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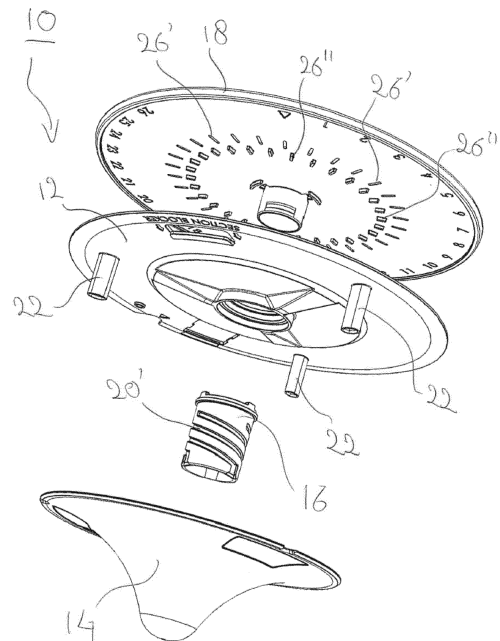
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(54) **COVER AND BASE FOR AN AIR DIFFUSER, AIR DIFFUSER, AIR DIFFUSING SYSTEM AND METHOD FOR CONTROLLING THE AIR FLOW OF AN AIR DIFFUSING SYSTEM**

(57) The present invention relates to a cover for an air diffuser comprising a mounting plate configured for mounting the cover to an air diffuser base such that the cover and the mounting plate are positioned at some distance from the air diffuser base and wherein the cover further comprises an air flow controller moveably connected to the mounting plate for controlling the flow of air in the air diffuser. The present invention also relates to an air diffuser base substantially free of air flow disturbing obstacles and the an air diffuser comprising the air diffuser base and cover of the present invention.



**Fig. 2**

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## Description

**[0001]** The present invention relates to a cover for an air diffuser comprising a mounting plate configured for mounting the cover to an air diffuser base such that the cover is positioned at some distance from the air diffuser base and to an air diffuser base. The present invention further relates to an air diffuser, air diffusing system and method for controlling the air flow in an air diffusing system.

**[0002]** Air diffusers for air diffusing systems, also known as in- or exhaust air dampers, are well-known in the art. Typically, such air diffusers comprise an air diffuser base part (also known as damper body part) with a cover (or damper disc) adjustably mounted thereon. The air diffusers in the art may have a conical air channel and a substantially conformant conical shape on the cover. The cover is typically adapted mountable so that the cover can be threaded into a compatibly threaded hole of the air diffuser base. Thus, the rotation of the cover allows the flow cross section between the air diffuser base and the cover to be adjusted larger or smaller, whereby the volumetric rate of the in- or exhaust air passing there through may be controlled.

**[0003]** While plural other types of air diffusers for air diffusing systems are known in the art, most of them are characterised by having the control means adapted movably in the direction of the longitudinal axis of the in- or exhaust air duct.

**[0004]** Different to the air diffusers known in the art, the present invention now provides an air diffuser having optimal air flow characteristics. In order to provide such optimal air flow characteristics, the present invention provides hereto a cover for an air diffuser comprising a mounting plate configured for mounting the cover to an air diffuser base such that the cover and the mounting plate are positioned at some distance from the air diffuser base, wherein the cover further comprises an air flow controller moveably connected to the mounting plate for controlling the flow of air in the air diffuser. It was found that by providing the cover of the present invention, the air flow path of the air diffuser base may be substantially free of any air flow disturbing obstacles. Despite of one or more elements for mounting the cover to the air diffuser base, the air diffuser base can be free of any further air flow controlling adjusting means connected to the internal shaft of the air diffuser base. By providing a cover wherein the air flow controller is moveably connected to the cover itself, there is no further need for any further air flow controlling adjusting means provided in the air diffuser base.

**[0005]** Although the air flow controller may be adjusted by manually moving the air flow controller by the user (e.g. air diffusing system installer), preferably the mounting plate may be provided with one or more air flow controller adjusting means for adjusting the position of the air flow controller relative to the mounting plate. Such air flow controller adjusting means may include adjusting means for manually or automatically adjusting the posi-

tion of the air flow controller. By providing an air flow controller provided with flow controller adjusting means the user is able to control the flow settings in a reciprocal, sustainable and reliable manner. By providing flow controller adjusting means, the user is even able to control the flow settings based on predefined information as may be provided by a look-up table or the like. As a consequence, by using predefined settings, it is no longer a requirement to measure the air flow after installation of one or more air diffusers of the present invention.

**[0006]** In case the position of the air flow controller is adjusted automatically, the cover may comprise a drive unit, such as an electrical actuator like a servomotor, for actuating the air flow controller adjusting means. By providing such an automatically adjusted air flow controller, there is no need to disconnect the air diffuser from the air diffusing system in order to adjust the air diffuser settings. Any risk of damaging the wall or ceiling the air diffuser is connect with is herewith further reduced. It is further noted that such automatically controlled air diffuser can be remotely controlled, i.e. by using an air diffusing system provided with sensors (e.g. sensors for measuring the relative humidity, carbon dioxide concentrations, and the like) based upon the air flow throughout the system is adjusted and controlled. Also, the air diffuser of the present invention might be controlled by a remote control unit, e.g. a server able to connect with the air diffuser of the present invention.

**[0007]** In case the position of the air flow controller is adjusted manually, the air flow controller adjusting means are preferably connected to handling means for handling the air flow controller adjusting means. The handling means may include outwardly protruding handles or lever actuator extending from the edge of the cover. However, from an aesthetic point of view, it is preferred that the air flow controller and the air flow controller adjusting means are provided with cooperating screw threads, wherein the screw thread of the air flow controller adjusting means is connected to rotating handling means, such as a rotatable disc. The rotatable disc may have similar dimensions of the mounting plate of the present invention. In a preferred embodiment of the present invention the rotatable disc may be provided with protrusions which protrusions cooperate with indentations provided in the mounting plate defining a plurality of defined positions of the rotatable disc and, consequently, a plurality of defined positions of the air flow controller, i.e. a plurality of defined air flow rates. As already stated above, based on the defined positions of the air flow controller, the user may be able to adjust the air flow of an air diffusing system based on data comprised in a look-up table.

**[0008]** The cover of the present invention may be provided with one or more spacers for mounting the cover to an air diffuser base at some distance from the air diffuser base. In order to provide a sustainable and reliable connection between the cover and the air diffuser base, the cover may comprise three spacers. Obviously, the cover may, instead of being provided with one or more

spacers, also be provided with one or more spacer receiving means for receiving spacers provided onto the air diffuser base.

**[0009]** The cover of the present invention may further be provided with a locking mechanism having a first position for locking the position of the air flow controller and a second position for unlocking the position of the air flow controller. By locking the position of the air flow controller, undesired deviations in air flow controller position is prevented, e.g. during cleaning of the air diffuser or any other action involving direct contact between the air diffuser and an user. In case the air flow rate needs to be adjusted, the locking mechanism can be unlocked (second position) in order to allow the air flow controller to be repositioned.

**[0010]** In a further embodiment of the present invention, the air flow controller of the cover of the present invention is configured for cooperation with the surface of an air diffuser base. In a preferred embodiment, the air flow controller is cone-shaped. The shape of the air flow controller is preferably designed using computational fluid techniques. By providing the air diffuser of the present invention it is possible to design an air diffuser having an air velocity of at most 4.5 m/s and an air flow rate of at least about 60 m<sup>3</sup>/h. It is noted that an air diffuser having an air flow rate of up to about 75 m<sup>3</sup>/h can be designed using the cover of the present invention, without resulting in a significant increase in air velocity.

**[0011]** In another aspect of the present invention, the present invention relates to an air diffuser base for an air diffuser comprising one or more mounting elements for mounting the air diffuser base to a cover such that the cover is positioned at some distance from the air diffuser base, and wherein the air flow path of the air diffuser base is free of air flow disturbing obstacles. The air flow path of the air diffuser base is defined by the inner structure part of the air diffuser base, i.e. the flow path followed by the air inside the air diffuser base. Although one or more mounting elements needs to be present in order to connect a cover to the air diffuser base, despite those elements, the air diffuser base is free of any further air flow disturbing obstacles. Unlike the air diffuser bases disclosed in the prior art, the air diffuser base of the present invention herewith provides the most optimal, controllable and highly predictable distribution of an air flow through an air diffusing system. In particular, the air diffuser base of the present invention is able for design of an air flow system having an air flow rate of about 50 to 75 m<sup>3</sup>/h at an air pressure loss of at most 10 Pa, more particular an air pressure loss of about 7-9 Pa. Consequently, the air diffuser of the present invention is suitable for providing high air flow rates without producing high at a low level of noise, i.e. at most 30 dB(A), preferably less than 25 dB(A) or even less than 20 dB(A).

**[0012]** In order to fix the air diffuser base in an end of an air duct of an air diffusing system, the air diffuser base may comprise one or more fixing elements. The fixing element may be in the form of a sleeve provided with

clamping elements wherein the air diffuser base may be form-fittingly clamped into the sleeve.

**[0013]** The one or more mounting elements of the air diffuser base may comprise spacer receiving means for clampingly receiving cooperating spacers of a cover. Alternatively the air diffuser base may be provided with spacers wherein the cover is provided with spacer receiving means.

**[0014]** In a further aspect of the present invention, the present invention relates to an air diffuser comprising the air diffuser base of the present invention connected to the cover of the present invention. As noted above, the air diffuser of the present invention differs from the air diffusers disclosed in the art in that the air diffuser base may be free of any air flow disturbing obstacles. By providing such air diffuser, the present invention results in an air diffuser system, wherein the air flow rates through the air ducts of the system are better to predict with high reliability.

**[0015]** The present invention further relates to an air diffusing system comprising an air duct, wherein at least one end of the air duct is connected to the air diffuser of the present invention.

**[0016]** Further the present invention relates to a method of controlling the flow of air in an air diffusing system, comprising the steps of:

- providing an air diffusing system of the present invention; and
- controlling the flow of air by adjusting the position of the air flow controller relative to the air diffuser base,

wherein the cover of the air diffuser is provided with a rotatable disc for handling the air flow controller and wherein the position of the air flow controller is adjusted by rotating the rotatable disc. By providing an air flow controller which is moveably connected to the mounting plate of the cover, the air diffuser base may be free of any further air flow disturbing obstacles.

**[0017]** The present invention will be further elucidated on the basis of the non-limitative exemplary embodiments shown in the following figures. Herein:

- figure 1 is an exploded view of the air diffuser of the present invention; and
- figure 2 is a exploded view of the air diffuser cover of the present invention.

**[0018]** Figure 1 shows an exploded view of air diffuser 1. Air diffuser 1 comprises cover 10 and air diffuser base 30. Cover 10 comprises mounting plate 12 provided with three spacers 22. Air flow controller 14 is moveably connected to mounting plate 12 by air flow controller adjusting means 16, depicted in figure 1 as screw threads 20, 20', in further connection to handling means 18, depicted in figure 1 as a rotating handling means, like a rotatable disc. Cover 10 is further provided with locking mechanism 24 for locking and unlocking the position of air flow con-

troller 14. Also shown are protrusions 26 provided in mounting plate 12 for cooperation with indentations (not shown) provided in handling means 18. Also shown is air flow blocker 28 for directing the air flow.

**[0019]** Air diffuser base 30 comprises three mounting elements 32 depicted in figure 1 as spacer receiving means 36. The spacer receiving means 36 of air diffuser base 30 are configured to clampingly receive spacers 22 of cover 10. Air diffuser base 30 is further provided with fixing elements 34 for fixing air diffuser base 30 in an end of an air duct. It is noted that the air flow path 38 is free of any air flow disturbing obstacles. In figure 1, the air diffuser base 30 comprises sleeve 40 for receiving base element 42. The air diffuser base 30 may further comprise air sealing members 44, 46.

**[0020]** Figure 2 shows an exploded view of cover 10. In figure 2 the indentations 26' provide in handling means 18 are visible. The indentations 26' cooperate with the protrusions (not shown) provided in mounting plate 12. Further, handling means 18 are provided with resistance elements 26" for cooperation with mounting plate 12.

#### Claims

1. Cover (10) for an air diffuser (1) comprising a mounting plate (12) configured for mounting the cover (10) to an air diffuser base (30) such that the cover (10) and the mounting plate (12) are positioned at some distance from the air diffuser base (30), **characterised in that** the cover (10) further comprises an air flow controller (14) moveably connected to the mounting plate (12) for controlling the flow of air in the air diffuser (1).
2. Cover (10) according to claim 1, **characterised in that** the mounting plate (12) is provided with one or more air flow controller adjusting means (16) for adjusting the position of the air flow controller (14) relative to the mounting plate (12).
3. Cover (10) according to claim 2, **characterised in that** the one or more air flow controller adjusting means (16) are connected to handling means (18) for handling the air flow controller adjusting means (16).
4. Cover (10) according to claim 2 or 3, **characterised in that** the air flow controller (14) and air flow controller adjusting means (16) are provided with cooperating screw threads (20, 20') and wherein the screw thread (20') of the air flow controller adjusting means (16) is connected to rotating handling means.
5. Cover (10) according to claim 4, **characterised in that** the handling means (18) comprise a rotatable disc.
  6. Cover (10) according to any of the preceding claims, **characterised in that** the mounting plate (12) is provided with one or more, preferably three, spacers (22) for mounting the cover (10) to an air diffuser base (30) at some distance from the air diffuser base (30).
  7. Cover (10) according to any of the preceding claims, **characterised in that** the mounting plate (12) is provided with a locking mechanism (24) having a first position for locking the position of the air flow controller and a second position for unlocking the position of the airflow controller.
  8. Cover (10) according to any of the preceding claims, **characterised in that** the air flow controller (14) is configured for cooperation with the surface of an air diffuser base (30), preferably the air flow controller (14) is cone-shaped.
  9. Air diffuser base (30) for an air diffuser (1) comprising one or more mounting elements (32) for mounting the air diffuser base (30) to a cover (10) such that the cover (10) is positioned at some distance from the air diffuser base (30), **characterised in that** the air flow path (38) of the air diffuser base (30) is free of air flow disturbing obstacles.
  10. Air diffuser base (30) according to claim 9, **characterised in that** the air diffuser base (30) comprises one or more fixing elements (34) for fixing the air diffuser base (30) in an end of an air duct.
  11. Air diffuser base (30) according to claim 9 or 10, **characterised in that** the one or more mounting elements (32) comprise spacer receiving means (36) for clampingly receiving cooperating spacers (22) of a cover (10).
  12. Air diffuser (1) comprising the air diffuser base (30) according to any of claims 9-11 and the cover (10) according to any of claims 1-8 connected to the air diffuser base (30).
  13. Air diffuser (1) according to claim 12, **characterised in that** the air flow path (38) of the air diffuser base (30) is free of air flow disturbing obstacles.
  14. Air diffusing system comprising an air duct, **characterised in that** at least one end of the air duct is connected to the air diffuser (1) according to claim 12 or 13.
  15. Method of controlling the flow of air in an air diffusing system, comprising the steps of:
    - providing an air diffusing system according to claim 14; and

- controlling the flow of air by adjusting the position of the air flow controller (14) relative to the air diffuser base (30),

**characterised in that** the cover (10) of the air diffuser (1) is provided with a rotatable disc for handling the air flow controller (14) and wherein the position of the air flow controller (14) is adjusted by rotating the rotatable disc.

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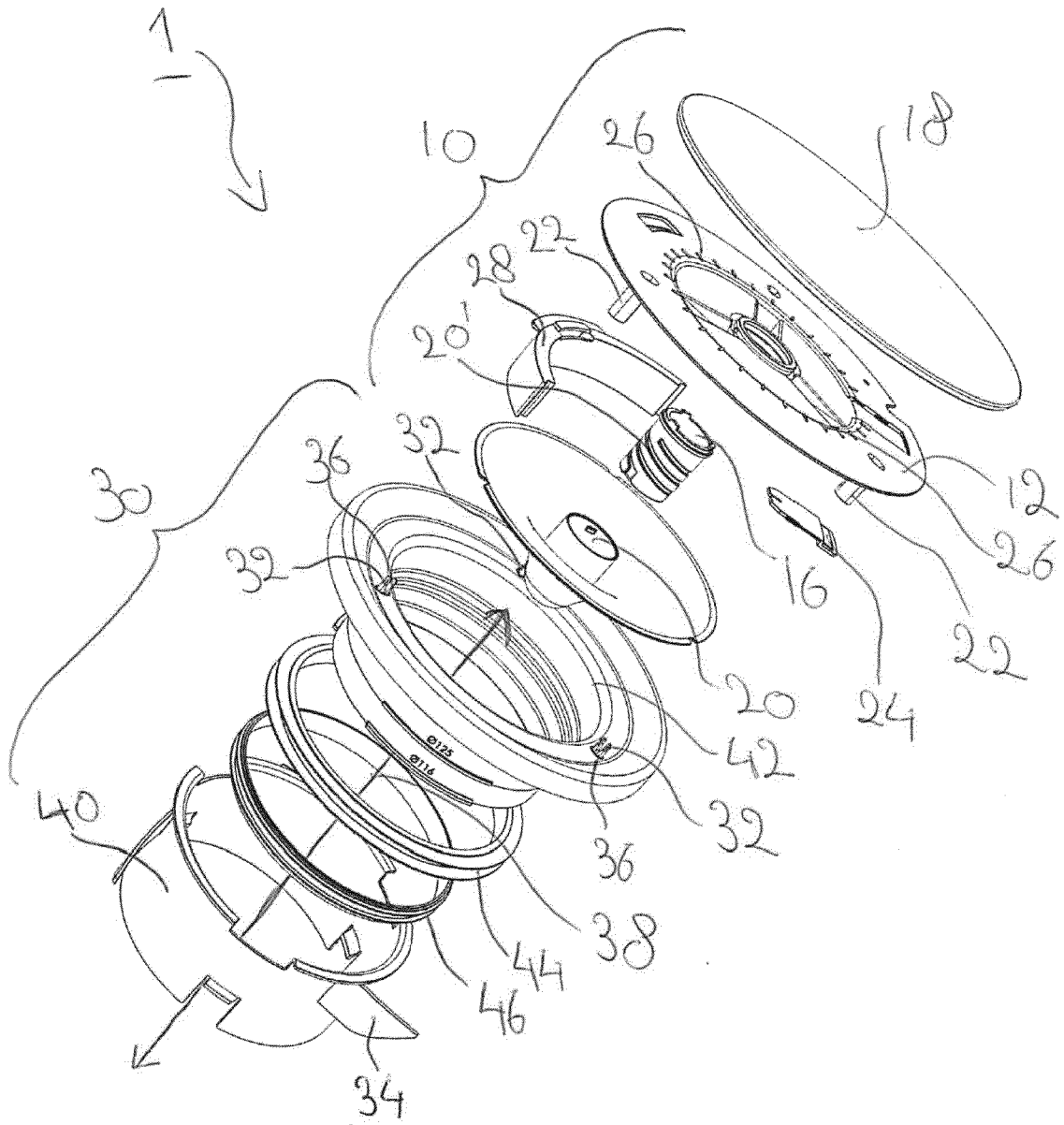
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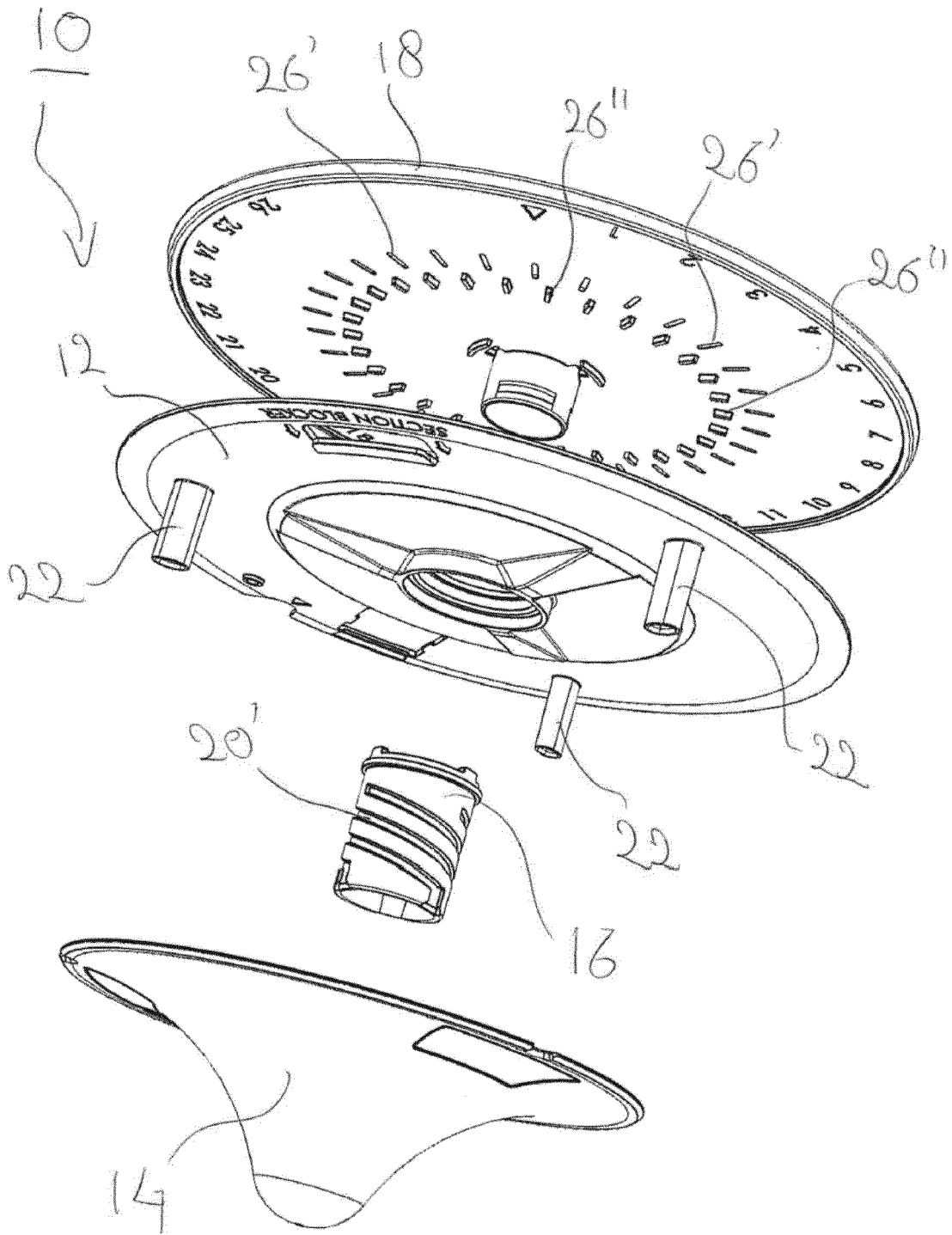
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**Fig. 1**



**Fig. 2**



EUROPEAN SEARCH REPORT

Application Number  
EP 19 17 7360

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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	US 4 800 804 A (SYMINGTON LAURENCE I [US]) 31 January 1989 (1989-01-31) * the whole document * -----	1-15	INV. F24F13/10 F24F13/08 F24F13/06
X	US 5 556 335 A (HOLYOAKE NOEL V [NZ]) 17 September 1996 (1996-09-17) * column 5, line 29 - column 8, line 21 * * figures * -----	1,9	
X	EP 2 894 415 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 15 July 2015 (2015-07-15) * paragraph [0037] - paragraph [0031] * * figures * -----	1,9	
X	EP 2 481 999 A1 (HEATING COMPANY BVBA [BE]) 1 August 2012 (2012-08-01) * paragraph [0024] - paragraph [0031] * * figures * -----	1,9	
A	GB 1 244 725 A (OSMA PLASTICS LTD) 2 September 1971 (1971-09-02) * abstract; figures * -----	1-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
Place of search		Date of completion of the search	Examiner
Munich		19 September 2019	Mattias Grenbäck
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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 03.02 (P04C01)



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

EP 19 17 7360

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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19-09-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4800804 A	31-01-1989	NONE	
US 5556335 A	17-09-1996	AU 674049 B2 CA 2119704 A1 GB 2277374 A NZ 247231 A US 5556335 A	05-12-1996 24-09-1994 26-10-1994 26-10-1994 17-09-1996
EP 2894415 A1	15-07-2015	CN 104764183 A EP 2894415 A1 KR 20150082969 A US 2015192323 A1 WO 2015105349 A1	08-07-2015 15-07-2015 16-07-2015 09-07-2015 16-07-2015
EP 2481999 A1	01-08-2012	DE 102011009517 A1 EP 2481999 A1	26-07-2012 01-08-2012
GB 1244725 A	02-09-1971	NONE	