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(54) **Combination extractor fan and light unit**

(57) A combination light and extractor fan unit,
wherein the unit is provided with a single connection to

an external power supply and, in use, this connection is
used to power both the light and the fan.

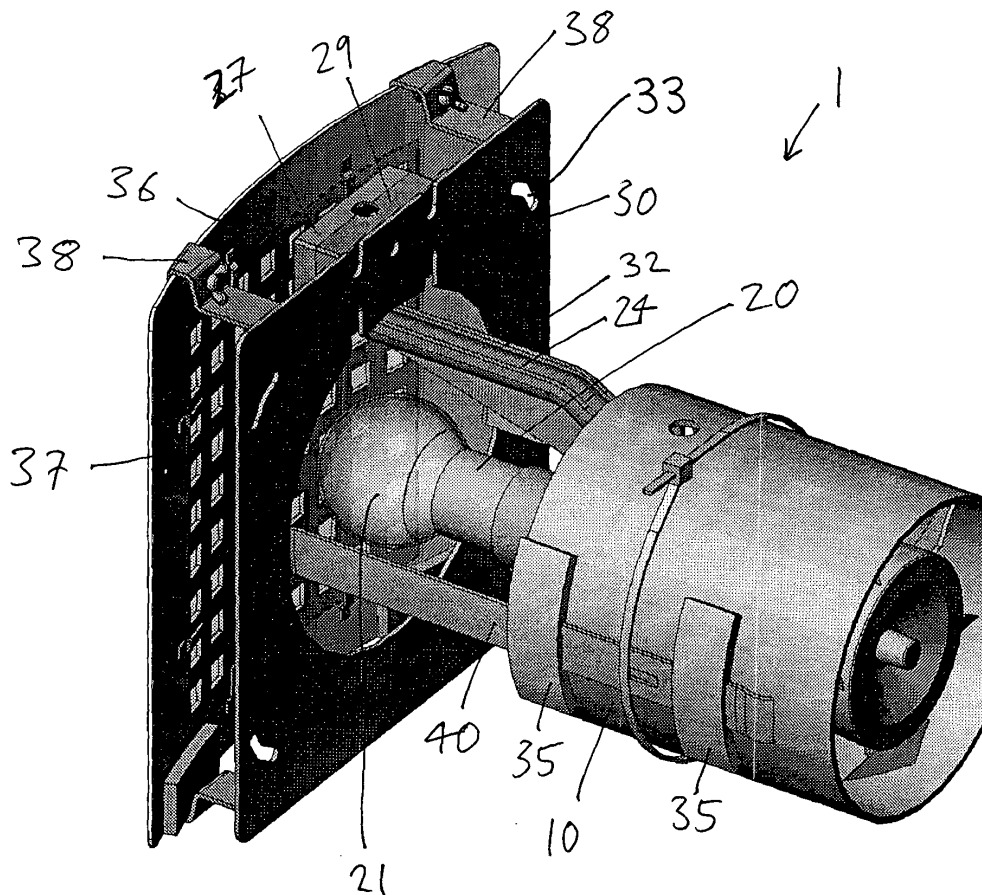


Fig. 3

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Description

[0001] This invention relates to an extractor fan, such as may be used in a domestic kitchen or bathroom, which also has an integral light fitting.

[0002] Extractor fans are commonplace around the home and the office. If an extractor fan is required in a room which does not already have one, a suitable extractor fan unit can be bought (e.g. off the shelf in a do-it-yourself (DIY) shop) and installed.

[0003] Installation usually involves forming a suitable hole in a wall or a ceiling of the building to house the fan unit, obtaining a power supply connection from the building mains supply, installing the fan in the wall or ceiling and connecting the power supply to the fan motor. If the fan is to be installed in a ceiling, additional ducting will normally have to be supplied to channel the extracted air from the back of the fan unit to outside the building. Building regulations usually require that such installation be carried out by a qualified electrician.

[0004] It is known to combine extractor fans with light fittings. The known apparatus consists of a ceiling mounted light fitting and air inlet, the latter being connected by ducting to a remote (typically 1.5 metres from the inlet) electric fan which draws air through the inlet and along the ducting. The air then flows along a further length of ducting to an outlet where it is vented to the outside.

[0005] Such combination light and extractor fan apparatus requires a person installing the apparatus to make an electrical connection from the building mains supply to both the fan and the light. However, providing two separate electrical power connections within the unit can be time consuming.

[0006] According to the present invention, there is provided a combination light and extractor fan unit, wherein the unit is provided with a single connection to an external power supply and, in use, this connection is used to power both the light and the fan.

[0007] When the electrician only has to make a single power supply connection, the installation is quicker and easier and more reliable. The unit then uses this single connection to power both the light and the fan.

[0008] The single connection may comprise a plurality of electrical contacts, for example for live and neutral inputs. The electrical contacts are preferably of the type for direct connection to the electrical conductors of an electric cable, preferably being provided with securing means for securing the electrical conductors to the electrical contacts, such as screws, springs or the like. The single connection is preferably in the form of a connection block, which may be provided with the electrical contacts and the securing means. Thus, in order to supply power to the unit, an electrician need only connect the conductors of an electrical cable at a single location, such as the connection block.

[0009] In a preferred arrangement, in which the unit is mounted in a cavity in a wall, such a connection block is recessed in the wall, with the electric supply cable also

being so recessed. The connection block may be located rearwardly of a bracket for mounting the unit (such a bracket being for example arranged to be screwed to the wall), either directly behind the bracket or laterally offset therefrom. Thus, in a preferred embodiment, the connection block is arranged to be mounted rearwardly of a bracket of the unit.

[0010] Preferably the external power supply connection powers a printed circuit board assembly which in turn supplies power to the light and the fan. With such an arrangement, the printed circuit board assembly can be housed inside the unit away from the potential heat sources. Also, as the printed circuit board can be manufactured, installed in the unit and tested before the unit is sold, the fan unit is made more reliable as there are fewer connections to be made when the unit is installed in its final destination.

[0011] In a preferred embodiment, the external power supply connection takes a live input and a switch live input which is dependent upon the state of an external switch, and the printed circuit board assembly powers the light with the switch live. This arrangement is particularly useful as the light will not usually always need to be on. Therefore an external switch can be built in to the mains power supply connection so that the light can be switched on and off as needed. For example, in an embodiment including a timer, a user entering a room may turn on a switch so that the light comes on and the fan starts, and then when leaving the room he may turn off the switch so that the light switches off and the fan then continues for the period set by the timer before stopping.

[0012] Extractor fans often only needed to be activated when somebody is present in the room and possibly for some time after they have left, e.g. when somebody is showering in a bathroom or cooking in a kitchen. The light switch can be used as an indication of a person's presence in the room. Therefore it is preferred that the printed circuit board assembly includes a timer circuit, and the timer circuit is triggered by the external switch and is used to provide power to the fan. The timing circuit can then be used, for example, to switch the fan on when the light is switched on, and to switch the fan off a predetermined time after the light has been switched off. Other more complicated timing functions can easily be built into the timing circuit, for example to take account of the amount of time the light was switched on, or inputs from other sensors such as temperature or humidity sensors.

[0013] Preferably the printed circuit board assembly further provides a means for transferring an external ground connection to the unit casing and/or the fan motor.

[0014] It is noted that the standard PVC cable used by most electricians is intended to withstand temperatures up to about 75 degrees centigrade. However, temperatures inside a combination extractor fan and light unit, if the fan failed, but the light remained on, could easily rise above that temperature. When the fan/light unit is recessed into a wall or ceiling (as is usually the case), it is

not always possible to route the mains power cable away from the light bulb or fan motor (the main heat sources).

[0015] For example, if the mains power cable is routed in a conduit on the surface of the wall in which the unit is recessed, the power supplies to both the light and the fan motor will have to pass through the front of the unit, past the light. If ordinary PVC cable was used, and if the fan failed, but the light remained on as described above, the cable could easily melt.

[0016] Accordingly it is preferred that the external power supply connection of the unit is located outside the main unit and therefore away from the heat sources of the light and the fan motor. Preferably, the external power supply connection is located forwardly of the main body of the unit. The electrical power supply connection may be connected to the main body of the unit by a cable. In the preferred embodiments, the light/fan unit comprises a support projecting from the main body of the unit to support the cable. Such a support can ensure that the cable does not come into contact with a lamp, and can shield the cable from the lamp.

[0017] The cable which transfers power from the external power supply connection to the light and the fan can be installed in the fan during manufacture and can be chosen to be able to resist the anticipated fault temperature. Preferably the cable is capable of withstanding a fault temperature of over 80 degrees centigrade. With this arrangement, the safety of the unit does not depend upon the electrician using the correct type of cable when installing the unit. As the power supply connection is located away from the main heat sources, ordinary PVC cable will be adequate.

[0018] In a particularly preferred embodiment, the anticipated fault temperature is 86 degrees centigrade. It is therefore preferred that the internal wiring of the unit is VDE cable which can withstand up to 200 degrees centigrade.

[0019] Preferably the fan and the light are arranged coaxially. This provides a neat and compact arrangement which is quick and easy to install.

[0020] The unit is preferably designed so that, in use, it is sufficiently recessed into a wall or a ceiling that the unit does not project unduly into the room in which the unit is installed, thus making the unit more flush with the wall or ceiling and more aesthetically pleasing to look at.

[0021] Preferably, the main body of the unit is generally cylindrical. This makes it suitable to be received in a cavity in a wall, for example in a generally cylindrical duct mounted in a cavity in a wall.

[0022] It is preferred that the electrical power supply connection is located forwardly of a socket for a light. When the unit is wall mounted the power supply connection is thus in a relatively forward position for connection to a mains power cable on the wall surface, whereas the lamp may be at least partly recessed into the wall.

[0023] A preferred embodiment of the invention will now be described, by way of example only and with reference to the accompanying drawings in which:

Figure 1 shows an exploded view of a combination light and fan unit according to an embodiment of the invention;

5 Figure 2 shows a plan view of a printed circuit board assembly according to an embodiment of the invention; and

10 Figure 3 is a perspective view of a light/fan unit according to an embodiment of the invention, seen from behind.

[0024] A 100 mm bathroom wall extractor fan and light unit has a light fitting for a 40 W light bulb and an extractor fan capable of extracting 28 l/s from the bathroom.

[0025] As shown in Figure 1, the unit 1 comprises a housing 10 into which a fan and motor (not shown) are fitted. A printed circuit board assembly (pcba) 16 is shown in more detail in Figure 2 and is fitted inside the housing and provides electrical power to the motor by flying leads connected to M1 and M2. The pcba also provides electrical power to a light fitting 20 through flying leads connected to LP1 and LP2. A lamp 21 is mounted in the light fitting.

[0026] The pcba 16 gets its power input through cable 24 which is connected at one end to a connector block 26 on the pcba 16 and at the other end to an external connector block 28 mounted on an outer bracket 30 of the unit 1. The cable 24 is routed from the pcba 16 to the external connector block 28 via a plastic cable run 32. The cable 24 is a VDE cable which is capable of withstanding temperatures up to 200 degrees centigrade.

[0027] In the embodiment shown in Figure 1, the pcba is mounted inside the housing 10 and a pcba cover 34 is fixed over the top of the pcba. The cable run 32 is formed integrally with the pcba cover 34 and the light fitting 20 is fitted into the pcba cover 34.

[0028] An outer bracket 30 is to be secured on the surface of a wall by screws 31 passing through screw holes 33. The external connector block 28 may be attached to the outer bracket 30, but it is preferred that the external connector block 28 is instead recessed into the wall as this means that no cables are visible from the side of the unit. The external connector block is protected by a cover 27, 29 which may be fixed to the bracket 30 or the wall.

[0029] An external cover 36 is provided in front of the unit 1 and is held in place by retaining hooks 38 positioned around the bracket 30. The external cover 36 is preferably made from frosted glass or chrome. The chrome cover may also have a plastic diffuser plate 37 fixed behind it. The hooks 38 position the cover 36 slightly away from the wall to which the unit 1 is mounted so that air can pass behind the cover 36 and through to the fan.

[0030] In the embodiment shown, the bracket 30 is attached to the main unit 1 by two side bars 40 which are clipped to the unit 1 and also held in place by foam strips 35.

[0031] The external connector block 28 has four con-

nection points. These connection points are of the normal screw-down type. The four inputs are for live, neutral, switch live and earth. The live, neutral and earth are to be directly connected to the live, neutral and earth of the building mains supply. The switch live is also connected to the mains live, but via an external switch.

[0032] The connector block 26 on pcba 16 has 3 inputs (also of the screw-down type): live, neutral and switch live. These are connected via cable 24 to the live neutral and switch live connectors in external connector block 28. The pcba 16 also has an earth connection block 42 which can be used to connect an earth wire from cable 24 (from the earth connector of external connector block 28) to the fan motor.

[0033] The pcba 16 also includes a timer circuit which is used to provide power to the fan motor when the external switch is on or for a predetermined time after the external switch is switched off. The predetermined time can be varied between about 1 minute and about 30 minutes by setting a variable resistor on the pcba 16.

[0034] To connect the fan/light unit to an electrical supply (the building mains supply) once the fan has been installed in an external wall, the electrician only needs to make live, neutral, earth and switch live connections to the external connector block 28. He does not need to make separate electrical connections to the fan motor and the light fitting 20. As the external connector block is located away from the major heat sources, the electrician may also use normal PVC electrical wiring without risk of it melting if a fault occurs.

[0035] Figure 3 shows the light/fan unit in its assembled form. Figure 3 shows the light fitting 20, coaxial with the fan and motor (not shown) and projecting forwardly of the housing 10. The lamp 21 is mounted in the light fitting. The cable 24 supported by the cable run 32 connects the pcba (not shown) to the external power supply connector (not shown). The external power supply connector is housed in a two part casing 27, 29 which is shown mounted to the front of the bracket 30. The external power supply connector and its casing 27, 29 can alternatively be mounted behind the bracket 30 in a recess formed in the wall in which the unit is mounted. In either case, the connector is located forwardly of the light fitting 20. Therefore the light does not project out significantly from the wall. The only part of the unit which projects out from the wall is the front cover 36, held in place by the retaining hooks 38. The front cover typically projects out from the wall by an inch or two so that air can be sucked behind the front cover 36 and through the unit 1 via the extractor fan.

Claims

1. A combination light and extractor fan unit, wherein the unit is provided with a single connection to an external power supply and, in use, this connection is used to power both the light and the fan.

2. A unit as claimed in claim 1, wherein the external power supply connection powers a printed circuit board assembly which in turn supplies power to the light and the fan.
3. A unit as claimed in claim 2, wherein the external power supply connection takes a live input and a switch live input which is dependent upon the state of an external switch, and wherein the printed circuit board assembly powers the light with the switch live.
4. A unit as claimed in claim 3, wherein the printed circuit board assembly includes a timer circuit, and wherein the timer circuit is triggered by the external switch and is used to provide power to the fan.
5. A unit as claimed in claim 2, 3 or 4, wherein the printed circuit board assembly further provides a means for transferring an external ground connection to the unit.
6. A unit as claimed in any preceding claim, wherein the external power supply connection is located outside a main body of the unit.
7. A unit as claimed in claim 6, wherein the external power supply connection is located forwardly of the main body.
8. A unit as claimed in claim 6 or 7, wherein the electrical power supply connection is connected to the main body of the unit by a cable.
9. A unit as claimed in claim 8, wherein the cable is capable of withstanding a fault temperature of over 80 degrees centigrade.
10. A unit as claimed in claim 8 or 9, comprising a support projecting from the main body of the unit to support the cable.
11. A unit as claimed in any preceding claim, wherein the electrical power supply connection is disposed forwardly of a socket for a lamp.
12. A unit as claimed in any preceding claim, wherein the fan and the light are arranged coaxially.

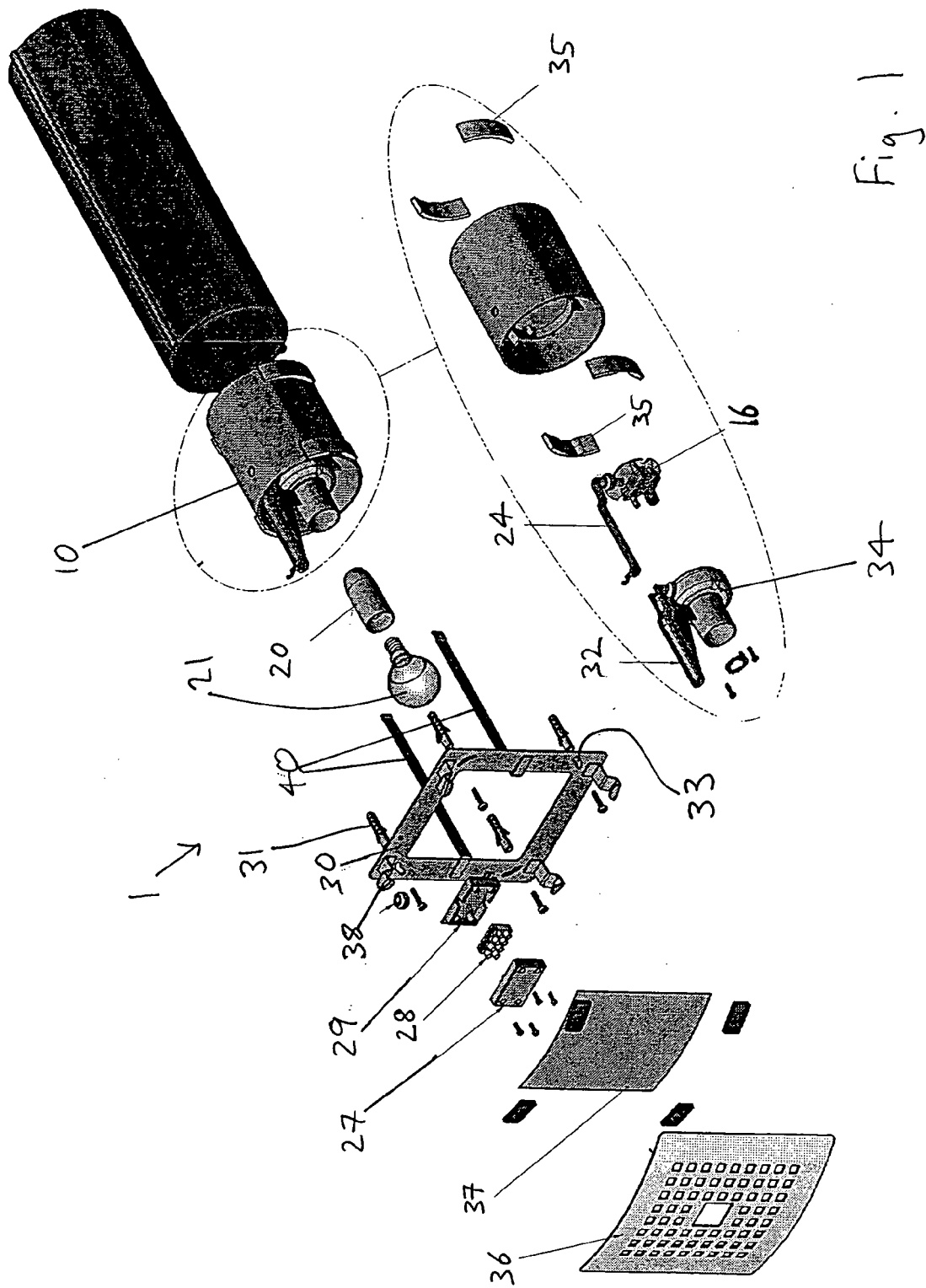


Fig. 1

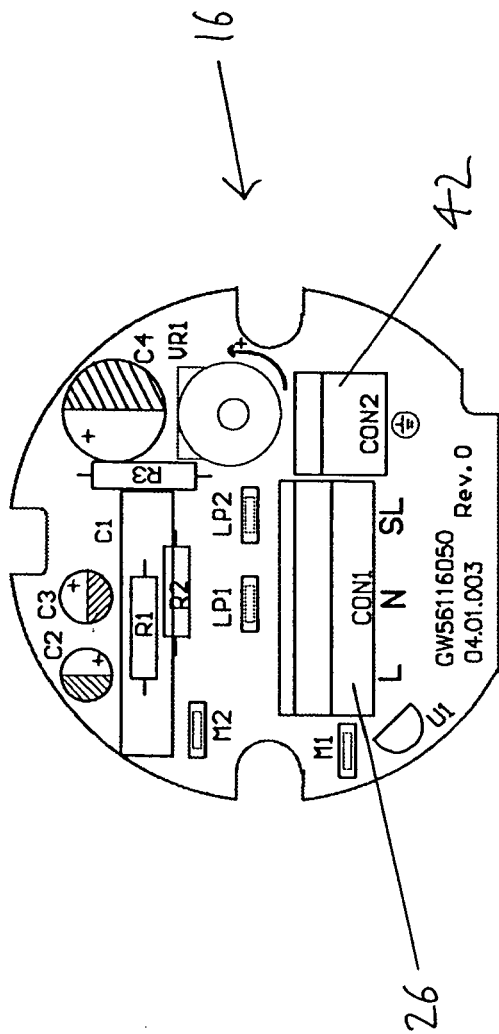


Fig. 2

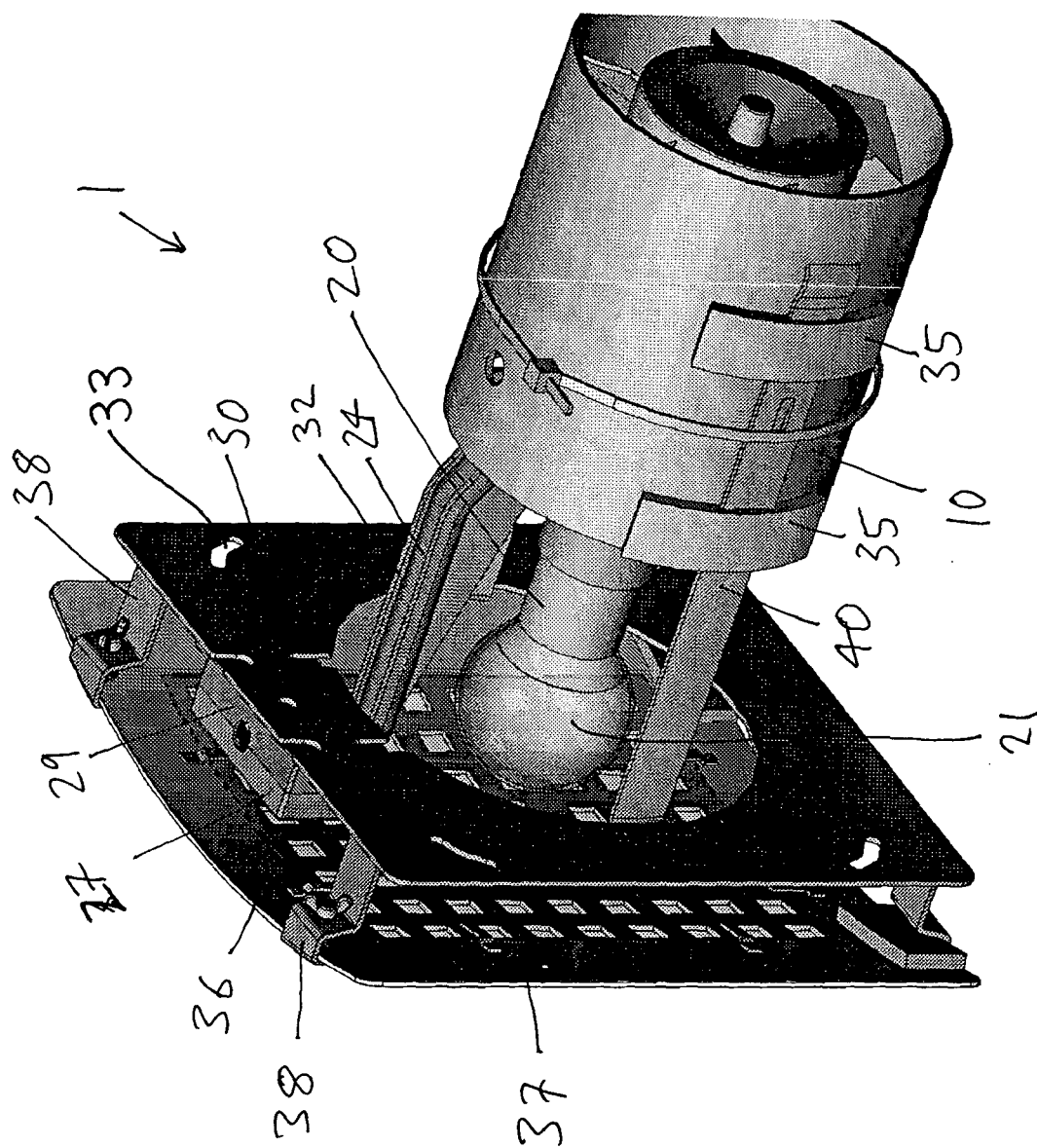


Fig. 3



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			F24C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 September 2006	Examiner Merkt, Andreas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 25 2805

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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