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(54) A HEATED VENTILATION ASSEMBLY

(57) A heated ventilation assembly comprises a fan and includes at least one air supply vent with an outlet aperture for supplying air to the habitable space of a building. A conduit connects the air vents to the fan and an airflow pathway is defined by the conduit between the vents and the fan therebetween. The fan is located at one end of the airflow pathway and is arranged to supply air along the airflow pathway to the vents located at a second end of the airflow pathway. Heating elements are located at the second end of the airflow pathway at the outlet apertures of the air supply vents which minimise losses within the ducting by heating the airflow is it exists the vents.

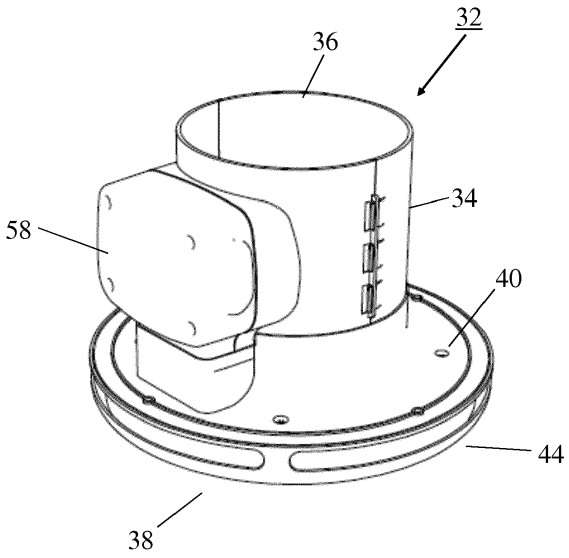

FIG.3

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Description

[0001] The present invention relates to a heated ventilation assembly for a dwelling or other building, and in particular a heated positive pressure ventilation system.

[0002] Positive pressure or 'forced ventilation' systems for dwellings are known and comprise a fan located in the loft or roof space of the building and ducting arranged to channel air from the fan into the living or space of the building. Forced ventilation into the accommodation space places the accommodation space under a slight positive pressure, which acts to force air to flow out of the building through gaps in windows, doors etc. This has the effect of subjecting the accommodation space to a continuous ventilating air flow. Beneficially forced ventilation removes or prevents the build-up of condensation within the accommodation. This is particularly important in dwellings suffering from problems of damp or mould build up. It has also been shown that forced ventilation may act to remove or prevent the possible build-up of radon gas.

[0003] It is important that the temperature of forced ventilation systems is moderated to ensure that the air supplied to the accommodation does not cause discomfort. In warm months where the temperature in the loft may significantly exceed the temperature of the accommodation the volume airflow may be varied to moderate temperature. In colder months active heating may be required to temper the supplied airflow to prevent cold drafts in the accommodation. It is known to provide combine a heater with the fan unit to heat the airflow as it leaves the fan. However, this has been found to be an inefficient and inconvenient means of heating the airflow. As air travels from the fan to the supply vents heat is lost from to the ducting and surrounding atmosphere resulting in efficiency losses. Furthermore, maintenance or repair of the heating element requires the loft space to be accessed causing inconvenience and increasing the time and effort of a maintenance call. Locating the heater on the fan also requires a control system for the fan to be remotely located and connected to the heater, adding to the complexity and cost of installation.

It is therefore desirable to provide an improved heated ventilation system which addresses the above described problems and/or which offers improvements generally.

[0004] According to the present invention there is provided a heated ventilation assembly as described in the accompanying claims.

[0005] In an embodiment of the invention there is provided a heated ventilation assembly comprising a fan; at least one air supply vent having an outlet aperture for supplying air to the habitable space of a building; a conduit connecting the at least one vent to the fan and defining an airflow pathway therebetween, the fan being located at a first end of the airflow pathway and arranged to supply air along the airflow pathway to the vent located at the second end of the airflow pathway; and a heating element located at the second end of the airflow pathway proximate the outlet aperture of the air supply vent. Locating the heating element at the second end of the conduit minimises losses within the ducting experienced by arrangements of the prior art, thereby improving the efficiency of the assembly. Mounting the heating element at the second end also enables the heating element to be accessed from within the accommodation space for repair or replacement, rather than requiring access to the roof space.

[0006] The heating element is preferably mounted to the air supply vent and located within the airflow pathway. In this way the vent and the heating element comprise part of an integral unit that may be supplied an installed as a single component.

[0007] Preferably the air supply vent includes a channel section having the outlet aperture located at one end and wherein the heating element is mounted to the air supply vent such that it is located within the channel section. Mounting the element within the channel section provides a compact arrangement that minimises space while also protecting the element.

[0008] The air supply vent preferably comprises a mounting plate surrounding the outlet aperture for securing the vent to a structure. Preferably a wall section defining the channel extends away from the mounting plate. The heating element may be mounted to the wall section.

[0009] The wall section is preferably separated along its length defining two wall sections that are separable to enable installation or removal of the heating element during assembly or maintenance.

[0010] The two wall sections preferably include cooperating fasteners for releasably securing the walls sections to each other. This enables the heating element to be easily removed from the channel for repair or maintenance.

[0011] The heated ventilation assembly preferably further comprises a controller for the heating element, the controller being mounted to the vent such that it is accessible when the vent is mounted to a structure. In this way the controller may be accessed from within the accommodation space rather than requiring roof space or a remote control unit that must be wired separately.

[0012] The air supply vent preferably includes comprises a mounting plate surrounding the outlet aperture for securing the vent to a structure, and a removable cover arranged to at least partially obscure the plate in use. The cover is also preferably arranged to obscure the controller in normal use, the controller being accessible by removal of the cover.

[0013] The controller preferably includes a control panel and the controller extends through the mounting plate such that the control panel is accessible from the underside of the mounting panel is use.

[0014] The heating element and the fan are preferably electrically connected and one of the fan and the heating element includes a power supply connection for connection to a power source. Preferably the fan and the heating element are arranged to be powered by said a single

power supply connection. In this way the unit may be advantageously connected to the lighting circuit or other power circuit within the accommodation space, with the fan unit also being powered from this connection rather than requiring a separate power connection to the roof space to be installed.

[0015] In another aspect of the invention there is provided a building including a heated ventilation system for providing a ventilation airflow to the habitable space of the building, the heated ventilation system including a fan located at a location remote from the habitable space; at least one air supply vent having an outlet aperture arranged to supply air to the habitable space of the building; a conduit connecting the at least one vent to the fan and defining an airflow pathway therebetween. The fan is located at a first end of the airflow pathway and arranged to supply a ventilation airflow air along the airflow pathway to the habitable space via the vent located at the second end of the airflow pathway. A heating element is located at the second end of the airflow pathway proximate the outlet aperture of the air supply vent arranged to heat the ventilation airflow prior to entry into the habitable space.

[0016] Preferably the fan is located in the roof space of the building and the vent is located within a ventilation apertures formed in a ceiling between the roof space and the accommodation space.

[0017] The building preferably includes an electrical power supply that is connected to the heating element, and the heating element is electrically connected to the fan to provide a power supply thereto such that both the heating element and the fan are powered via the power supply connection to the heating element.

[0018] The heating element is preferably mounted to the vent and wherein part of the vent is mounted to the ceiling within the habitable space. The heater preferably includes a controller that is mounted to vent and which is accessible and controllable from within the habitable space.

[0019] The present invention will now be described by way of example only with reference to the following illustrative figures in which:

Figure 1 shows a ventilation assembly according to the prior art;

Figure 2 shows a fan assembly;

Figure 3 shows an exploded view of a supply vent according to the present invention;

Figure 4 shows the vent of assembly of Figure 4;

Figure 5 is a view from above of the vent assembly of Figure 4, and

Figure 6 shows an exploded view of a supply vent according to another embodiment the present invention.

[0020] Referring to Figure 1, a heated ventilation assembly 1 of the prior art includes a fan contained within a housing 4 that is mounted with the roof space of a building. The housing 2 includes a pair of air inlets 4 located on opposing sides and filters 6 connected to each inlet 4. The housing 2 includes an outlet 8 that is connected to a rigid ducting section 10 extending from the outlet 8. A heater 12 is connected to the rigid ducting section 10 and includes a heating element located within the ducting section and arranged such that airflow from fan passes directly over the element as it exits the outlet 8. Flexible ducting 14 connects the rigid ducting 10 to a vent 16 mounted to the ceiling 18 of the accommodation space below the roof space.

[0021] Mounting the heater 12 directly to the fan unit has conventionally been thought the convenient solution as the fan and heater form an integral unit requiring a single power source. However, once the airflow has passed across the heating element it must travel the length of the ducting 14 before exiting the vent 16. While the vent is represented as short length in Figure 1 for illustrative purposes, the length of ducting may be significantly longer depending on the distance between the mounting location of the fan and the position of the vent. As the air travels along the ducting it cools with heat losses to the ducting and surrounding air. These losses result either in air entering the habitable space below the required temperature or if feedback control is used the heater must operate well above the required temperature to account for the losses leading to a significant loss in efficiency.

[0022] In the arrangement of Figure 2 a filtered fan unit 20 includes a fan contained within a main body housing 22. The main body housing 22 includes a pair of air inlets 24 located on opposing sides of the main body housing 22. A fibre filter 26 is connected to each inlet 24 to filter the air drawn into the fan unit 20. The housing 22 includes an outlet 28 that is axially aligned with the outlet of the fan contained within the housing 22. A flange section 28 surrounds the outlet 28 to which is mounted a flexible ducting (not shown). The flange section 30 is significantly shorter than the rigid ducting section 10 of the prior art as it does not house a heating element. The fan unit 20 is configured to be mounted with the loft or roof space of a building.

[0023] A vent 32, as shown in Figure 3, includes a cylindrical body section 34 defining and airflow channel having an inlet 36 at a first end an outlet 38 at the opposing second end. The first end 36 is configured to connect to the second end of the ducting that is connected at its first end to the flange 28 of the fan unit 20 with the ducting extending between the fan unit 20 and the vent 32 within the roof space. The main body section 34 in use extends through an aperture formed in the ceiling of the habitable space of the building. A mounting plate 40 extends radially outwards from the second end of the body 34 and

secures the vent to the lower surface of the ceiling, internal to the habitable space via screw holes 42. A cover plate 44 is provided at the lower side of the mounting plate to cover and obscure the fixings of the mounting plate 40.

[0024] As shown in Figure 4 the cover plate incudes a central outlet aperture 46 and lateral diffusion vents 48. A heating element 52 is located within the body section 34. The body section 32 is formed in two parts 34a, 34b which are separable to allow the heating element to be mounted within the channel. Snap fit connectors 54 releasably connect the two body sections 34a,34b. A pair of aperture 56 are formed in on of the wall section 34a through which extends the connection legs of the heating element, connecting to the connection box and controller 58 which secured to the outer surface of the body section 34a. A housing 60 is formed on the upper surface of the mounting plate for receiving the base of the controller 58. The housing 60 is open at its base with an access port extending through the mounting plate 40 to allow access to the controls of the controller from the underside of the mounting plate 40.

[0025] As shown in Figure 5 the heating element 52 has a sinuous form to maximise the heat exchange surface area. The peripheral footprint of the heating element is designed to closely fit within the inner wall of the body section 34 to maximise the cross sectional area of the channel across which it extends.

[0026] In an alternative embodiment shown in Figure 6, the body section 134 has a single piece, cylindrical form. The body section 134 is formed from a section of aluminium tube. This arrangement simplifies construction, and also assists in earthing the ducting unit. A heat cut out bracket 162 is provided for mounting heat cut out devices within the body section 134 to control the heating element 152. The heat cut out bracket 162 includes a failure cut out 166 and a control cut out 168. The failure cut out 166 comprises a bi metallic strip having that is calibrated to permanently cut out and disable the heating unit I the event that a temperature is reached that indicates serious failure of the unit. This is a last resort cut out that prevents a temperature any catastrophic elevation in temperature. The control cut out is also a safety cut out, and cuts out power to the heating element in the event that the temperature exceeds a predetermined safe level.

[0027] However, the control cut out 168 is configured to re-activate the heating element once the temperature drops below the safety cut out level. The cut out bracket is also configured to support as thermistor for comfort level temperature control. This feeds back to the control pcb 170 which controls the heating element for temperature control. The base pcb 172 allows remote control of the fan unit from the celling unit. This further embodiment also includes a damper element 174 that locates between the mounting plate 140 and the cover plate 144 to 'blank' a predetermined region of outlet to limit the direction of outlet airflow.

[0028] Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. A heated ventilation assembly comprising:

   a fan;
   at least one air supply vent having an outlet aperture for supplying air to the habitable space of a building;
   a conduit connecting the at least one vent to the fan and defining an airflow pathway therebetween, the fan being located at a first end of the airflow pathway and arranged to supply air along the airflow pathway to the vent located at the second end of the airflow pathway; and
   a heating element located at the second end of the airflow pathway proximate the outlet aperture of the air supply vent.

2. A heated ventilation assembly according to claim 1 wherein the heating element is mounted to the air supply vent and located within the airflow pathway.

3. A heated ventilation assembly according to claim 1 wherein the air supply vent includes a channel section having the outlet aperture located at one end and wherein the heating element is mounted to the air supply vent such that it is located within the channel section.

4. A heated ventilation assembly according to claim 3 wherein the air supply vent comprises a mounting plate surrounding the outlet aperture for securing the vent to a structure, and a wall section defining the channel extending away from the mounting plate.

5. A heated ventilation assembly according to claim 4 wherein the heating element is mounted to the wall section.

6. A heated ventilation assembly according to claim 5 wherein the wall section is separated along its length defining two wall sections that are separable to enable installation or removal of the heating element during assembly or maintenance.

7. A heated ventilation assembly according to claim 6 wherein the two wall sections include cooperating fasteners for releasably securing the walls sections to each other.

8. A heated ventilation assembly according to any preceding claim further comprising a controller for the heating element, the controller being mounted to the vent such that it is accessible when the vent is mounted to a structure.

9. A heated ventilation assembly according to claim 8 wherein the air supply vent includes comprises a mounting plate surrounding the outlet aperture for securing the vent to a structure, and a removable cover arranged to at least partially obscure the plate in use, and wherein the cover is also arranged to obscure the controller in normal use, the controller being accessible by removal of the cover.

10. A heated ventilation assembly according to claim 9 wherein the controller includes a control panel and the controller extends through the mounting plate such that the control panel is accessible from the underside of the mounting panel is use.

11. A heated ventilation assembly according to any preceding claim wherein the heating element and the fan are electrically connected and one of the fan and the heating element includes a power supply connection for connection to a power source, and the fan and the heating element are arranged to be powered by said a single power supply connection.

12. A building including a heated ventilation system for providing a ventilation airflow to the habitable space of the building, the heated ventilation system including:

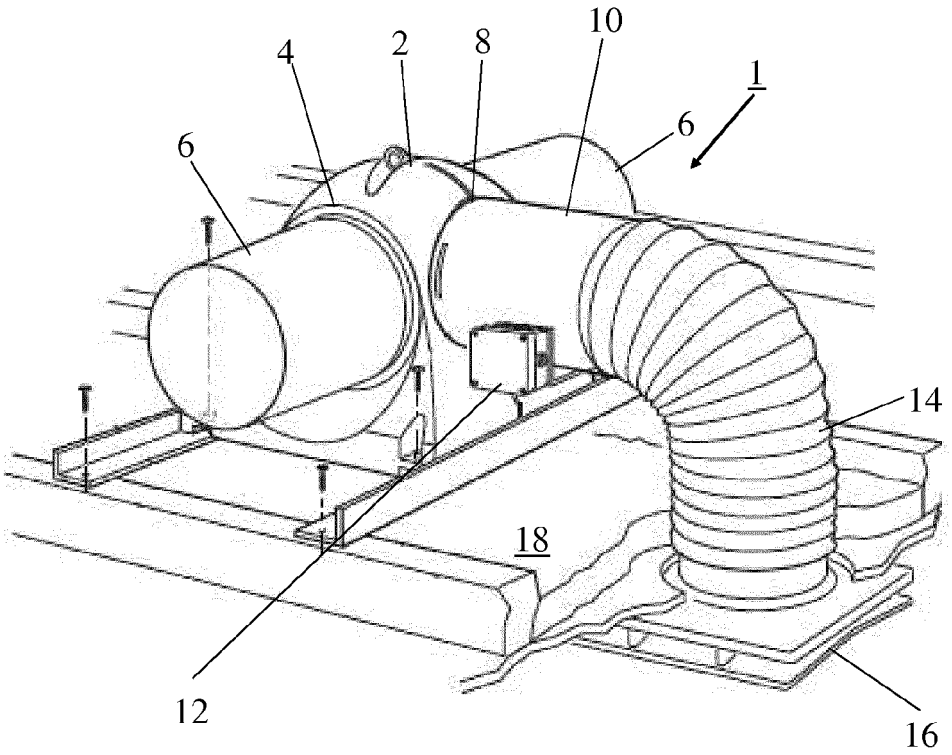
a fan located at a location remote from the habitable space;
at least one air supply vent having an outlet aperture arranged to supply air to the habitable space of the building;
a conduit connecting the at least one vent to the fan and defining an airflow pathway therebetween, the fan being located at a first end of the airflow pathway and arranged to supply a ventilation airflow air along the airflow pathway to the habitable space via the vent located at the second end of the airflow pathway; and
a heating element located at the second end of the airflow pathway proximate the outlet aperture of the air supply vent arranged to heat the ventilation airflow prior to entry into the habitable space.

13. A building according to claim 12 wherein the fan is located in the roof space of the building and the vent is located in a ceiling and/or wherein the building includes an electrical power supply that is connected to the heating element, and the heating element is electrically connected to the fan to provide a power supply thereto such that both the heating element and the fan are powered via the power supply connection to the heating element.

14. A building according to claim 13 wherein the heating element is mounted to the vent and wherein part of the vent is mounted to the ceiling within the habitable space, the heater including a controller that is mounted to vent and which is accessible and controllable from within the habitable space.

15. A supply vent for a heated ventilation system comprising:

a body section including an airflow channel having an inlet and an outlet, the outlet being configured for connection to a supply duct,
a mounting section arranged to mount the vent to a structure having a ventilation aperture such that the body section is at least partially received within the ventilation aperture of the structure; and
a heating element arranged such that airflow through the channel passes across the heating element prior to leaving the outlet.



PRIOR ART

FIG.1

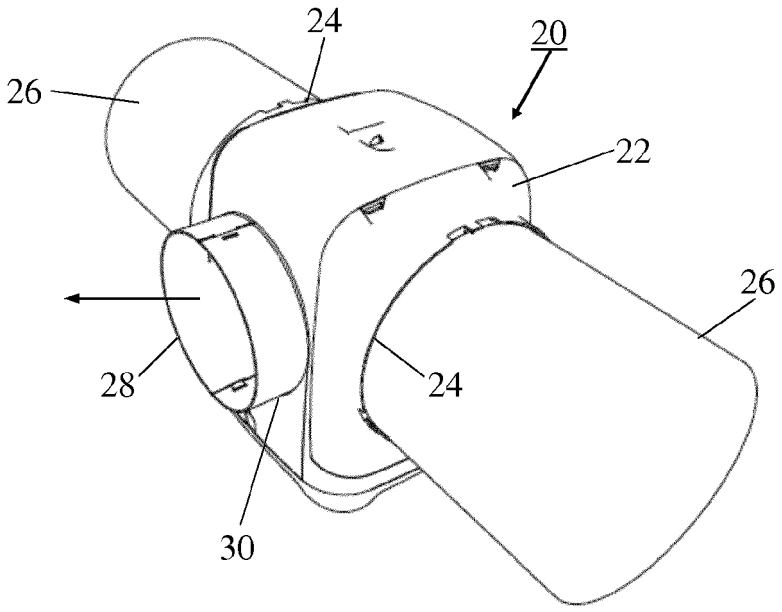


FIG.2

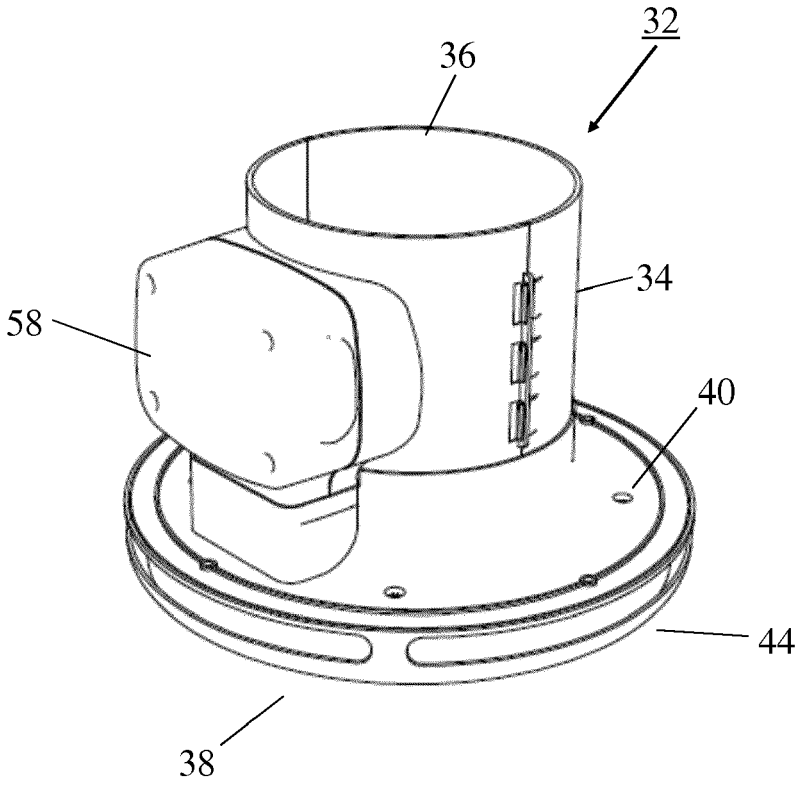


FIG.3

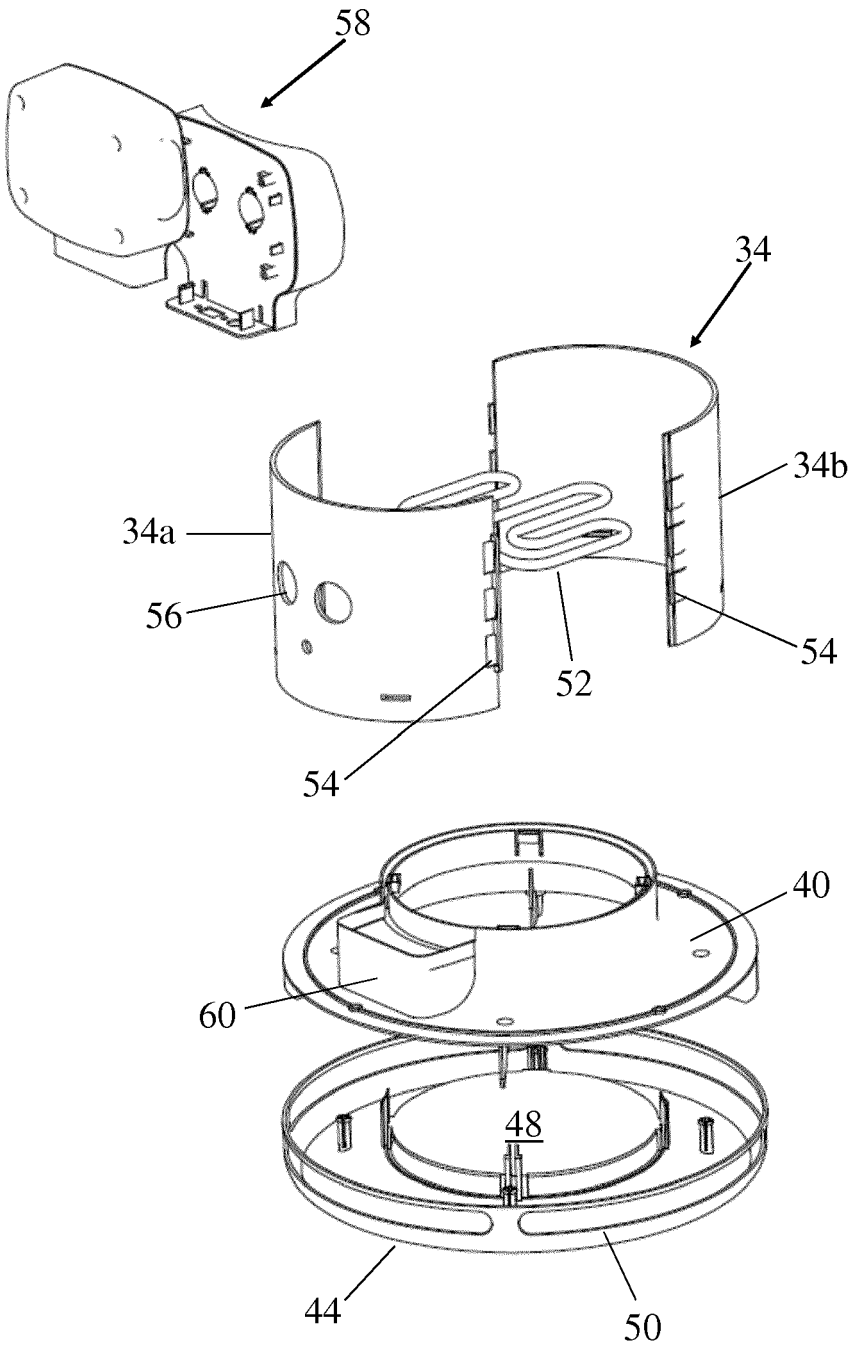


FIG.4

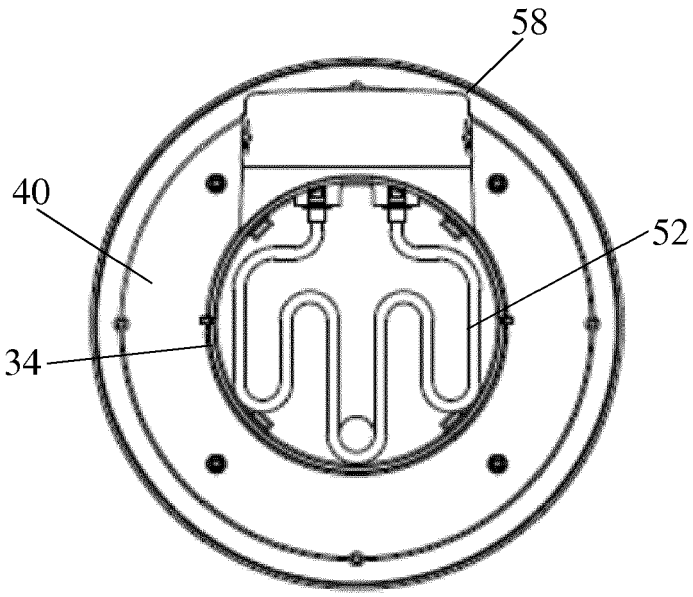


FIG.5

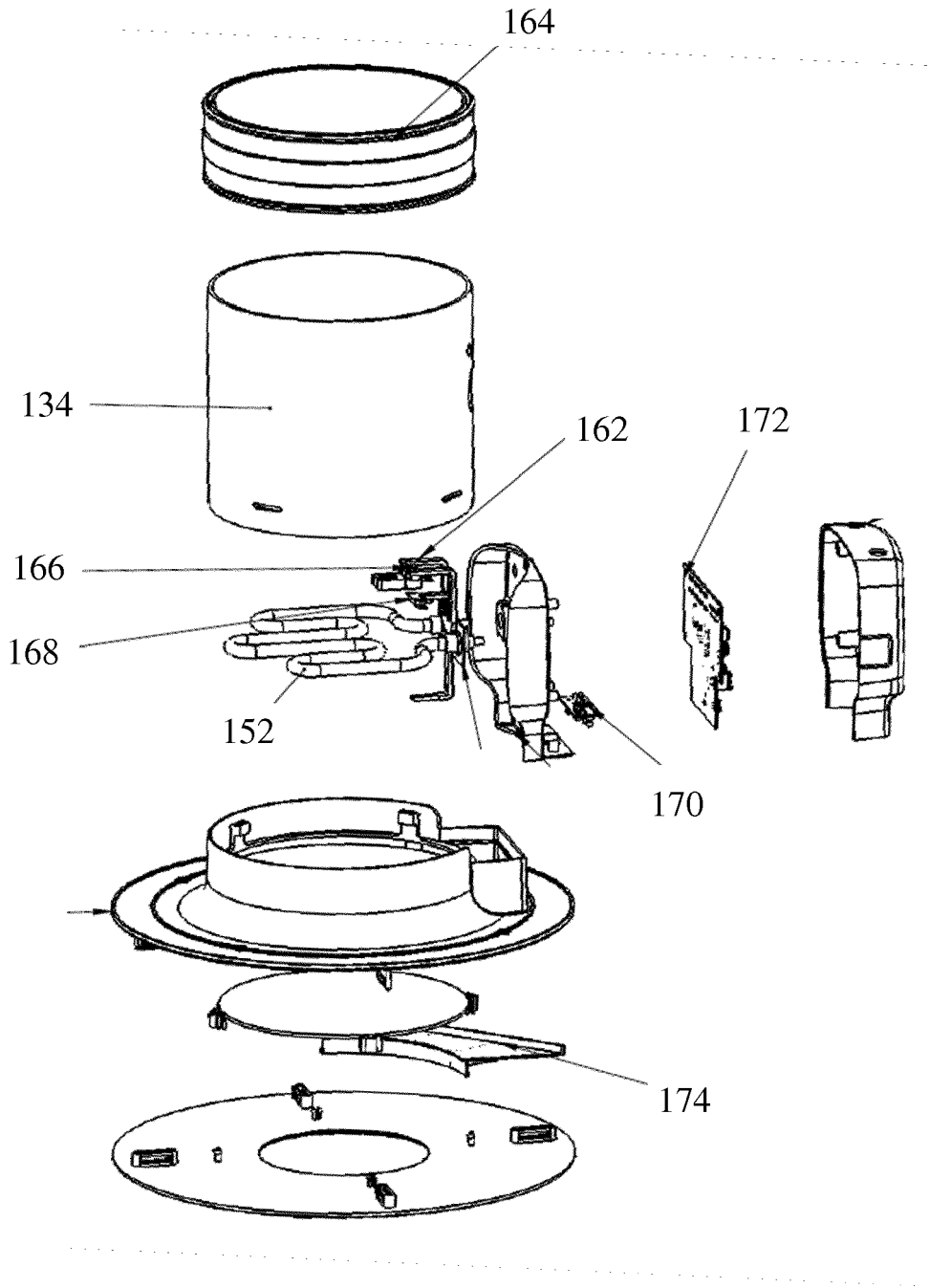


FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 16 27 5084

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 203 837 195 U (HEFEI HEIMA) 17 September 2014 (2014-09-17) * abstract; figure 1 * * paragraph [0024] *	1-15	INV. F24D5/02 F24F7/013 F24F7/06
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X	WO 2013/106882 A1 (BRIVIS CLIMATE SYSTEMS PTY LTD [AU]) 25 July 2013 (2013-07-25) * paragraphs [0039], [0078]; claims 44-47; figures 1-13 *	1-13	
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A	GB 2 188 413 A (STUKLEY PHILIP ARTHUR RICHARD) 30 September 1987 (1987-09-30) * the whole document * * figures 1,2 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

F24D
F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 October 2016	García Moncayo, O

CATEGORY OF CITED DOCUMENTS

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18-10-2016

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