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(54) **FLOW CONTROL DEVICE FOR AN AIR EXHAUST SYSTEM**

(57) The present invention relates to a flow control device (20) comprising a stationary disc (21) and a rotatable disc (22). In further aspects, the present invention

provides novel use of said flow control device (20) in a range hood (10) or a common exhaust system of a building.

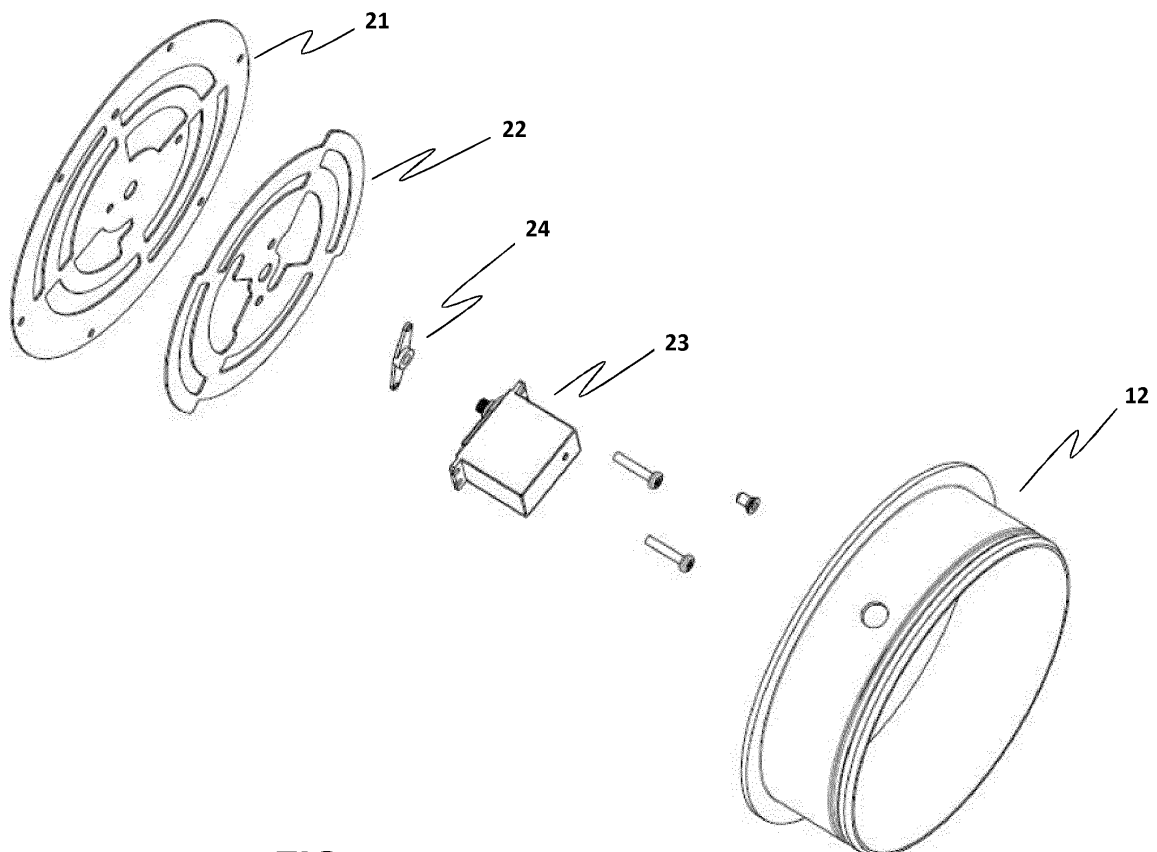


**FIG. 7**

## Description

### Technical Field

[0001] The present invention relates to a flow control device for use in an air exhaust system. More particularly, the present invention pertains to an improved flow control device designed specifically for use in range hoods or ventilation of apartments having a common exhaust system. The present invention further relates to a novel range hood comprising the flow control device as mentioned hereinabove.

### Background of the Invention

[0002] Common exhaust systems are increasingly used in multi-unit residential buildings for sucking dirty air from kitchens, rooms, bathrooms or any other area of the apartments. These systems typically involve a high power engine connected to a common exhaust line for sucking the internal air of the apartments and discharging the same to the outside. The common exhaust line may be connected to the kitchen appliances such as range hoods in the kitchens for extracting smoke on a cooktop. In these kinds of range hoods, there is no need to employ a separate blow fan as in the classical range hoods because the vacuum necessary for extracting air is already supplied by the common exhaust system of the building.

[0003] However, flow control devices are required in the foregoing systems in order to adjust the air flow through the common exhaust line. These flow control devices are typically integrated to the range hoods in the kitchens, or on the walls and ceilings of other rooms whereby the user can adjust amount of the air flowing to the common exhaust line. It can be desirable to operate flow control devices in an open/activated position in order to extract low quality air swiftly. However, it can be desirable also to operate flow control devices in a partly or entirely closed position so that internal heat of the apartment wouldn't be lost and any reverse flow from the common exhaust line can be prevented. The flow control devices used for the above purposes are generally complicated and costly. One another drawback of the conventional flow control devices is that they do not allow sensitive adjustment of air flow because they are simply designed to operate between open and closed position.

[0004] Flow control devices for limiting or extending a fluid passage line in ducts in order to adjust volumetric flow rate are generally known in the art. WO 99/47839 A1, for instance, discloses a flow control device for ducts which is operated based on the iris-diaphragm principle with control leaves. This arrangement, however is more convenient for ventilating a room rather than range hoods, because the system is complicated and not suitable for discharging smoked air over a cooktop due to the accumulation of fatty dirtiness on the control leaves. Additionally, there is provided a single orifice provided centrally and therefore this flow control device wouldn't

be suitable for carrying out the objectives described herein.

[0005] Therefore, there has been a continuous need in prior art to provide air flow control devices suitable for common exhaust systems as well as range hoods connected to these systems, which would minimize changes in direction of flow and ensure improved control of air flow while minimizing reverse flow from a common exhaust line. These objectives are currently achieved with a flow control device according to claim 1.

### Brief Description of the Invention

[0006] The present invention relates to a flow control device (20) comprising;

- a stationary disc (21) having a plurality of arc shaped apertures (211, 211', 212, 212') around the periphery of a central area (215) thereof which constitute air flow passageways, and
- a rotatable disc (22) comprising a central area (225) surrounded by a plurality of ridges (221, 221', 222) and apertures (224), at least some of which correspond to the arc shaped apertures (211, 211', 212, 212') of the stationary disc (21) such that the latter are partially or wholly closed as the rotatable disc (22) is rotated in radial direction, by alignment of the ridges (221, 221', 222) to the said arc shaped apertures (211, 211', 212, 212').

[0007] In preferred embodiments, the flow control device (20) mentioned above further comprises an actuation motor (23) which rotates the rotatable disc (22) over the said stationary disc (21); and an actuation lever (24) coupled with the actuation motor (23) and the rotatable disc (22) to provide desired motion of the rotatable disc (22) in radial direction.

[0008] Preferably, the arc shaped apertures (211, 211', 212, 212') around the central area (215) substantially form a semi-circle or a complete circle, wherein the arc shaped apertures (211, 211', 212, 212') are separated by juncture sections (213, 214). More preferably, a first line of arc shaped apertures (212, 212') are provided in close proximity of the central area (215) such that these apertures (212, 212') surround the said central area (215), and at least a second line of arc shaped apertures (211, 211') surrounding the first line of arc shaped apertures (212, 212') are provided.

[0009] The neighbouring arc shaped apertures (211, 211', 212, 212') in the same line can be arranged with an offset (A) in radial direction, with respect to each other. Accordingly, the neighbouring ridges (221, 221') on the rotatable disc (22) may also include an offset (B) with respect to each other in order to overlap with at least some of the apertures (211, 211', 212, 212') provided in the stationary disc (21).

[0010] In preferred embodiments, the flow control de-

vice (20) according to the present invention comprises a connection to a control switch of a room or a range hood in a kitchen. In the case of a range hood (10), this can be realized by an actuation motor (23) being in electrical communication with switches or a control unit of the range hood (10) whereby an electrical signal produced to increase the air flow is transmitted to the motor (23) in order to increase the air passageways in the flow control device (20).

**[0011]** In another aspect, the present invention relates to a range hood (10) comprising the flow control device (20) as mentioned above.

**[0012]** In further aspects, the invention is related to a method for producing a range hood (10) comprising mounting of a flow control device (20) as described above to an exhaust duct (12) of the range hood (10).

### Brief Description of the Figures

**[0013]** The preferred embodiments of the present invention are illustrated via non-limiting drawings wherein;

Figure 1 is an exploded view of a range hood comprising a flow control device according to the present invention.

Figure 2 is the side view of the range hood according to an aspect of the present invention.

Figure 3 is a planar view of the range hood according to an aspect of the present invention.

Figures 4 and 5 show a stationary disc of the flow control device according to preferred embodiments of the present invention.

Figure 6 is a perspective view of a rotational disc of the flow control device according to preferred embodiments of the present invention.

Figure 7 is an exploded view of the flow control device and the exhaust duct according to preferred embodiments of the present invention.

Figures 8 and 9 show side and planar view of the arrangement shown in Fig. 7.

Figures 10, 11 and 12 are planar views of the flow control device according to preferred embodiments of the present invention, in different operating positions.

### Detailed Description of the Invention

**[0014]** The present invention provides an improved flow control device (20) for use in common exhaust systems of multi-unit residential buildings having multiple of flats. The flow control device (20) of the present invention

can be mounted to the walls and ceilings of the rooms, or to the range hoods in the kitchens.

**[0015]** Therefore, in an aspect of the present invention, the flow control device (20) of the present invention is placed into an exhaust duct (12) of a range hood (10) as shown in Figures 1, 2 and 3. Referring to Fig. 1, the flow control device (20) is located between main body of the range hood (10) and the exhaust duct (12). Therefore, the air drawn into the range hood (10) from an air inlet area (11) is directed to the flow control device (20) before being discharged through the exhaust duct (12) such that the flow rate of the air is adjusted to the desired level.

**[0016]** As shown in Fig. 7, the flow control device (20) comprises basically, a stationary disc (21), a rotatable disc (22), and an actuation motor (23) which rotates the said rotatable disc (22) over the said stationary disc (21). Preferably, an actuation lever (24) is provided for this purpose in a manner such that the lever (24) is coupled with the actuation motor (23) and the rotatable disc (22) to have the desired motion. This motion is preferably a radial movement.

**[0017]** Perspective and planar views of a preferred form of the stationary disc (21) as mentioned above is shown in Figures 4 and 5, respectively. The stationary disc (21) comprises a plurality of arc shaped apertures (211, 212) around the periphery of a central area (215) which constitute air flow passageways for the air drawn from the room.

**[0018]** In preferred embodiments, the stationary disc (21) comprises a plurality of arc shaped apertures (211, 211', 212, 212') around the central area (215) which substantially form a semi-circle, and more preferably a complete circle, but each of the arc shaped apertures (211, 211', 212, 212') being separated by juncture sections (213, 214) in order to keep rigidity of the stationary disc (21).

**[0019]** In these preferred embodiments, a first line of arc shaped apertures (212, 212') are provided in close proximity of the central area (215) such that these apertures (212, 212') surround the said central area (215). Then, at least a second line of arc shaped apertures (211, 211') are provided in a manner such that these apertures surround the first line of arc shaped apertures (212, 212'). As noted hereinabove, each line of the apertures are preferably arranged such that they form a semi-circle, and more preferably a complete circle. However, in most preferred forms, the neighbouring arc shaped apertures (211, 211') in the same line are arranged with an offset (A) in radial direction, with respect to each other. Provision of the arc shaped apertures (211, 211', 212, 212') with plurality of lines and an offset increase the possibility of forming fluid passageways in different locations and different distances from the central area (215) which eventually ensures better air flow with minimum of swirling and more precise control of the air flow through the exhaust duct (12).

**[0020]** These arc shaped apertures (211, 211', 212, 212') of the stationary disc (21) are partially or wholly

closed by the rotatable disc (22) in order to adjust the air flow. A preferred form of the rotatable disc (22) is shown in Fig. 6. Accordingly, the said rotatable disc (22) is provided with a central area (225) which is surrounded by a plurality of ridges (221, 221', 222) and apertures (224), and at least some of these ridges correspond to the arc shaped apertures (211, 211', 212, 212') of the stationary disc (21) such that the latter are partially or wholly closed, or are opened as the rotatable disc (22) is rotated in radial direction. The ridges (221, 221', 222) mentioned above are separated from each other and from the central area (225) by a number of apertures (224) and juncture sections (223), and at least some of those apertures correspond to the arc shaped apertures (211, 211', 212, 212') of the stationary disc (21). Therefore, as the rotatable disc (22) is moved in radial direction, the arc shaped apertures (211, 211', 212, 212') of the stationary disc (21) are closed when the ridges (221, 221', 222) overlap with them, whereas said apertures (211, 211', 212, 212') are opened when the apertures (224) overlap with them. Again, it would be preferable to arrange neighbouring ridges (221, 221') with an offset (B) with respect to each other depending on shape of apertures (211, 211', 212, 212') provided in the stationary disc (21).

**[0021]** A side view and a planar view of the flow control device (20) along with an exhaust duct (12) of a range hood (10) are shown in Figures 8 and 9, respectively. The rotatable disc (22) is superposed with the stationary disc (21) to have a radial movement by way of the actuation motor (23). As shown in Fig. 9, an actuation lever (24) which is connected to the motor (23) and the rotatable disc (22) can be provided in order to ensure the said radial movement. Preferably, a guiding means are provided on the rotatable disc (22) which guides rotation of the same in clockwise and counter-clockwise direction.

**[0022]** Referring now to these figures, according to preferred embodiments of the present invention, the functioning of the flow control device (20) is illustrated sequentially. In Fig. 10, the flow control device (20) is shown in a closed position because the apertures (211, 211', 212, 212') are fully closed with the corresponding ridges (221, 221', 222) of the rotatable disc (22).

**[0023]** In a second position as shown in Fig. 11, the rotatable disc (22) is rotated radially in order to allow access to at least some of the apertures (211, 211', 212, 212') such that air passageways exposed to air flow in different locations of the stationary disc (21).

**[0024]** In a third position as shown in Fig. 12, the rotatable disc (22) is further rotated radially in order to allow access to all of the arc shaped apertures (211, 211', 212, 212') by removing ridges (221, 221', 222) in front of them, and therefore full access to the said apertures ensured for the maximum of air flow.

**[0025]** In the foregoing embodiments, the offset (A) between neighbouring arc shaped apertures (211, 211') of the stationary disc (21) and the offset (B) between neighbouring ridges (221, 221') of the rotatable disc (22) advantageously provide air passageways in different loca-

tions of the flow control device (20) rather than a particular area. Therefore, distributing air passageways in this way provide improved air flow by minimization of swirling. When the rotatable disc (22) is brought into a closed position as shown in Fig. 10, reverse flow from a common exhaust line of a building is also minimized.

**[0026]** In further embodiments, the flow control device (20) according to the present invention can be incorporated into a range hood (10) such that air flow rate can be controlled by the said range hood (10). For this purpose, the actuation motor (23) of the flow control device (20) is provided in electrical communication with switches or a control unit (not shown) of the range hood (10) whereby a command of the user to increase the volumetric air flow rate causes the motor (23) to be activated and increase the air passageways in the flow control device (20).

**[0027]** Further, means for measuring pressure (226) can be provided on the flow control device (20) and more preferably on the stationary disc (21) as shown in Fig. 9. This pressure measuring means (226) is provided to measure the negative pressure at the outlet of the flow control device (20) of in a common exhaust line of a building. Therefore, this embodiment may advantageously comprise a connection with the motor (23) so that the positioning of the rotatable disc (22) can be arranged in order to obtain the desired air flow.

**[0028]** The stationary disc (21) and the rotatable disc (22) of the of the flow control device (20) according to the present invention may conveniently be produced from plastics, metal or a combination of metal and plastics such that one of the discs is metal and the other is plastics.

**[0029]** In a further aspect, the present invention relates to a method for producing a range hood (10) by mounting of the flow control device (20) described hereinabove to an exhaust duct (12) of said range hood (10). Further aspects and embodiments of the present invention will be apparent for those skilled in the art in view of the appended claims.

## Claims

1. A flow control device (20) comprising;

- a stationary disc (21) having a plurality of arc shaped apertures (211, 211', 212, 212') around the periphery of a central area (215) thereof which constitute air flow passageways, and
- a rotatable disc (22) comprising a central area (225) surrounded by a plurality of ridges (221, 221', 222) and apertures (224), at least some of which correspond to the arc shaped apertures (211, 211', 212, 212') of the stationary disc (21) such that the latter are partially or wholly closed as the rotatable disc (22) is rotated in radial direction, by alignment of the ridges (221, 221',

- 222) to the said arc shaped apertures (211, 211', 212, 212').
2. A flow control device (20) according to claim 1 wherein the flow control device (20) further comprises an actuation motor (23) which rotates the rotatable disc (22) over the said stationary disc (21). 5
  3. A flow control device (20) according to claim 1 wherein the flow control device (20) further comprises an actuation lever (24) coupled with the actuation motor (23) and the rotatable disc (22) to provide desired motion of the rotatable disc (22) in radial direction. 10
  4. A flow control device (20) according to claim 1 wherein the arc shaped apertures (211, 211', 212, 212') around the central area (215) substantially form a semi-circle or a complete circle, wherein the arc shaped apertures (211, 211', 212, 212') are separated by juncture sections (213, 214). 15 20
  5. A flow control device (20) according to any of the preceding claims wherein the flow control device (20) comprises a first line of arc shaped apertures (212, 212') provided in close proximity of the central area (215) such that these apertures (212, 212') surround the said central area (215), and at least a second line of arc shaped apertures (211, 211') surrounding the first line of arc shaped apertures (212, 212'). 25 30
  6. A flow control device (20) according to claim 5 wherein neighbouring arc shaped apertures (211, 211', 212, 212') in the same line are arranged with an offset (A) in radial direction, with respect to each other. 35
  7. A flow control device (20) according to claim 6 wherein neighbouring ridges (221, 221') on the rotatable disc (22) include an offset (B) with respect to each other in order to overlap with at least some of the apertures (211, 211', 212, 212') provided in the stationary disc (21). 40
  8. A flow control device (20) according to claim 1 wherein the device comprises means for measuring the pressure (226) at the outlet of the device. 45
  9. A flow control device (20) according to claim 8 wherein the device further comprises a motor (23) which is connected to said pressure measuring means (226) so that the motor (23) can be actuated according to the pressure value measured in the pressure measuring means (226). 50
  10. A range hood (10) comprising the flow control device (20) according to any of the preceding claims. 55
  11. A range hood (10) according to claim 10 wherein the flow control device (20) comprises an actuation motor (23) being in electrical communication with switches or a control unit of the range hood (10) in order to increase or decrease the air passageways in the flow control device (20).
  12. A method for producing a range hood (10) comprising mounting of a flow control device (20) according to claim 1 to an exhaust duct (12) of the range hood (10).
  13. Use of a flow control device (20) according to claim 1 in an exhaust system of a building or a range hood.
  14. The use according to claim 13 wherein the exhaust system is of the type common exhaust system of a multi-unit residential building.

FIG. 1

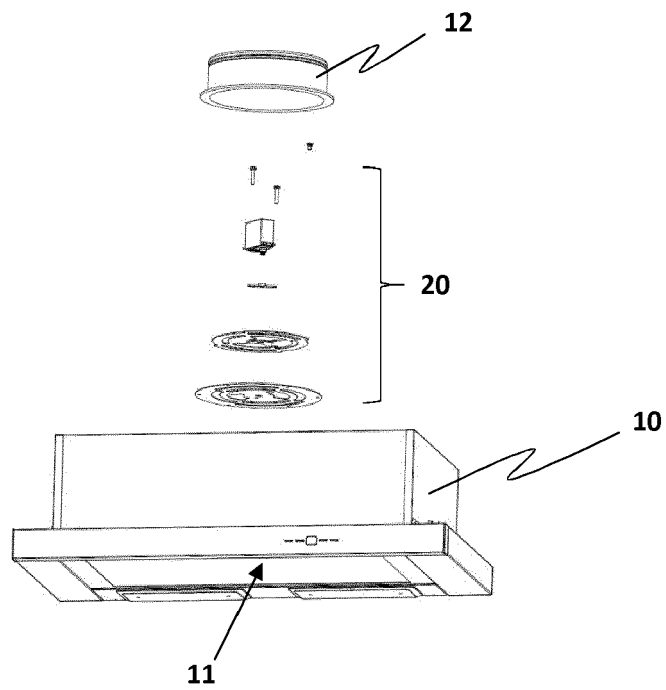


FIG. 2

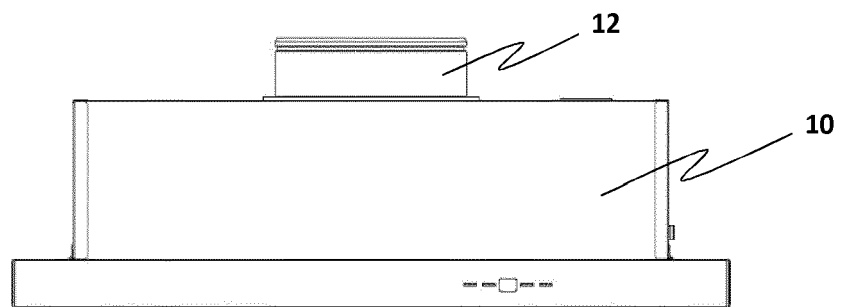
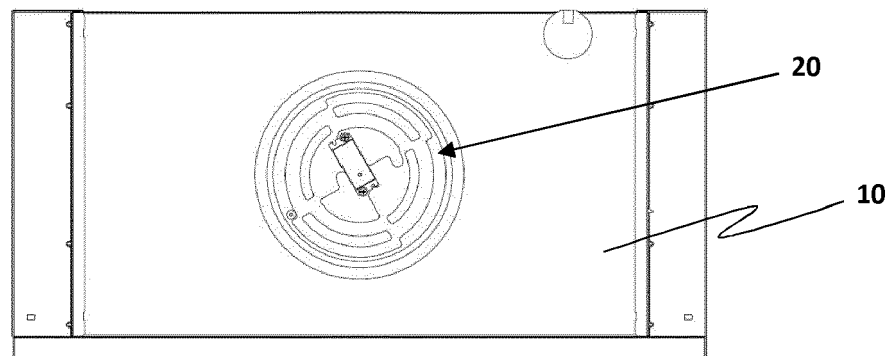


FIG. 3



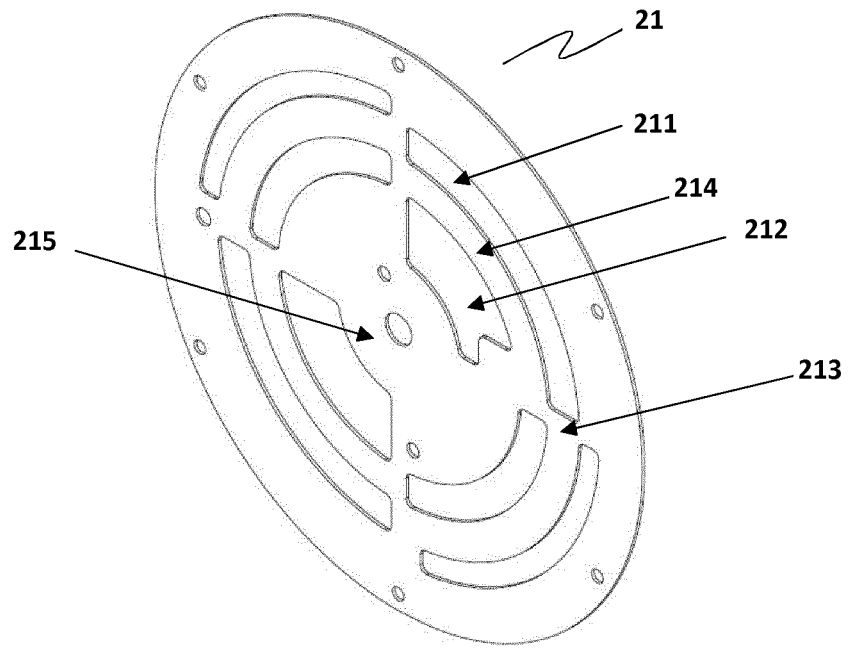


**FIG. 4**

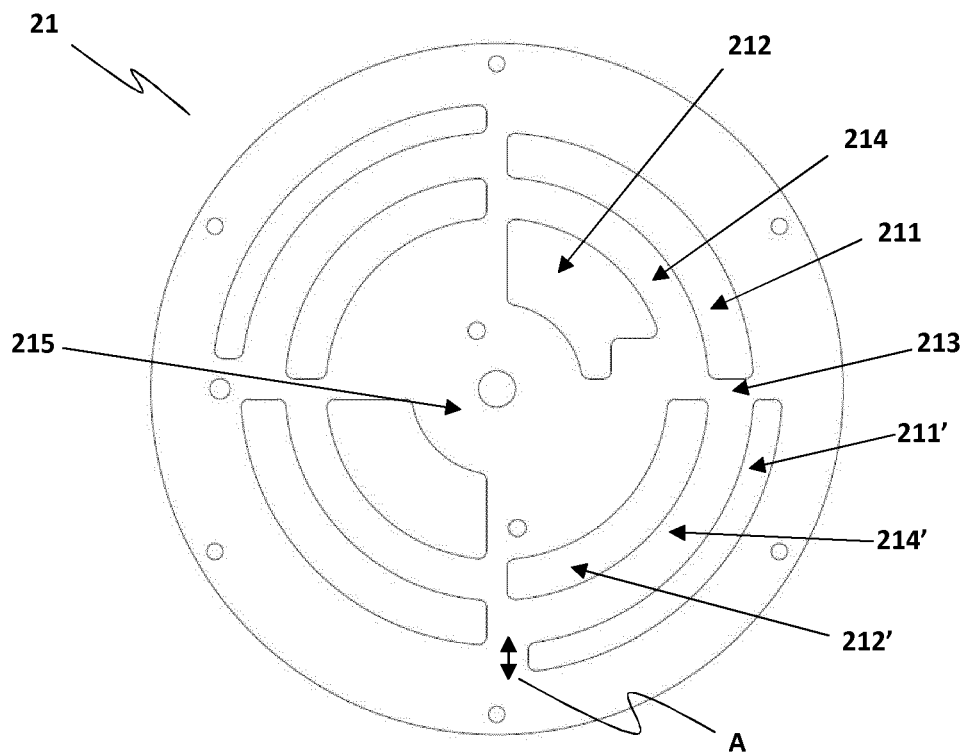
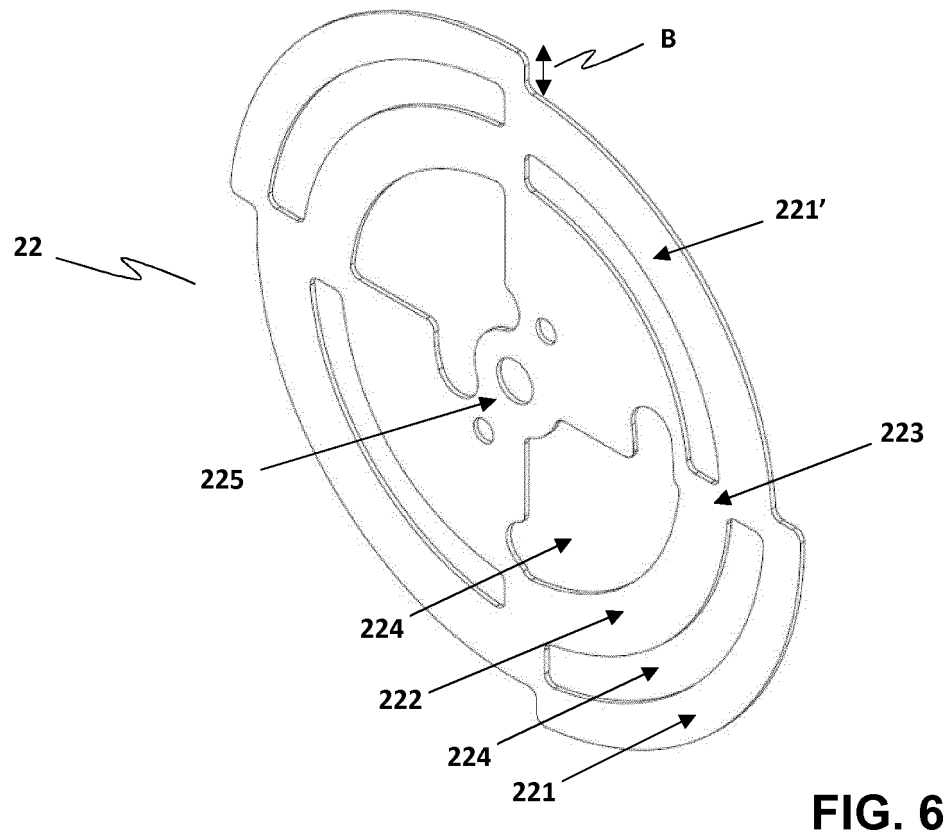


**FIG. 5**



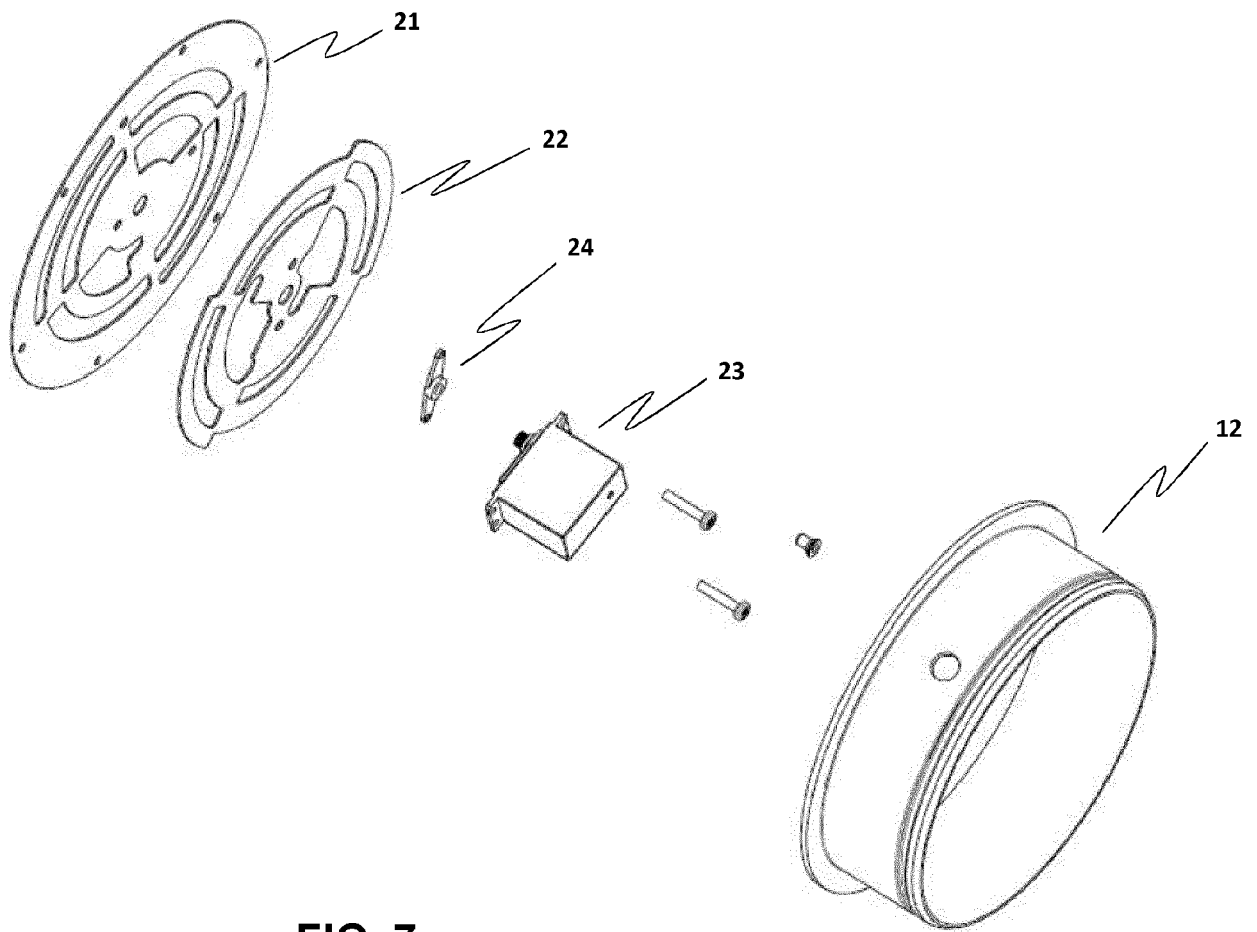


**FIG. 7**

FIG. 8

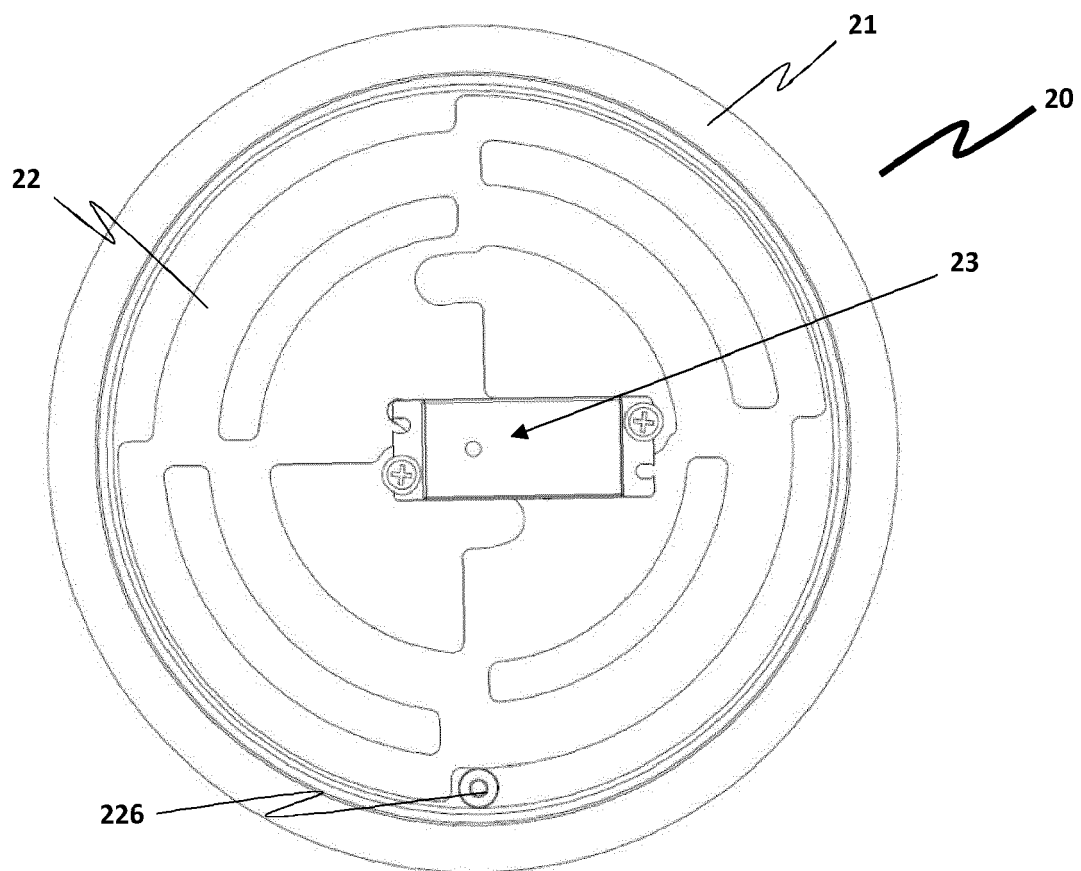
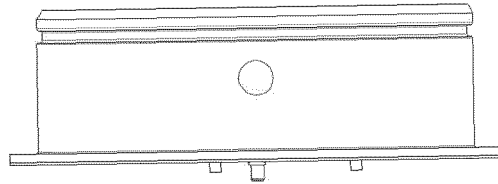


FIG. 9

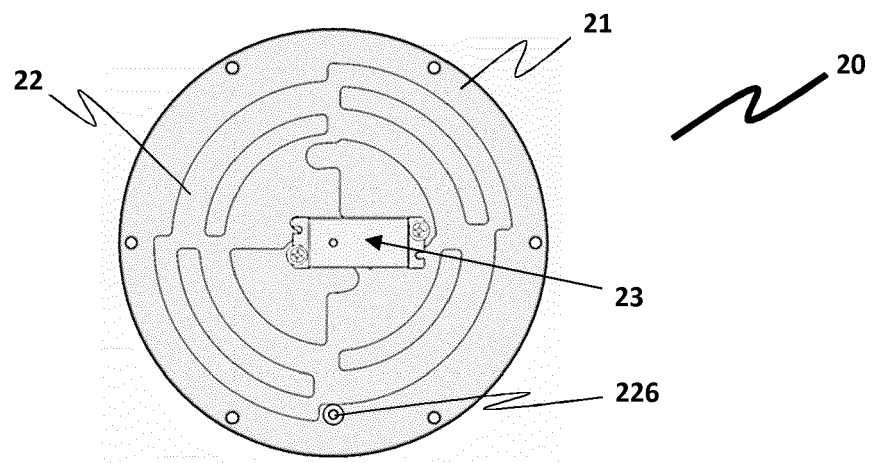


FIG. 10

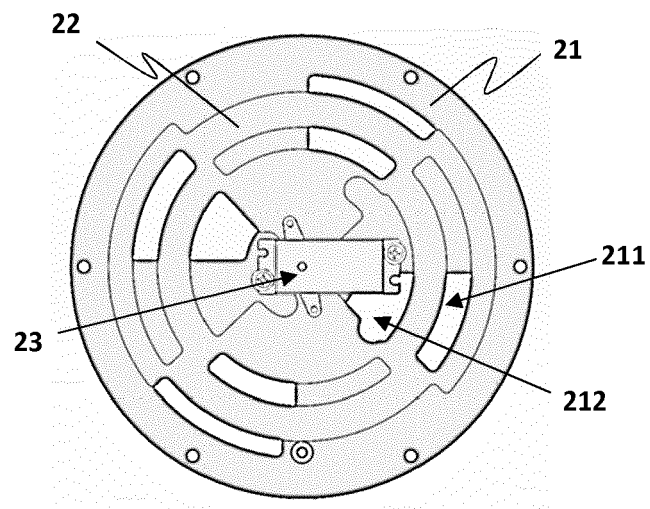


FIG. 11

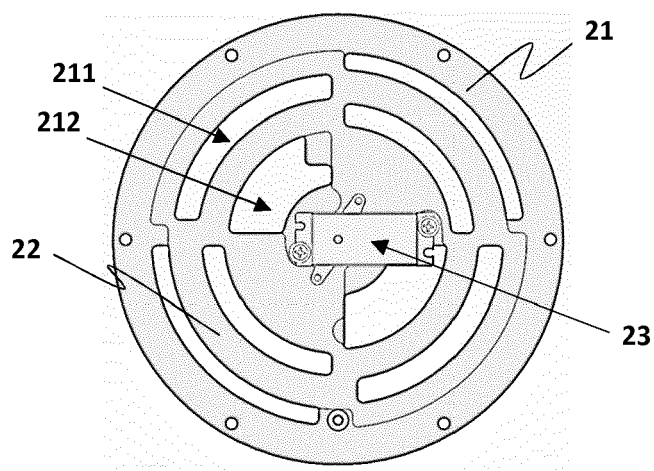


FIG. 12



## EUROPEAN SEARCH REPORT

Application Number  
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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                                                                                                                                                                                                                                                      | JP H08 145452 A (OKAMURA CORP)<br>7 June 1996 (1996-06-07)                                                           | 1,3-8,14                                                                                                                                                                                                                                                                              | INV.<br>F24C15/20<br>F24F13/10          |
| Y                                                                                                                                                                                                                                                      | * figures 1-3,5,7 *<br>-----                                                                                         | 2,9-13                                                                                                                                                                                                                                                                                |                                         |
| X                                                                                                                                                                                                                                                      | US 2 235 731 A (SPALDING JR JACK J)<br>18 March 1941 (1941-03-18)<br>* column 1, lines 55-58; claim 1; figures 1-2 * | 1                                                                                                                                                                                                                                                                                     |                                         |
| X                                                                                                                                                                                                                                                      | FR 1 345 195 A (MESTRUP & CO)<br>6 December 1963 (1963-12-06)<br>* claim 1; figures 1-2 *                            | 1                                                                                                                                                                                                                                                                                     |                                         |
| Y                                                                                                                                                                                                                                                      | US 2013/068846 A1 (BLUESTONE RICHARD A [US])<br>21 March 2013 (2013-03-21)<br>* figures 6A-6B *                      | 2                                                                                                                                                                                                                                                                                     |                                         |
| Y                                                                                                                                                                                                                                                      | EP 2 908 057 A2 (SEAKING OY [FI])<br>19 August 2015 (2015-08-19)<br>* claims 1-2; figure 1 *<br>-----                | 9-13                                                                                                                                                                                                                                                                                  |                                         |
|                                                                                                                                                                                                                                                        |                                                                                                                      |                                                                                                                                                                                                                                                                                       | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                        |                                                                                                                      |                                                                                                                                                                                                                                                                                       | F24C<br>F24F                            |
| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                      |                                                                                                                                                                                                                                                                                       |                                         |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                    |                                                                                                                      | Date of completion of the search<br><b>8 January 2018</b>                                                                                                                                                                                                                             | Examiner<br><b>Adant, Vincent</b>       |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                      | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                         |

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ON EUROPEAN PATENT APPLICATION NO.**

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| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s)        | Publication<br>date      |
|-------------------------------------------|----|---------------------|-----------------------------------|--------------------------|
| JP H08145452                              | A  | 07-06-1996          | NONE                              |                          |
| US 2235731                                | A  | 18-03-1941          | NONE                              |                          |
| FR 1345195                                | A  | 06-12-1963          | NONE                              |                          |
| US 2013068846                             | A1 | 21-03-2013          | CA 2790638 A1<br>US 2013068846 A1 | 21-03-2013<br>21-03-2013 |
| EP 2908057                                | A2 | 19-08-2015          | NONE                              |                          |

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EPO FORM P0459

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

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- WO 9947839 A1 [0004]