(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 078 920 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.10.2016 Bulletin 2016/41

(21) Application number: **16164579.1**

(22) Date of filing: **08.04.2016**

(51) Int Cl.:
F24F 13/06 *(2006.01)* ***F24F 13/08*** *(2006.01)*
F24F 13/20 *(2006.01)* ***F24F 13/10*** *(2006.01)*

(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
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **08.04.2015 GB 201505990**

(71) Applicant: **NuAire Limited**
Caerphilly
Mid Glamorgan CF8 1XH (GB)

(72) Inventor: **Jenkins, Richard**
Caerphilly (GB)

(74) Representative: **Jones, David Alan**
Urquhart-Dykes & Lord LLP
7th Floor Churchill House
Churchill Way
Cardiff CF10 2HH (GB)

(54) AN AIR SUPPLY AND EXTRACT VENT

(57) An air supply and extract vent comprises a main body having an open channel extending therethrough and fixing means for securing the main body within a ventilation aperture of a structure. An airflow damper support is configured to be at least partially received within the main body and has an airflow channel extending therethrough. An airflow damper is mounted to the airflow damper support. The position of the airflow damper is adjustable relative to the airflow damper support to vary the airflow through the airflow channel and the airflow damper support is releasably secured to the main body such that the airflow damper support and airflow damper may be disconnected from the main body while retaining said relative position between the airflow damper and the airflow damper support.

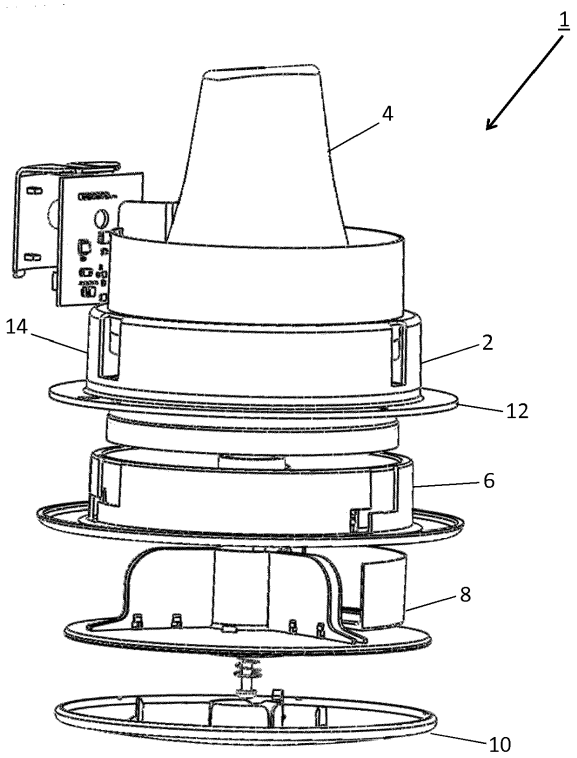

FIG. 1

EP 3 078 920 A1

Description

[0001] The present invention relates to an air supply and extract vent, and in particular a supply and extract vent for a residential property having an adjustable damper.

[0002] Residential ventilation systems use air supply and extract valves as a means of independently regulating the supply and extract airflow for the rooms. Supply and extract valves typically comprise a main body that is secured within the ceiling aperture and defines the inlet/outlet of the air ducting to that room. A filter may be located within the ducting that is inserted and removed via the main body. A flow plate that is secured to the main body within the airflow, and is arranged to selectively close the inlet/extract aperture of the main body. Adjustment of the airflow rate is achieved by varying the spacing between the main body and the flow plate. The flow plate is connected to the main body by a threaded shaft and linear adjustment of the flow plate is actuated by rotating the flow plate relative to main body.

[0003] During commissioning of a ventilation system the flow rate to each room of the property is measured and adjusted to the required level through selective adjustment of the flow plate spacing. For correct operation of the ventilation system the flow plates should not be adjusted following commissioning to ensure the balance achieved during commissioning is retained. However, it common for residents to adjust the flow plates themselves thereby unbalancing the system. It is also a requirement to periodically replace filters within the ducting. To do this the flow plate must be unscrewed and removed to provide access to the main body. Following filter replacement the flow plate is replaced, but the commissioned spacing cannot be accurately repeated. The only way to ensure the required flow rate from the vent is to re-commission the vents, which would significantly increase the time and cost of vent maintenance.

[0004] It is therefore desirable to provide an improved air supply and extract vent which addresses the above described problems and/or which offers improvements generally.

[0005] According to the present invention there is provided an air supply and extract vent as described in the accompanying claims.

[0006] In an embodiment of the invention there is provided an air supply and extract vent comprising a main body having an open channel extending therethrough and including fixing means for securing the main body within a ventilation aperture of a structure; an airflow damper support configured to be at least partially received within the main body and having an airflow channel extending therethrough; and an airflow damper mounted to the airflow damper support. The position of the airflow damper is adjustable relative to the airflow damper support to vary the airflow through the airflow channel and the airflow damper support is releasably secured to the main body such that the airflow damper support and airflow damper may be disconnected from the main body while retaining said relative position between the airflow damper and the airflow damper support. The flow rate is able to be set by the spacing relative spacing of the support member. As the support member is removably connected to the main body, and the low plate is mounted to the support member, the flow plate and support member may be removed and replaced into the main body without effecting the set flow rate.

[0007] The airflow channel of the airflow damper support preferably has a longitudinal axis defined along its length, and the position of the airflow damper is linearly adjustable relative to the airflow damper support in the longitudinal direction. Preferably linear adjustment is effected by rotation of the connection between the flow plate and the support.

[0008] The airflow damper is preferably a damper plate arranged transverse to the longitudinal axis of the airflow damper support.

[0009] The airflow damper is preferably secured to the airflow damper support by a longitudinally extending threaded fastener such that rotation of the fastener causes a corresponding change in the longitudinal position of the damper plate relative to the airflow damper support. This provides a convenient and effective may of manually setting the linear position in an accurate manner.

[0010] The airflow damper may include a cover plate which obscures the head of the threaded fastener in normal use, thereby preventing un-authorised tampering.

[0011] The air supply vent preferably further comprising a biasing member arranged to bias the airflow damper away from the airflow damper support. This advantageously reduces rattle between the flow plate and the main body.

[0012] The airflow damper plate and/or the airflow damper support include an anti-rotation element arranged to prevent rotation of the airflow damper relative to the airflow damper support as it is longitudinally actuated relative to the airflow damper support. This ensures that the damper plate is always returned to the same rotational position set during commissioning.

[0013] The airflow damper preferably comprises one or more partition walls extending in a first direction longitudinally towards the airflow damper support and radially in a second direction, the partition walls being arranged at angularly spaced positions to defining a plurality of airflow zones.

[0014] The airflow damper support preferably includes a plurality or radially extending blades arranged at corresponding angular positions to the partition walls of the airflow damper, and wherein the partition walls each include a radially extending cavity configured to receive the corresponding blades of the airflow damper support to rotationally fix the airflow damper and airflow damper support relative to each other.

[0015] The damper preferably further comprising one or more airflow screens arranged to block airflow out of one or more of the airflow zones. In this way direct airflow

to certain areas of the room may blocked. As the damper plate is always fixed in the same single rotational position, the screen is always returned to the same rotational position when the flow plate is replaced.

[0016] The one or more airflow screens may be removable to selectively block or open said one or more airflow zones.

[0017] The airflow damper support preferably releasably secures to the main body in a fixed longitudinal position.

[0018] The airflow damper support preferably releasably secures to the main body in a single fixed rotational position.

[0019] The main body preferably includes a cylindrical wall section having an outwardly extending flange at one end for securing to a surface region surrounding the ventilation aperture, and wherein the airflow damper support comprises a cylindrical wall section configured to be received within the main body, the airflow damper support having a first insertion end that is inserted into the main body and an opposing second end including an outwardly extending bezel arranged to extend outwardly of and cover and obscure the flange of the main body.

[0020] The airflow damper support preferably includes an airflow opening at the second end and the airflow damper is located longitudinally outwardly of the opening and is longitudinally movable relative to vary the spacing between the airflow damper and the opening to vary the airflow through the opening.

[0021] The air supply vent preferably further includes a filter located at the first end of the airflow damper support and arranged such that is removable from the vent when the airflow damper support is disconnected from the main body.

[0022] The filter preferably has an annular open end configured to seat within the cylindrical wall of the airflow damper support and including a filter membrane that extends longitudinally away from the opening in the direction of the main body.

[0023] The present invention will now be described by way of example only with reference to the following illustrative figures in which:

Figure 1 shows an exploded view of an air supply and extract vent according to an embodiment of the invention;

Figure 2 shows the main body and flow plate support of the arrangement of claim 1 in situ;

Figure 3 is an exploded view of the flow plate and fascia panel of an embodiment of the present invention; and

Figure 4 shows a filter mounted to the flow plate support according to an embodiment of the present invention.

[0024] Referring to Figure 1, an inlet/extract airflow valve 1 is provided for controlling air flow from a ventilation system into and out of a room. The valve 1 comprises a main body 2, a filter 4, an intermediate flow plate support 6, a flow plate 8 and fascia panel 10.

[0025] The main body 2 includes an annular fixing plate 12 and cylindrical wall 14 extending upwardly from the fixing plate 12. The annular fixing plate 12 extends radially outwards of the wall 14 in a flanged arrangement. As shown in Figure 2, the fixing flange 12 includes a plurality of fixing apertures 16 through which the fixing flange 12 is screwed or otherwise secured to the region of ceiling 13 immediately surrounding the ventilation aperture. The cylindrical wall 14 is spaced radially inwards of the outer edge 18 of the fixing ring 12 and defines a cylindrical ducting section which in use extends into and through the ventilation aperture 15 in the ceiling. In practice the ventilation aperture 15 in the ceiling is formed to have a size corresponding to the outer diameter of the cylindrical wall section 14 of the main body 2. Specifically the aperture 15 is formed to have a diameter substantially equal to the diameter of the annular wall section 14 and less than the outer diameter of the fixing ring 12 such that the fixing ring 12 defines a securing flange that abuts the external surface of the ceiling. The screw holes 16 are aligned along a common diameter path and the diameter of the aperture 15 is selected such that it is less than the diameter defined by the annular array of screw holes 16 to ensure that the screw holes 16 locate over a securable surface of ceiling and not over the ventilation aperture 15.

[0026] The inner surface of the cylindrical wall 14 includes projections 20 that extends inwardly into the air channel of the main body 2 and are arranged close to the lower end 22 of the main body 2. The projections 20 have a shallow projection depth and are elongate and are arranged such that their length extends circumferentially, perpendicular to the longitudinal axis of the main body 2.

[0027] As shown in Figure 3 the intermediate flow plate support 6 includes a cylindrical wall 24 having an annular cross section with an outer diameter corresponding to the inner diameter of the cylindrical wall section 14 of the main body 2. In this way the cylindrical wall section 14 of the main body 2 and the cylindrical wall section 24 of the intermediate flow plate support 6 are configured such that the flow plate support 6 is able to be slidingly received within the main body 2 with a closely toleranced fit. An annular fascia flange plate 26 extends radially outwards from the lower edge of the cylindrical wall 24 forming a bezel. The bezel 26 includes at its outer edge an upward extending lip 28 forming a circumferentially extending outer wall. The diameter of the bezel 26 is selected to be greater than the diameter of the flanged fixing plate 12 of the main body 2 such that when the flow plate support 6 is received within the main body 2 the bezel 6 covers and obscures the flange plate 12. The inner diameter of the lip 28 is greater than the outer diameter 18 of the fixing plate 12 and the height of the lip 28 is greater or

equal to the thickness of the plate 12. In this way when the bezel 6 is secured to the main body 2 the annular fascia plate 26 seats over and around the plate 12 with the lip 28 obscuring the plate 12 and its outer edge.

[0028] The cylindrical wall 24 of the flow plate support 6 includes a plurality of longitudinally extending channels 30 formed in the outer surface of the cylindrical wall 24 located at spaced circumferential locations corresponding to the circumferential locations of the projections 20 of the main body 2. The channels 30 have a width corresponding to the length of the transversely extending fixing lugs 20 of the main body 2 and the number and angular position around the circumference of the cylindrical wall 24 of the channels 30 corresponds to the number and angular position around the inner circumference of the cylindrical wall 14 of the main body.

[0029] Each channel 30 extends downwardly from the upper end of wall 24 and is open at the upper end. The channels 30 terminate at a common longitudinal position along the length of the wall 24. An transversely adjacent parallel channel 32 is located at the lower end of each of the first channels with the two adjacent channels 30,32 being joined by a linking section having a height corresponding to the vertical thickness of the projections 20. In use the first channels 30 are rotationally aligned with the projections 20 and the flow plate support 6 is then inserted longitudinally into the main body with the projections 20 being slidingly received within the channels 30. When the projections 20 reach the base 31 of the channels 30 the flow plate support 6 is then rotated such that the projections 20 moves sideways into the adjacent channels 32. Each adjacent channel 32 includes an upper abutment end 34 and in this rotated position the projection 22 abuts the abutment end 34 to prevent longitudinal retraction of the flow plate support 6 from the body 2. In this way the channel 30 and projection 20 arrangement defines a twist lock arrangement. The fixed position of the projections 20 means that the flow plate support 6 may only lock into a single fixed rotational and longitudinal position relative to the main body 2.

[0030] The flow plate support 6 includes a cylindrical separate section 33 having blades 34 projecting from its outer edge at angularly spaced locations. The blades 34 are spaced from the surface of the wall 24 at their upper ends defining an annular inner channel 35 and extend to and connect with the inner surface of wall 24 at their lower edges. The flow plate 8 includes a centre cylindrical section 36 having an inner diameter substantially equal to the outer diameter of the cylindrical section 33 of the flow plate support 6. Partition walls 37 extend from the centre cylindrical section 36 of the flow plate 8 in the radial direction and are located at the same angularly spaced positions as the blades 34 of the flow plate support 6. Each partition wall 37 include a pair of spaced wall sections between which is defined a channel 38. The thickness of the channel 38 corresponds to the width of the blades 34 such that the channels 38 are configured to receive the blades 34 as the flow plate 8 moves longitudinally towards the flow plate support 6. The channels 38 extend into the centre cylindrical section 36 such that as the channels 38 receive the blades 34 the central cylindrical section is able to receive the corresponding cylindrical section 33 of the flow plate support 30. The spaced wall sections of the partition walls 37 and the blades 34 interact such that when the blades 34 are received within the channels 38 they are rotationally fixed to prevent rotation of the flow plate 8 relative to the flow plate support 6.

[0031] A threaded fastener 39 in the form of a bolt extends through a corresponding aperture at the centre of the flow plate 8. A corresponding threaded nut is provided on the opposing side of the aperture to secure the flow plate 8 to the flow plate support 6. The fastener 39 threadingly secures the flow plate 8 to the flow plate support 6 and rotation of the threaded fastener 39 causes the flow plate 8 to move longitudinally towards or away from the flow plate support 6 linearly depending on the rotational direction of the fastener 39. A compression spring 40 is provided within the centre cylindrical section 36 of the flow plate 8 which engages at its upper end the outer end of the central cylindrical section 33 of the flow plate support 6. As the threaded fastener 39 is rotated to move the flow plate 8 towards the flow plate support 6 the compression spring 40 is compressed and biases the flow plate 8 away from the flow plate support 6 to limit rattle and vibration of the flow plate 8. During commissioning the threaded fastener 39 is adjusted to vary the longitudinal spacing between the flow plate 8 and the flow plate support 6 to vary the air flow through the opening of the flow channel of the flow plate support 6. A flow measurement device is used to measure the flow through the vent 1 for giving extract/supply flow conditions and the fastener 39 is adjusted to set the spacing between the flow plate 8 and the flow plate support 6 to achieve a desired flow rate. Once the correct spacing has been achieved a fascia plate 10 is clipped to the base of the flow plate 8 which obscures the threaded fastener 39, thereby preventing unauthorised adjustment of the flow plate 8 as well as obscuring the fastener 39 for aesthetic purposes.

[0032] As shown in Figure 4, the filter 4 include a filter membrane 41 having a substantially truncated conical shape with its upper end 42 closed by a linear seam. At its open base the filter membrane 41 connects to an annular reinforcement membrane which holds the base of the filter membrane 40 in the open position. The annular reinforcement member 44 has a diameter configured to be closely received within the inner diameter of the cylindrical wall 24 of the flow plate support within the channel 35 defined between the ends of the blades 34 and the end surface of the wall 24 of the flow plate support 6. The filter is longitudinally held in position between the flow plate support 6 and the main body 2. The filter 40 extends upwardly through the main body 2 into the duct. When the flow plate support 6 is inserted into the main body 2 and twist locked in position, airflow through the airflow channel of the flow plate support 6 is directed

through the filter 40 and into the duct, or vice versa in the supply condition.

[0033] To change the filter 4 the maintenance engineer need only untwist the flow plate support 6 and remove it from the main body to allow the filter 4 to be removed. Previously filter removal required the flow plate to be unscrewed from the main body to which it was directly mounted to enable release of the filter. Following cleaning or replacement, the filter would then be returned to the duct and the flow plate screwed back into position. When re-securing the flow plate to the main body, rotation of the flow plate sets the spacing between the flow plate and the main body which determines the outlet flow rate. As the spacing that was set during commissioning is lost on removal of the flow plate, it is not possible to replicate the spacing between the flow plate and the main body on replacement of the flow plate without re-commissioning the system.

[0034] Advantageously the present invention ensures that the commissioned flow rate is not effected on removal of the filter. This is because the flow plate is not mounted directly to the main body and the flow rate is set by the spacing between the flow plate 8 and the flow plate support 6. As the flow plate 8 is mounted to the flow plate support 6 and not to the main body 2 as in the prior art, the flow plate support 6 may be removed in a simple twist lock manner from the main body 2 with the flow plate 8 being removed simultaneously as it is connected to the flow plate support 6. During removal the flow plate 8 does not need to be removed from, or adjusted relative to the flow plate support 6 and as such the spacing of the flow plate 8 defining the commissioned air flow is not adjusted or effected in any way during such removal. Similarly, the airflow of support 6 is then returned to the main body and reconnected with the spacing of the flow plate 8 remaining constant and unaffected.

[0035] 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. An air supply vent comprising:

a main body having an open channel extending therethrough and including fixing means for securing the main body within a ventilation aperture of a structure;

an airflow damper support configured to be at least partially received within the main body and having an airflow channel extending therethrough;

an airflow damper mounted to the airflow damper support;

wherein the position of the airflow damper is adjustable relative to the airflow damper support to vary the airflow through the airflow channel and the airflow damper support is releasably secured to the main body such that the airflow damper support and airflow damper may be disconnected from the main body while retaining said relative position between the airflow damper and the airflow damper support.

2. An air supply and extract vent according to claim 1 wherein the airflow channel of the airflow damper support has a longitudinal axis defined along its length, and the position of the airflow damper is linearly adjustable relative to the airflow damper support in the longitudinal direction.

3. An air supply and extract vent according to claim 2 wherein the airflow damper is a damper plate arranged transverse to the longitudinal axis of the airflow damper support.

4. An air supply and extract vent according to claim 2 or 3 wherein the airflow damper is secured to the airflow damper support by a longitudinally extending threaded fastener such that rotation of the fastener causes a corresponding change in the longitudinal position of the damper plate relative to the airflow damper support.

5. An air supply and extract vent according to claim 4 wherein the airflow damper includes a cover plate which obscures the head of the threaded fastener in normal use.

6. An air supply and extract vent according to claim 4 or 5 further comprising a biasing member arranged to bias the airflow damper away from the airflow damper support.

7. An air supply and extract vent according to any one of claims 2 to 6 wherein the airflow damper plate and/or the airflow damper support include an anti-rotation element arranged to prevent rotation of the airflow damper relative to the airflow damper support as it is longitudinally actuated relative to the airflow damper support.

8. An air supply and extract vent according to claim 7 wherein the airflow damper comprises one or more partition walls extending in a first direction longitudinally towards the airflow damper support and radially in a second direction, the partition walls being arranged at angularly spaced positions to defining a plurality of airflow zones.

9. An air supply and extract vent according to claim 8

wherein the airflow damper support includes a plurality or radially extending blades arranged at corresponding angular positions to the partition walls of the airflow damper, and wherein the partition walls each include a radially extending cavity configured to receive the corresponding blades of the airflow damper support to rotationally fix the airflow damper and airflow damper support relative to each other.

10. An air supply and extract vent according to claim 9 wherein the damper further comprising one or more airflow screens arranged to block airflow out of one or more of the airflow zones.

11. An air supply and extract vent according to claim 9 wherein the one or more airflow screens is removable to selectively block or open said one or more airflow zones.

12. An air supply and extract vent according to any preceding claim wherein the airflow damper support releasably secures to the main body in a fixed longitudinal position.

13. An air supply and extract vent according to any preceding claim wherein the airflow damper support releasably secures to the main body in a single fixed rotational position.

14. An air supply and extract vent according to any preceding claim wherein the main body includes a cylindrical wall section having an outwardly extending flange at one end for securing to a surface region surrounding the ventilation aperture, and wherein the airflow damper support comprises a cylindrical wall section configured to be received within the main body, the airflow damper support having a first insertion end that is inserted into the main body and an opposing second end including an outwardly extending bezel arranged to extend outwardly of and cover and obscure the flange of the main body.

15. An air supply and extract vent according to claim 14 wherein the airflow damper support includes an airflow opening at the second end and the airflow damper is located longitudinally outwardly of the opening and is longitudinally movable relative to vary the spacing between the airflow damper and the opening to vary the airflow through the opening.

16. An air supply and extract vent according to claim 14 or 15 further including a filter located at the first end of the airflow damper support and arranged such that is removable from the vent when the airflow damper support is disconnected from the main body.

17. An air supply and extract vent according to claim 16 wherein the filter has an annular open end configured to seat within the cylindrical wall of the airflow damper support and including a filter membrane that extends longitudinally away from the opening in the direction of the main body.

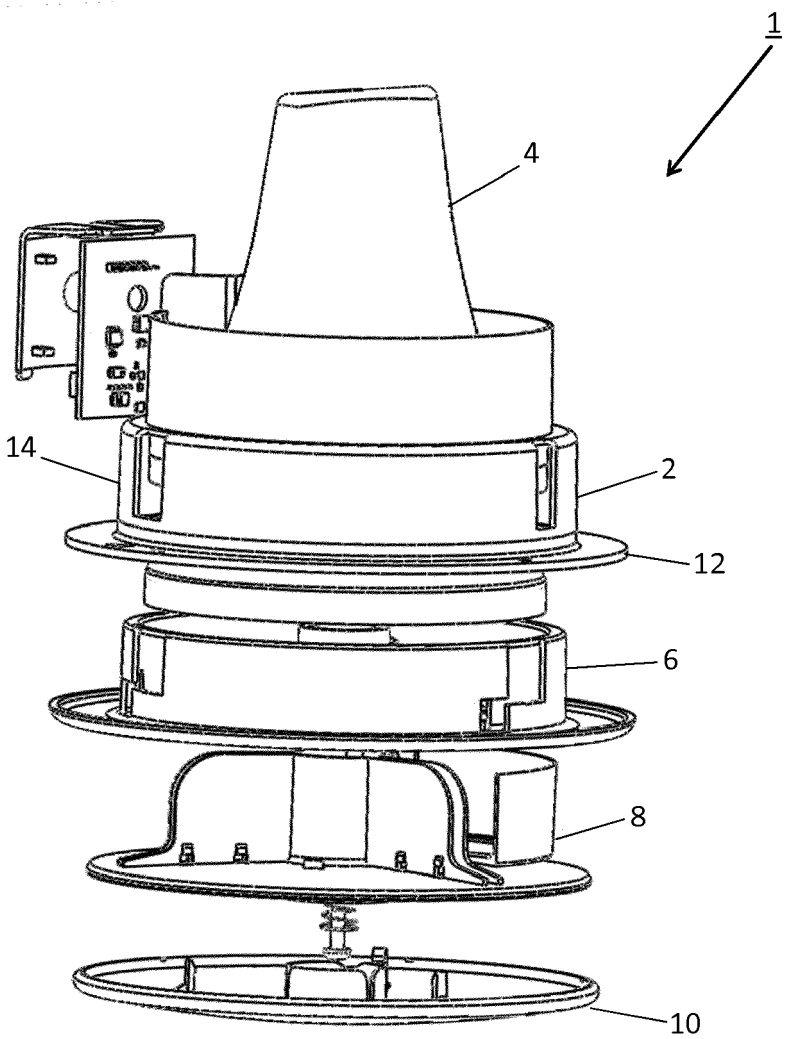

FIG. 1

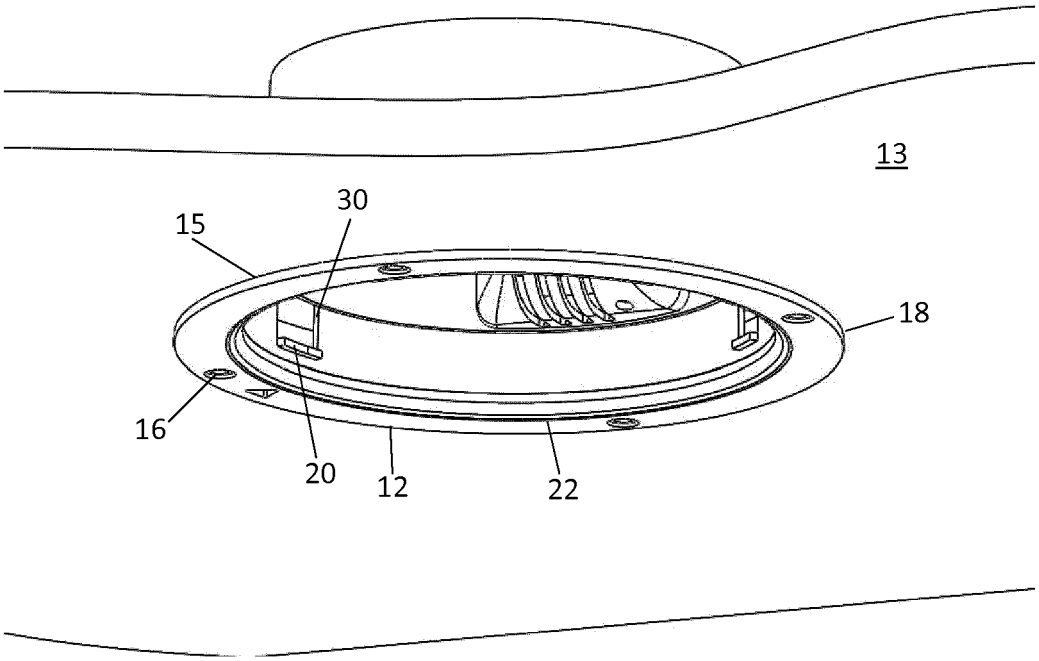

FIG. 2

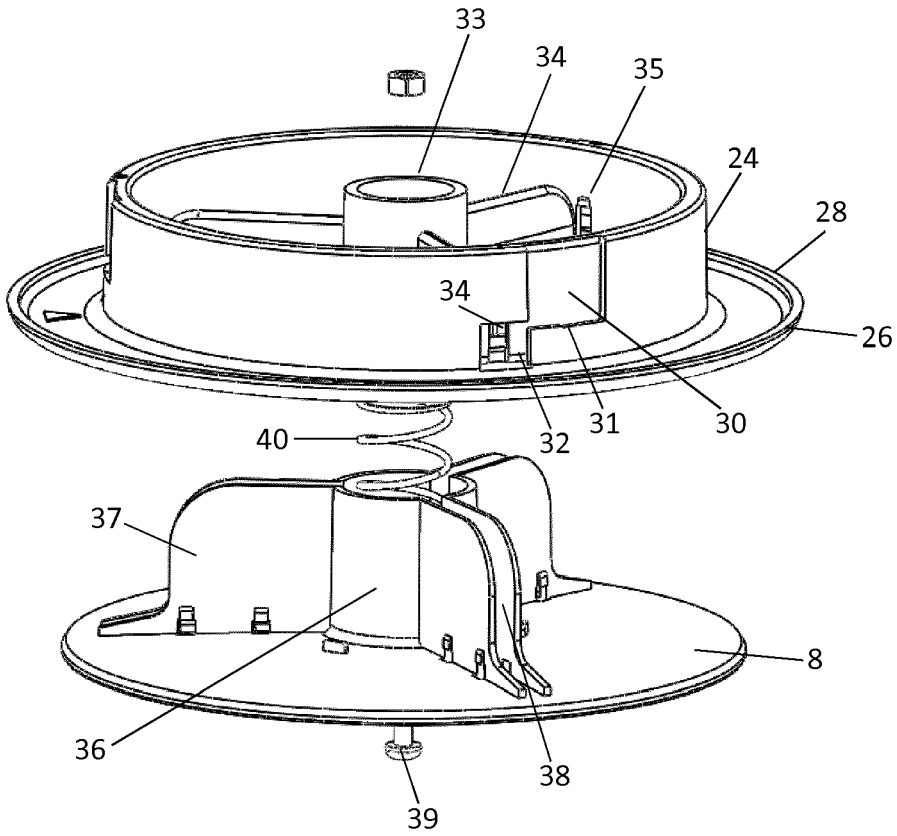

FIG. 3

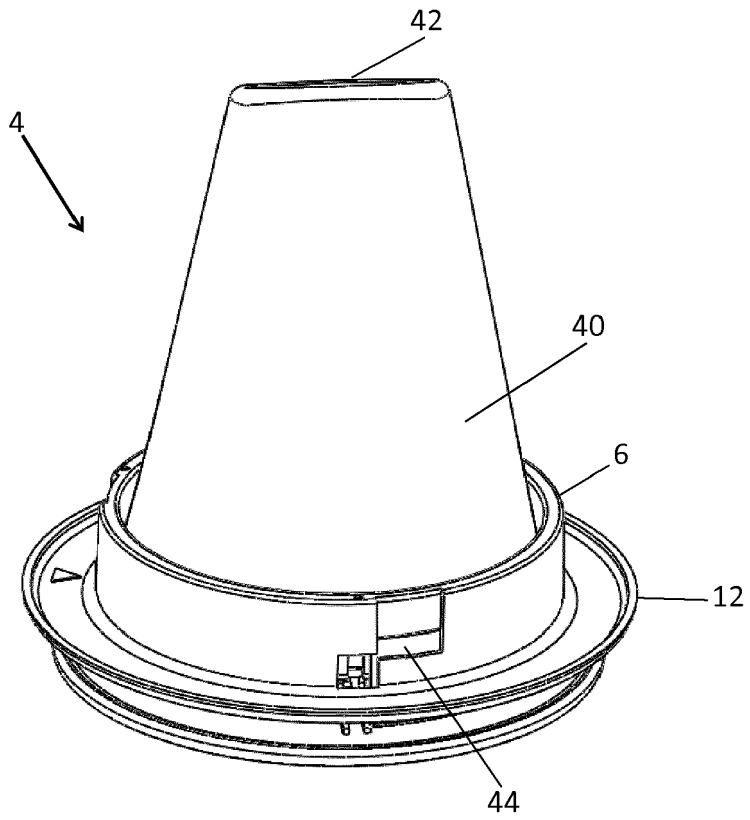

FIG. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 16 16 4579

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	WO 2013/139572 A1 (FLAEKT WOODS AB [SE]) 26 September 2013 (2013-09-26) * the whole document *	1-17	INV. F24F13/06 F24F13/08 F24F13/20
A	US 2003/100258 A1 (DONNELLY WILLIAM JAMES [AU]) 29 May 2003 (2003-05-29) * the whole document *	1-17	F24F13/10
A	US 4 407 187 A (HORNEY ROBERT W [US]) 4 October 1983 (1983-10-04) * the whole document *	1-17	

TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 August 2016	Decking, Oliver

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 16 4579

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-08-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013139572 A1	26-09-2013	EP 2828585 A1	28-01-2015
		FI 20125330 A	24-09-2013
		WO 2013139572 A1	26-09-2013
US 2003100258 A1	29-05-2003	CA 2363858 A1	27-05-2003
		US 2003100258 A1	29-05-2003
US 4407187 A	04-10-1983	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82