



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.09.2014 Bulletin 2014/37

(51) Int Cl.:
F24F 13/06 (2006.01)

(21) Application number: **14156908.7**

(22) Date of filing: **27.02.2014**

(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

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(30) Priority: **05.03.2013 FI 20135206**

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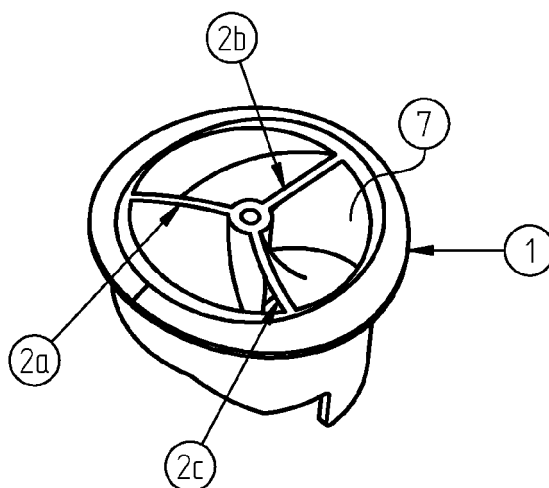
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(54) **Supply air diffuser**

(57) The invention relates to a supply air nozzle intended to be installed in the sleeve of a supply air duct (6) and through which supply air is discharged into a room, and which supply air nozzle has several chambers.

The supply air nozzle (1) is divided into chambers by one or more partition walls (2) extending round a central shaft (3) in an upward spiral.

Fig. 1



Description

[0001] This invention relates to a supply air nozzle which is intended to be installed in the sleeve of a supply air duct and through which supply air is discharged into a room, and which supply air nozzle has several chambers.

[0002] Offices, classrooms, negotiation and meeting rooms often contain a large number of people relatively densely packed into the same space. This large number of people in the same space necessitates, in terms of temperature and comfort, that the amount of ventilation supply air (qv) must be increased to such an extent that the temperature and comfort at least remain at the level required by the building regulations. The supply air amount regulations are not met if the air flow speed in an occupied area exceeds 0.2 m/s. The occupied area of a room is usually defined as an area extending from a height of 0.1 m above the floor to a height of 1.8 m above the floor, i.e. as the area occupied by the people. A large amount of supply air into a space which is small in proportion to the number of people, often causes high flow speeds in the occupied area which is sensed as an uncomfortable draft by the occupants.

[0003] The most common air distribution solutions are: a low-velocity unit, ceiling or wall diffuser, chilled beam or a supply air duct. The low-velocity units, which are installed at the floor level, require, in addition to the physical floor space, a lot of floor space, a so-called protective distance, for the air flows discharged by the diffusers. The throw lengths of the ceiling and wall diffusers usually exceed the dimensions of the space, i.e. the air flow continues along the wall, down to the floor. The chilled beams are primarily used for cooling offices and similar premises. Their air flow is not sufficient to meet the minimum air amount requirement of these premises. The supply air duct is intended to evenly distribute the supply air evenly within the space. The discharge sleeve of the supply air duct can be perforated, the sleeve of the supply air duct can have projecting jets or the supply air duct can be provided with supply air nozzles. The above-mentioned supply air duct solutions share in common an excessive throw length as well as a poor supply air/indoor air mixing ratio. The excessive throw length results in more or less the same problems as the above-described ceiling and wall diffusers. The temperature of the supply air (qv) being lower than the temperature of the indoor air, the poor supply air (qv)/indoor air mixing ratio usually causes the supply air flow to make, after the discharge outlet, a tight turn towards the occupied area.

[0004] The supply air duct according to the invention has several supply air nozzles serving to eliminate the above-mentioned disadvantages.

[0005] The supply air duct according to the invention is characterized in that the supply air nozzle is divided into chambers by one or more partition walls wind upwards round a central shaft.

[0006] The dependent claims describe different em-

bodiments of the invention.

[0007] The partition walls of the supply air nozzle project into the air flow of the supply air duct and turn the air flow of the supply air duct into several equally sized and evenly distributed partial supply air flows leaving the supply air duct at an angle of 90° relative to the flow direction of the supply air duct. While a part of the air flow of the supply air duct hits a partition wall of the supply air nozzle, its movement parallel to the main air flow stops and the dynamic pressure of the air flow becomes a static pressure in the inlet of the supply air nozzle. Thus, the air flows passing through the supply air nozzles disposed in the supply air duct are equal because $P_{tot} = P_{stat}$ = the same pressure in each supply air nozzle.

[0008] The actual invention lies in the structure of the supply air nozzle wherein the interior is, in an especially preferred embodiment, divided into two, three or more sections or chambers separated from each other by partition walls forming an angle which is equally divided depending on the number of the partition walls. In practice, it has been found to be preferable to divide the supply air nozzle into three sections or chambers but the number of the chambers can also be higher or lower.

[0009] The partition walls of the supply air nozzle are in the shape of an upward spiral, with each partition wall winding, in the direction of the air flow, round the central shaft over an angle of approximately 120°. The pitch angle and length of the upward partition wall spiral can be lower or higher. The partition wall pitch angle can also be adjustable for an optimal result. The upward-spiraling partition walls make the air flows passing through the supply air nozzle rotate intensively, resulting in that the supply air (qv), under the influence of the centrifugal force, effectively is blended into the indoor air, immediately after the discharge outlet of the supply air nozzle. The negligible temperature difference between the supply and indoor air ensures that the supply air (qv) under no conditions turns downwards, in the direction of the occupied area. As the above-described rotational motion of the air flow eliminates the straight forward directed kinetic energy in the air flow, the throw length of the supply air becomes considerably smaller.

[0010] The other aspects and the advantages related to them will appear from the following description of a few embodiments. The description is accompanied by the enclosed drawings.

Figure 1 shows the discharge outlet (7) of a supply air nozzle (1) according to the invention. The supply air nozzle (1) has three partition walls (2a, 2b and 2c) in the shape of an upward spiral and forming an angle 120° relative to each other.

Figure 2a show the inlet (8) of a supply air nozzle (1) according to the invention. The partition walls (2a, 2b and 2c) of the supply air nozzle (1) wind round a central shaft (3) in an upward spiral over an angle of approximately 120°, thus forming three chambers

(4).

Figure 3 is a side-view of a supply air nozzle (1) according to the invention. The body (9) of the supply air nozzle (1) is stepped (10). The ring (5) of the supply air nozzle is shaped to match the curvature of the sleeve of a round supply air duct (6).

Figure 4 shows the inlet (8) of a supply air nozzle (1) according to the invention seen from the direction of the main air flow. The partition walls (2a, 2b and 2c) open the chambers (4) of the supply air nozzle for the main air flow. The stepped (10) structure of the body (9), and the partition walls (2a, 2b and 2c), evenly distribute the supply air flow to the chambers (4), into partial air flows.

Figure 5 shows a supply air duct (6) provided with several supply air nozzles (1) according to the invention.

Figure 6 is a three-dimensional view of a supply air duct (6) provided with supply air nozzles (1) according to the invention.

Figure 7 is a three-dimensional view of a supply air duct (6) where a supply air nozzle (1) divides the supply air flow (qv) into partial air flows.

Figure 8 shows a supply air nozzle (1) according to the invention, having an air flow deflector (11) in front of the discharge outlet.

Figure 9 shows a supply air nozzle (1) according to the invention, only provided with a laterally (12) opened, tangential inlet in the body (9).

Figure 10 shows a supply air nozzle (1) according to the invention wherein the pitch angle of the upward spiral of the partition walls (2) can be lower or higher.

angles and/or lengths of the upward-spiraling partition walls (2) are adjustable.

4. A supply air nozzle, **characterized in that** the body (9) of the supply air nozzle (1) forms a stepped (10) structure, wherein the shape of the body, and the upward-spiraling partition walls (2), divide the supply air flow (qv) into partial air flows.
5. A supply air nozzle, **characterized in that** the body (9) of the supply air nozzle (1) only has a lateral opening, and the body (9) of the supply air nozzle (1) forms a stepped (12) structure.
6. A supply air nozzle with a ring (5) covering an opening made in a supply air duct (6), **characterized in that** the curvature of the ring (5) of the supply air nozzle (1) follows the curvature of the sleeve of a round supply air duct.
7. A supply air nozzle, **characterized in that** the central shaft (3) of the supply air nozzle (1) has a tubular structure to which a supply air deflector (11) can be fixed by means of a pin, for example.

Claims

1. A supply air nozzle intended to be installed in the sleeve of a supply air duct and through which supply air is discharged into a room, and which supply air nozzle has several chambers, **characterized in that** the supply air nozzle (1) is divided into chambers by one or more partition walls (2) wind upwards round a central shaft (3).
2. A supply air nozzle, **characterized in that** the upward-winding partition walls (2) of the supply air nozzle (1) extend from an inlet (8) to a discharge outlet (7) in the form of a spiral.
3. A supply air nozzle, **characterized in that** the pitch

Fig. 1

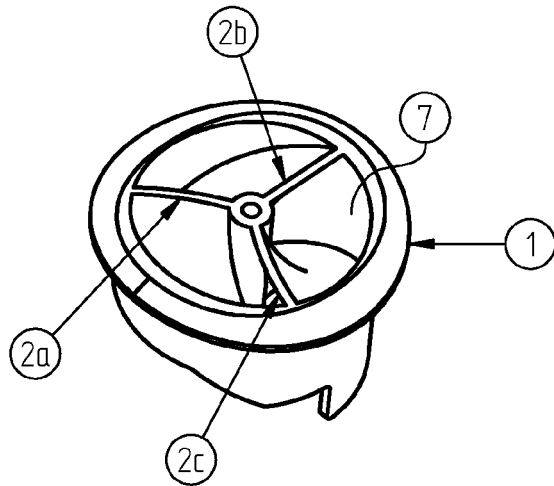


Fig. 2

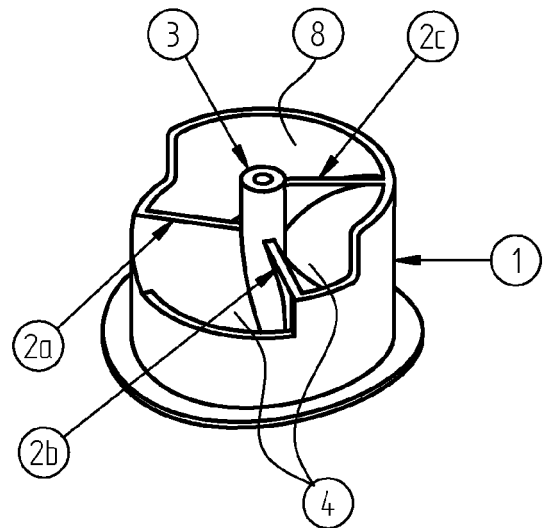


Fig. 3

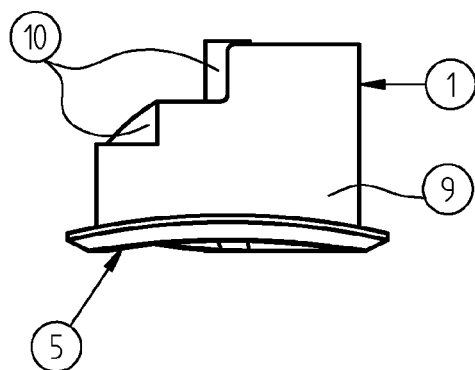


Fig. 4

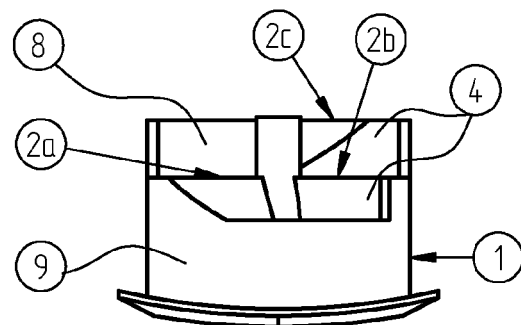


Fig. 5

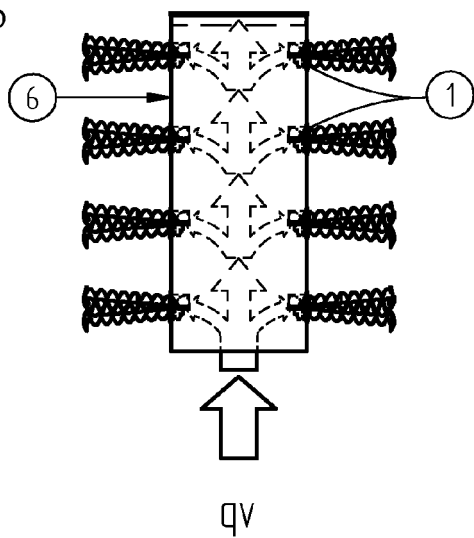


Fig. 6

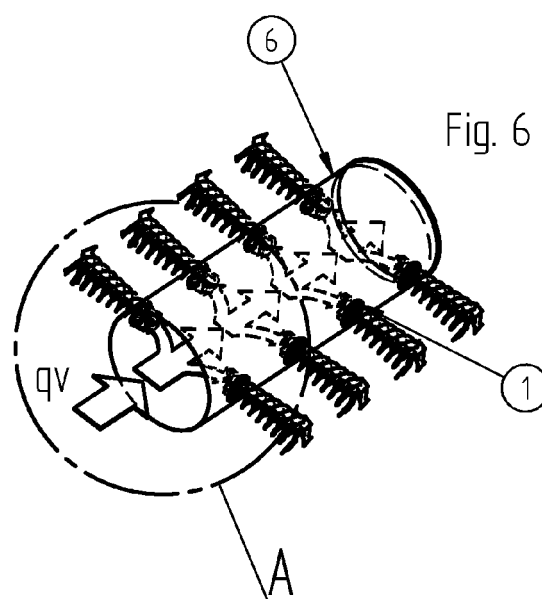


Fig. 7

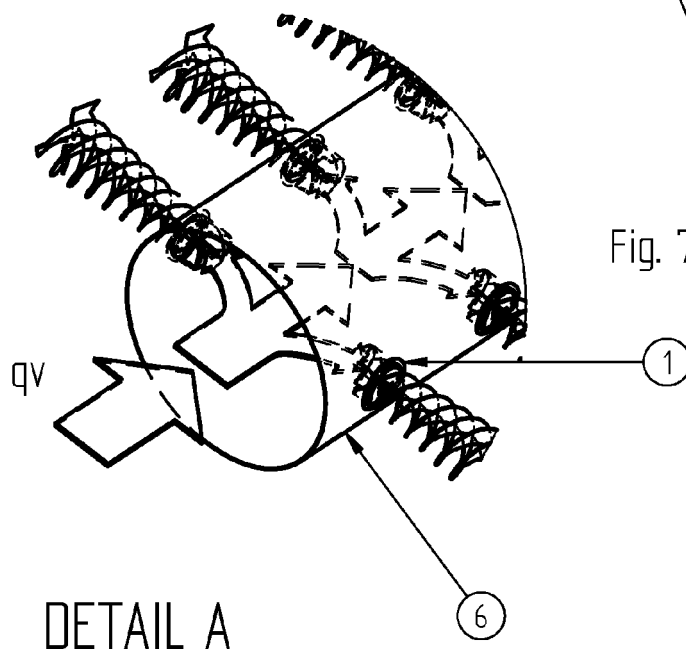


Fig. 8

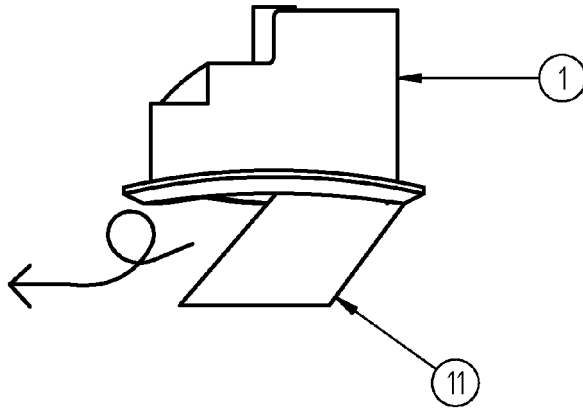


Fig. 9

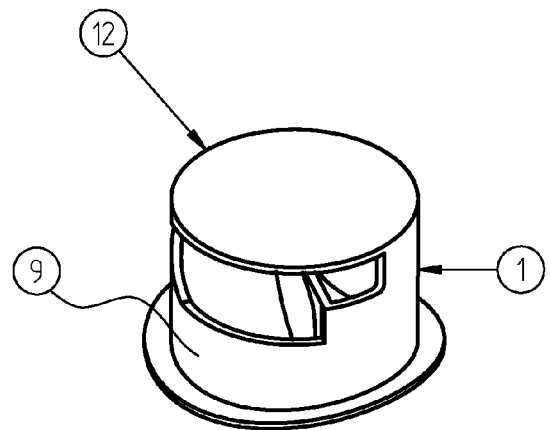


Fig. 10

