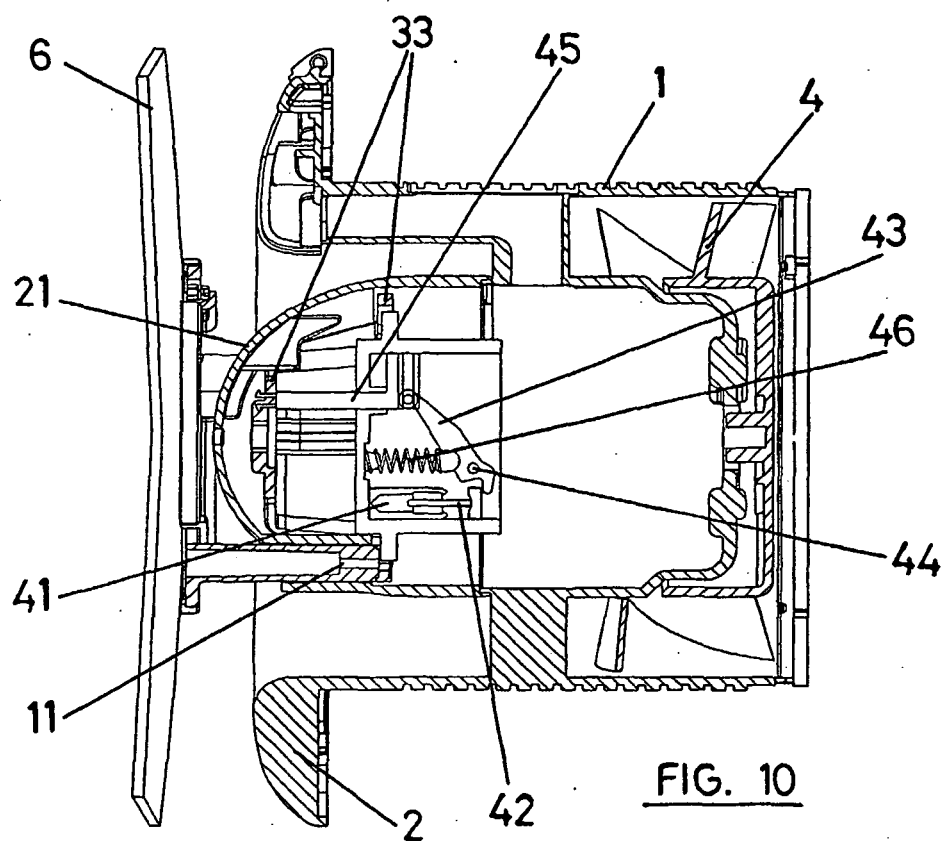


FIG. 10