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(54) **A diffuser.**

(57) A diffuser for use with a ventilating system comprising an apertured plate having means defining a surface extending inwardly from one edge of the or each aperture in the plate. Air passing through the aperture becomes entrained against the surface and then, by virtue of the coander effect remains entrained against the surface in which the diffuser is mounted.

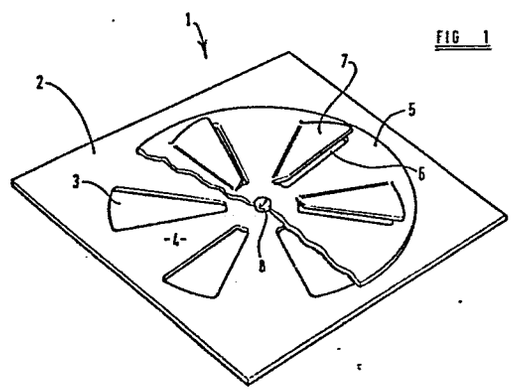

FIG 1

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A diffuser

THE PRESENT INVENTION relates to a diffuser and more particularly relates to a diffuser intended for use with a ventilation system.

According to this invention there is provided a diffuser for use with a ventilation system, said diffuser comprising a first plate defining at least one aperture therein and having a surface intended to be the exposed surface of the diffuser, there being means defining a surface positioned or positionable to extend from one side edge of said aperture at an angle to the plane of the plate away from the surface of the plate that is intended to be exposed. The means defining the surface may merely comprise an appropriate flange.

Said surface defining means may be formed integrally with the first plate, or may be formed on a separate closure plate that is mounted adjacent said first blade. Preferably the closure plate is movable relative to the first plate.

In one embodiment the closure plate is provided with an aperture of substantially the same size and configuration as the aperture in the first plate, said surface defining means extending from one side edge of the aperture in the closure plate, the arrangement being such that when the aperture in the closure plate is aligned with the aperture in the first plate the said surface defining means is in said position extending from one side edge of the aperture in the said first plate.

Preferably said diffuser is provided with a plurality of apertures each associated or associatable with a respective surface defining means.

Advantageously the closure plate is a rotatably mounted closure plate, rotatable about an axis perpendicular to the plane of the first plate and the closure plate said apertures in both the first plate and the closure plate being disposed in a radial configuration about the axis of rotation of the closure plate.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described by way of example with reference to the accompanyings in which:

FIGURE 1 is a perspective view from above of a diffuser in accordance with the present invention with parts thereof cut away,

FIGURE 2 is a diagrammatic sectional view illustrating one relative position of the components illustrated in Figure 1 for the purpose of explanation, and

FIGURES 3 to 5 are views corresponding to Figure 2 illustrating various alternative positions of the components of the apparatus.

Referring initially to Figure 1 a diffuser 1 in accordance with the present invention is illustrated. The diffuser shown is intended to be mounted on a ceiling and thus has the same exterior configuration as a ceiling tile so that the diffuser may readily be mounted in position in an array of ceiling tiles.

The diffuser comprises a lower plate 2 which may be formed of any suitable material, and the plate has formed therein a plurality of apertures 3. The illustrated apertures are of substantially triangular configuration, and the apertures are radially arranged about a centre point to resemble the petals of a flower. The area of the spaces 4 left between adjacent apertures 3 is at least as great each of the apertures. Any convenient number of apertures may be provided.

A closure plate 5 is provided which is located above the plate 2. The closure plate 5 is, in the embodiment illustrated, a circular plate which is provided with a plurality of apertures 6 corresponding substantially precisely

with the aperture 3 formed in the plate 2. However, each aperture 6 is provided with an inclined flange 7, which extends upwardly and angularly from one of the longer side edges of the triangular aperture 6. The flanges 7 are all arranged symmetrically on a consistant side edge of each of the apertures.

The closure plate 5 is rotatably and adjustably connected to the plate 2 by means of an appropriate boss 8, located at said centre point and the arrangement is such that by applying a screw driver or the like the part of the boss 8 exposed on the underside of the lower plate 2 the closure plate 5 may be rotated from the exposed face of the diffuser 2.

The diffuser as described above is intended for mounting in a position on a ceiling with a ventilation duct terminating immediately above the closure plate 5, and supplying air under a slight pressure to the space beneath the ceiling.

It will be appreciated that the closure plate 5 can be moved to a position in which the apertures 6 present in the closure plate 5 are precisely aligned with the apertures 3 present in the plate 2. This is the condition that is schematically illustrated in Figure 2 of the accompanying drawings. It will be appreciated that with the apparatus in this condition the inclined flange 7 will extend from a position within the chamber defined above the diffuser to terminate immediately adjacent one side edge of the aperture 3 formed in the plate 2. In such a condition air from the ventilation duct that terminates above the diffuser will flow down through the aperture 3, and will be guided by the flange 7. As a result of the coanda effect the stream of air will tend to become entrained against the lower surface of the plate 2, and will also be substantially entrained against the ceiling to flow across the ceiling of the room in which the diffuser is mounted as indicated schematically by the arrow 9. The various streams of air emanating from the various apertures present in the described diffuser will cooperatively interfere with one another (since, due to the radial arrangement of the apertures the streams of air will at least partially cross each other) to provide a gently turbulant pattern of air flow which will be substantially entrained across the ceiling of a room. This will generate a general upflow of air from the room beneath the diffuser and the end result is a general

circulation of air within the room without the creation of any violent draughts.

The closure plate 5 may be rotated by a small amount to have the position as illustrated in Figure 3. When the closure plate has this position, the apertures 3 are partly closed, and the part of the flange 7 that is connected to the closure plate 5 is located substantially centrally of the aperture 3. The result is that the effective size of the aperture 3 is reduced, and thus a smaller quantity of air will flow through the aperture. However, the air will still be directed by the flange 7 and by virtue of the coanda effect the air will still tend to adhere to the flush surface of the plate 2 and the surface of the adjacent portions of the ceiling as indicated by means of the arrow 10. A small degree of turbulance may be created as the flow passes the periphery of the aperture 3.

If the closure plate 5 is rotated further in the same sense a condition will exist in which the apertures 6 in the closure plate 5 are totally misaligned with the apertures 3 in the plate 2, and the diffuser will then be closed preventing the flow of air through the diffuser.

If the closure plate 5 is rotated further, the elements will have the condition illustrated in Figure 4. In this condition the next adjacent aperture 6 in the closure plate 5 is now becoming aligned with the aperture 3. However, it is the side edge of the aperture 6 that is not provided with the flange 7 that is aligned with the centre of the aperture 3. Thus the point at which the flange 7 meets the rest of the closure plate 5 is not aligned in any way with the aperture 3, although the free edge of the flange 7 is located above the open part of the aperture 3. In such a case the flow of air through the aperture is restricted, since the effective size of the aperture 3 is restricted, but the air is directed substantially downwardly as indicated by the arrows 11.

If the closure plate 5 is rotated still further to have the position illustrated in Figure 5, the effective size of the aperture 3 is increased, thus increasing the flow of air through the aperture, and the point of connection of the flange 7 to the closure plate 5 is brought closer to the edge of the aperture 3. Thus the flange 7 has an increasing effect, and in this position,

whilst some air will flow out of the aperture and continue to flow downwardly, as indicated by the arrows 12, some air, as indicated by the arrow 13 will, by virtue of the coanda effect cling to the underside of the plate 2.

It is envisaged that the closure plate may be formed from a material having a matt black finish to improve the aesthetic appearance of the diffuser.

Whilst the invention has been described with reference to an embodiment in which the closure plate is intended to be rotated to be moved into the various positions described, it is to be understood that in alternative embodiments of the invention the closure plate may be adapted to slide longitudinally between operative positions corresponding to those described above. In such an embodiment the various apertures would be laterally extending apertures, rather than radially extending apertures as in the present embodiment.

Whilst the invention has been described with reference to an adjustable embodiment in which a closure plate is provided which is separate from the main plate of the diffuser, it is to be appreciated that in a simple non-adjustable embodiment of the invention only a single plate need be provided carrying the appropriate rearwardly directed flange adjacent the edge of each aperture. In such an embodiment the apertures may be provided to have any desired orientation and layout on the plate, since there is no need to take into account, when designing the apparatus, any movement of a closure plate.

Whilst the invention has been described in terms of a diffuser for use with a duct supply air to a space to be ventilated it would be possible, for aesthetic reasons, to mount corresponding diffusers on exhaust ducts. Also, whilst the description given above indicates that the diffusers may be ceiling mounted, the diffusers may also be wall mounted, or may be "free standing" (i.e. hanging freely) when a larger lower plate 2 would be utilised to promote the coander effect in the absence of a suitable adjacent surface.

CLAIMS:

1. A diffuser for use with a ventilation system, said diffuser comprising a first plate defining at least one aperture therein and having a surface intended to be the exposed surface of the diffuser, there being means defining a surface positioned or positionable to extend from one side edge of said aperture at an angle to the plane of the plate away from the surface of the plate that is intended to be exposed.

2. A diffuser according to claim 1 wherein said surface defining means is formed integrally with the first plate.

3. A diffuser according to claim 1 wherein the surface defining means is formed on a separate closure plate that is mounted adjacent said first blade.

4. A diffuser according to claim 3 wherein the closure plate is movable relative to the first plate.

5. A diffuser according to claim 4 wherein the closure plate is provided with an aperture of substantially the same size and configuration as the aperture in the first plate, said surface defining means extending from one side edge of the aperture in the closure plate, the arrangement being such that when the aperture in the closure plate is aligned with the aperture in the first plate the said surface defining means is in said position extending from one side edge of the aperture in the said first plate.

6. A diffuser according to any one of claims 3 to 5 wherein said diffuser is provided with a plurality of apertures each associated or associatable with a respective surface defining means.

7. A diffuser according to claim 6 wherein the closure plate is a rotatably mounted closure plate, rotatable about an axis perpendicular to the plane of the first plate and the closure plate said apertures in both the first plate and the closure plate being disposed in a radial configuration about the axis of rotation of the closure plate.

8. A diffuser substantially as herein described with reference to and as shown in the accompanying drawings.

FIG 1

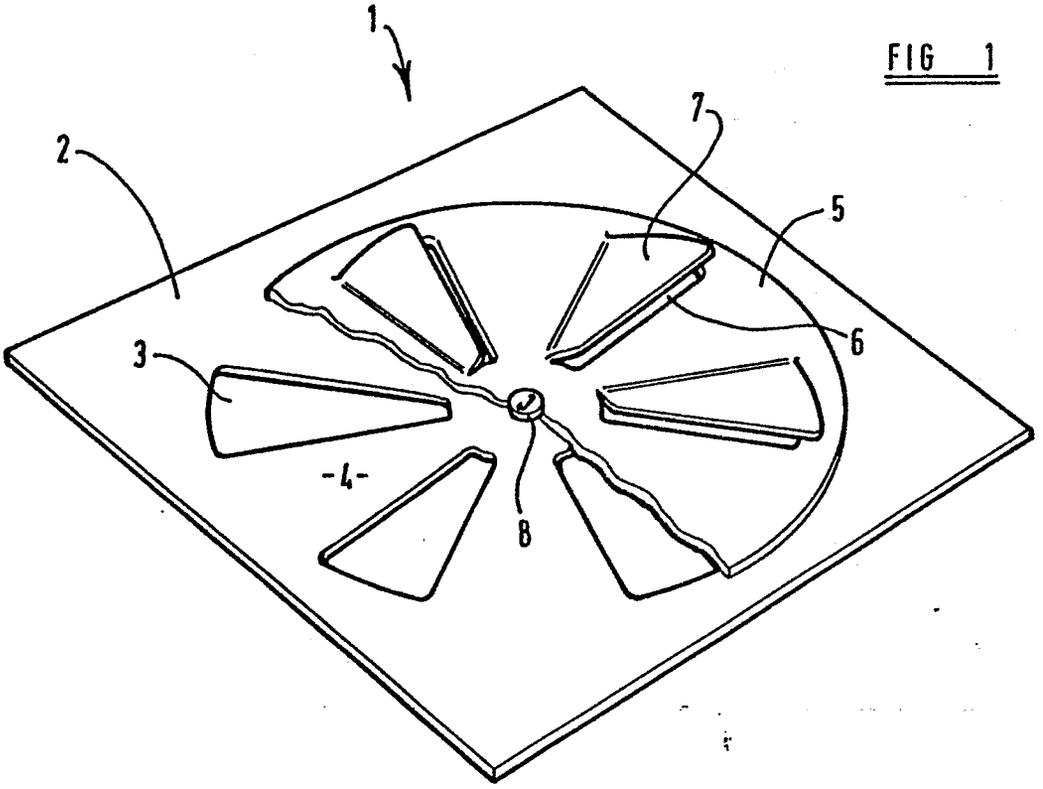

FIG 2

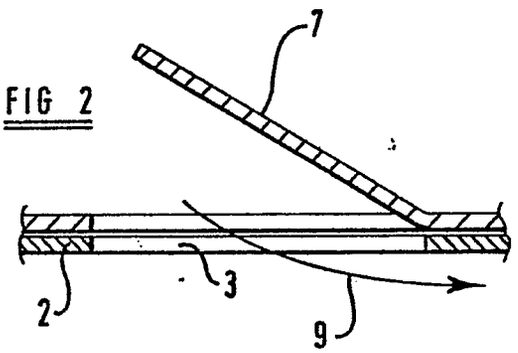

FIG 3

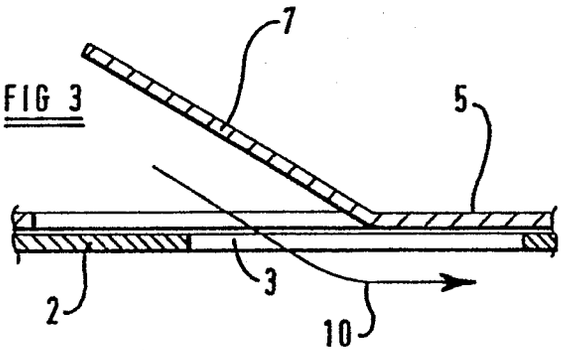

FIG 5

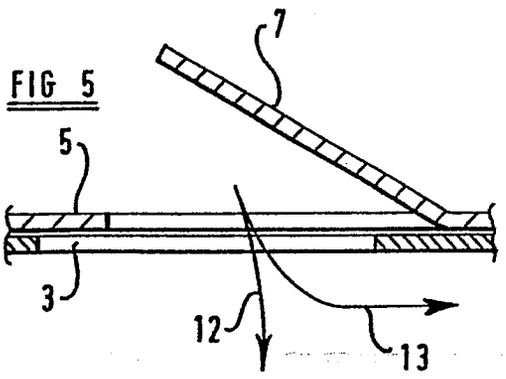

FIG 4