United States Patent [19]

Ruegg

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[54] **AIR OUTLET FOR VENTILATION EQUIPMENT**

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[73] Assignee: **Hess & Cie Metallwarenfabrik**

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[52] **U.S. Cl.** ..... **98/40 D,** 239/437

[51] **Int. Cl.** **F24f 13/06**

[58] **Field of Search**.... 98/40 D, 40 C, 40 DL, 40 B; 239/437, 438

[56] **References Cited**

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[57] **ABSTRACT**

An air outlet or diffuser includes a duct having an air inlet, rigid walls and an open outlet side. At least two guide plates having an L-shape are mounted to pivot on axes which are within the duct. The plates extend toward and through the outlet, dividing the air flow into three flows. By pivotal adjustment of the plates, the spacing between the plates and between the plates and the sidewalls is altered, adjusting the direction and relative volumes of the three partial flows. A constriction at the mouth of the outlet cooperates with the plates. The plates are provided with angled portions which have a deflecting effect. In a second embodiment the pivotal axes are mounted on slidable blocks so that the axes can be moved toward and away from the outlet to adjust total flow volume.

3 Claims, 10 Drawing Figures

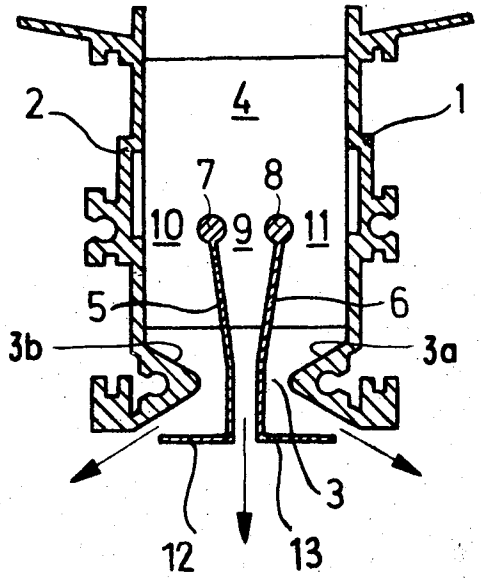


FIG. 1

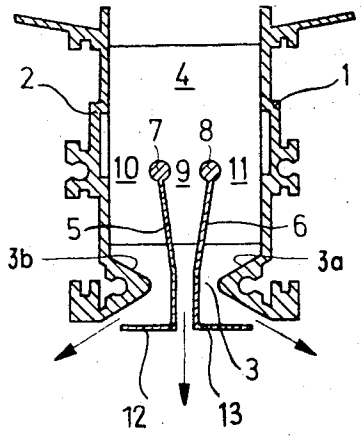


FIG. 3

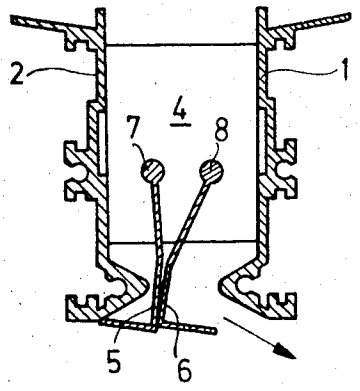


FIG. 2

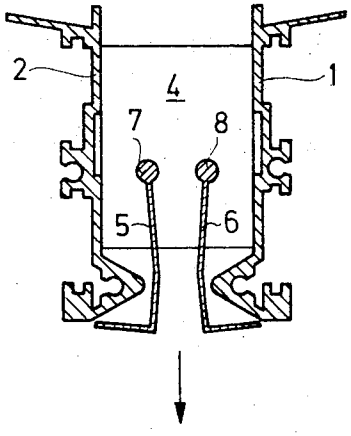


FIG. 4

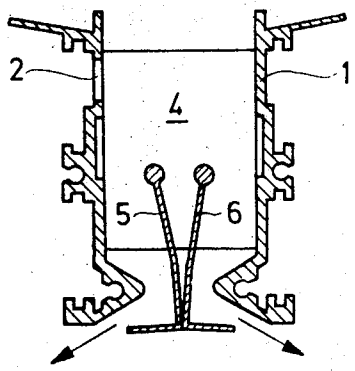


FIG. 5

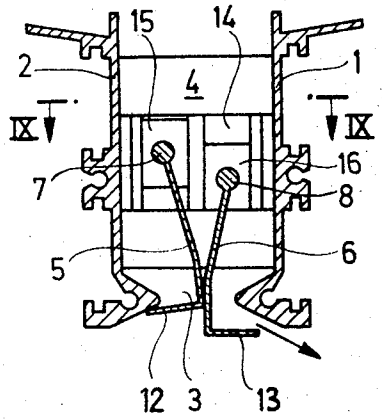


FIG. 6

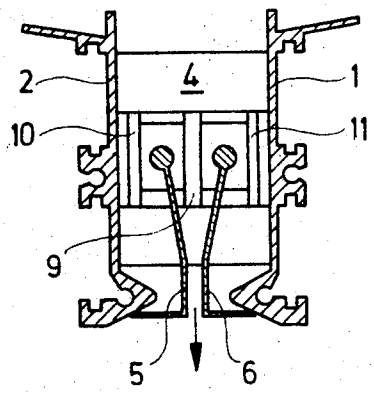


FIG. 7

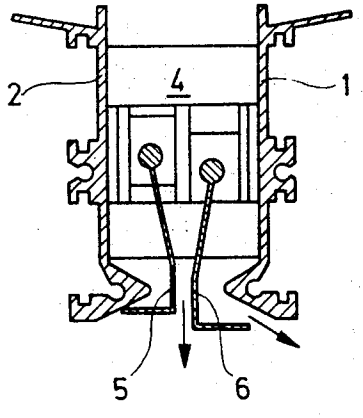


FIG. 8

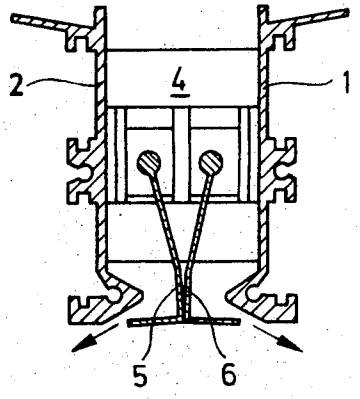


FIG. 9

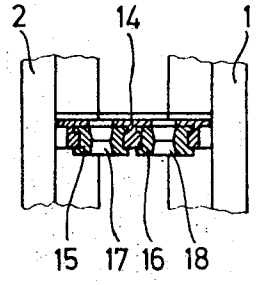
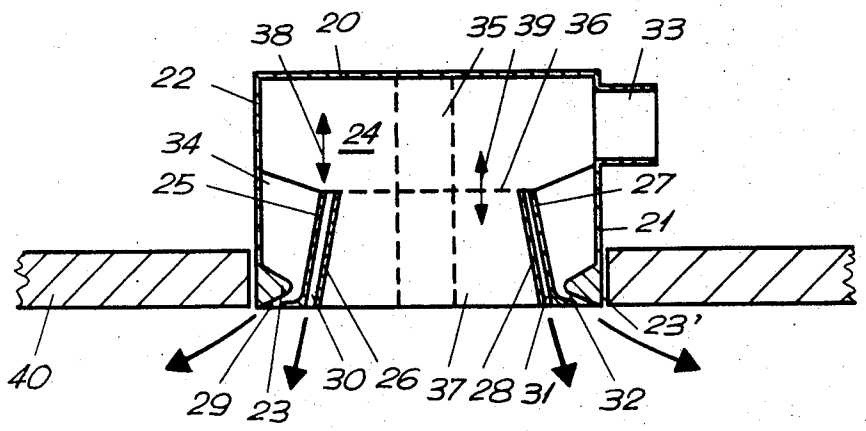


FIG. 10



AIR OUTLET FOR VENTILATION EQUIPMENT

This invention relates to air outlets for ventilation equipment.

It is desirable and conventional to provide air stream controlling apparatus by which the direction of the air stream emerging from ventilation equipment can be adjusted to conform to the needs of various circumstances. Presently, air outlets are conventionally provided with a one-part or a two-part guide member to enable adjustment of the direction of the emerging air stream.

The disadvantage of conventional air outlets is that the guide members permit only the adjustment of the direction of the whole emerging air stream. However, it is desirable in some instances to split the emerging air stream into several flow streams and to adjust the direction of these flows independently in order to achieve an even distribution of air in a given space. In the case of conventional air outlets, it has been necessary to provide two or three adjacently disposed air outlets, involving a significantly increased cost and space usage, to achieve even air flow distribution.

It is an object of the present invention to provide a diffuser apparatus for an air outlet for a ventilation apparatus in which a variety of suitable distributions of air flow can be attained.

Broadly described, the invention includes an air outlet having a flow duct which is defined by a plurality of rigid side walls and in which there is adjustable air guide means which can be positioned with respect to the side walls to adjust the direction and quantity of the emerging air stream. The guide means includes at least two guide plates which are adjustable to alter the spacing between each plate and its closest side wall and also with respect to the other plate, partial flow ducts being formed between the guide plates and between each guide plate and its closest side wall. The guide means are preferably such that they can be positioned to terminate air flow through one or more of the partial flow ducts, the guide plates being mounted for pivotal and/or translational movement axially with respect to the flow duct, and the plates may also be adjustable independently of each other. The major flow duct can be provided with a constriction near the outlet end of the duct and the guide plates can protrude beyond that restriction. Additionally, the guide plates can be coextensive with the periphery of the flow duct so that the partial flow ducts form a continuous air outlet ring.

In order that the manner in which the foregoing and other objects are attained in accordance with the invention can be understood in detail, particularly advantageous embodiments thereof will be described with reference to the accompanying drawings, which form a part of this specification, and wherein:

FIGS. 1–4 schematically illustrate one embodiment of an air outlet according to the invention, in vertical section, showing various arrangements of the guide members therein;

FIGS. 5–8 schematically show, in vertical section, a second embodiment according to the invention with the guide members in various positions;

FIG. 9 is a partial section along lines IX — IX of FIG. 5; and

FIG. 10 is a vertical section of a third embodiment of an air outlet according to the invention.

As shown in FIG. 1, the air outlet of this embodiment has two side walls 1 and 2 which in a normal installation would be connected by two end walls, not shown, to form a flow duct 4 defined by the inner surfaces of the two substantially parallel walls. Side walls 1 and 2 are so constructed that, at the lower or exit end of the flow duct, they form a constricted portion 3 defined by converging wall portions 3*a* and 3*b*.

Side walls 1 and 2 can conveniently be made of extruded sections and can be provided on their exterior surfaces with a plurality of webs shaped in accordance with the intended installation for the ducts. For example, the air outlet can be located at the end of a pipe in which case the exterior surfaces of the side walls would be visible in the installation and the webs would then be used for the attachment of a covering, not shown. If the air outlet is to be installed as a recessed outlet in a ceiling, then the webs can be used to locate a mask so that the exit end is flush with the ceiling. However, the specific construction of the webs is not material to the present invention.

Mounted within the flow duct 4 are a pair of guide plates having first portions 5 and 6 which are substantially L-shaped in cross-section and which have their major dimensions perpendicular to the plane of the drawing of FIG. 1. At the upper end of each guide plate is provided an enlarge portion and means for mounting the guide plates for pivotal movement about axes 7 and 8, which axes are parallel to each other and are spaced not only from each other but inwardly from side walls 1 and 2. Thus, the side walls, axes 7 and 8 and the guide plates depending therefrom define three partial flow ducts, 9, 10 and 11 which are dimensioned so that the air flows therethrough, in the plane containing axes 7 and 8, can be made substantially equal.

Guide plates 5 and 6 are provided with angled second portions 12 and 13 which are substantially at right angles to the major portion depending from the pivotal axes, the angled portions lying outside of the convergent portion of the flow channel. Because of these angled portions it is possible to deflect the merging air streams in various fashions and to divide them in different ways. FIG. 1 shows the disposition of the guide plates for substantially even air distribution in a room wherein the flow between the plates and the flow on either side of angled portions 12 and 13 are substantially equal to each other. FIG. 2 illustrates the situation wherein guide members 5 and 6 have been separated so that the angle portions are in contact with extensions of side walls 1 and 2, thereby terminating air flow to the side and directing the entire flow stream through the portion between the plates.

In FIG. 3 guide members 5 and 6 are pushed together and to a position adjacent one side wall so that the entire air flow is adjacent the opposite side wall and is directed at an angle from the major flow axis of the duct. In FIG. 4, the two plates are together but are separated from both walls so that there is no direct emerging flow but angled flows.

A second embodiment of the invention is shown in FIGS. 5–9, this embodiment incorporating those elements described with reference to FIGS. 1–4 but also including means for translating axes 7 and 8 about which guide plates 5 and 6 are pivotable. As shown in FIG. 5, this embodiment includes a guide member 14 having two guide ways in which blocks 15 and 16 are mounted for vertical movement. Axes 7 and 8 are sup-

ported in blocks **15** and **16** and are therefore translatable therewith as the blocks are moved. The additional flexibility introduced by the displacement of the axes enables the quantity of the emerging air stream to be adjusted in addition to the separation and direction of the air streams. As shown in FIG. **5**, it will be seen that the central and one side air stream have been closed, causing the entire flow to pass through that portion adjacent the other side wall. However, it will also be seen that by moving the sliding blocks axially upwardly the air flow is throttled, thereby diminishing the quantity of emerging air in addition to controlling its direction. Comparison of FIG. **5** with FIG. **3** clearly illustrates the difference in control available.

Similarly, a comparison of FIG. **6** will FIG. **2** illustrates a throttling available with air flow through the central passage and a comparison of FIG. **8** with FIG. **4** illustrates in similar fashion the flexibility available.

The mounting for blocks **15** and **16** is more clearly illustrated in FIG. **9** which shows a fragmentary view along lines IX — IX of FIG. **5**. Therein it will be seen that the guide member **14** constitutes a web extending between side walls **1** and **2** and formed with two dovetailed guides in which blocks **15** and **16** are matingly mounted for sliding movement. Pivot pins, not shown, correspond to axes **7** and **8** and are mounted in bores **17** and **18** in the blocks.

A modified form of the invention is shown in FIG. **10** wherein an air outlet according to the invention has flexibility of adjustment similar to that previously described. The outlet shown therein includes a substantially rectangular duct **24** having an upper wall **20** and side walls **21** and **22**. The duct, when completed with end walls not specifically shown, forms a downwardly opening box-like structure. Near the open edge thereof wall **22** is provided with an inwardly extending triangular rib **23** which extends along the lower edge of wall **22** forming one-half of a constriction as described with reference to FIGS. **1-9**. Similarly, wall **21** is provided with a triangular inwardly extending rib **23'** along the lower edge thereof. The guide plate **25** forms a partial flow duct **29** with side wall **22** and rib **23**. Similarly, a partial flow duct **30** is formed between guide plate **25** and guide plate **26**. On the other side of the unit, a partial flow duct **32** is formed between plate **27** and rib **23'** and a duct **31** is formed between plates **28** and **27**. Guide plates **25** and **27** or **26** and **28** are mounted to be either jointly or individually displaceable in the directions indicated by arrows **38** and **39**, respectively. The movement of the guide plates is achieved, for example, by mounting ribs **34** on the side walls or by ribs **37** which can be disposed in a central guide **35**, shown in broken lines, to be axially movable. Clearly, the greatest variety of adjustment can be obtained if all of the guide plates are independently displaceable. However, it is frequently sufficient merely to connect guide plates **26** and **28** together and to connect guide plates **25** and **27** together and to then displace them jointly. The cross-sections of the partial flow ducts **29, 30, 31** and **32** can then be adjusted at will. A mask or masks along the line indicated at **36** between the guide plates **26** and **28** can be provided to prevent air emerging into the space between the guide plates **26** and **28** or to limit that flow.

The size of the flow duct can be varied in accordance with the circumstances. For example, the dimension of the duct in a direction perpendicular to the plane of FIG. **10** can be substantially greater than the space between walls **21** and **22**, producing a very long, narrow duct extending along the center of or wall of a room. Alternatively, flow duct **24** can be rectangular, square or round in plan. In the case where the flow duct **24** is very long in one direction, the partial flow ducts must be substantially parallel to one another, whereas when the flow duct is rectangular, square or round in plan the partial flow ducts may form an interconnected angular gap or continuous air outlet ring. An air outlet with such a continuous air outlet ring can be located, for example, in the center of the ceiling of a room, and, by virtue of the continuous ring, permit a very even distribution of air in the room. By the inclination of the guide plates to the side walls it is possible to influence the direction of the emerging air stream.

As will be seen in FIG. **19**, the air inlet to duct **24** is through a conduit **33** and the entire apparatus can be mounted in a ceiling indicated generally at **40**.

While certain advantageous embodiments have been chosen to illustrate the invention it will be understood by those skilled in the art that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. An air outlet for ventilation system comprising the combination of

a duct including a back wall, at least one side wall, an air inlet penetrating at least one of said walls, and an outlet side;

first and second air guide plates each having a first portion extending generally through said outlet side and a second portion outside the major portion of said duct and disposed at a fixed angle with respect to said first portion;

first and second axles mounted on said first and second air guide plates;

means within said duct for supporting said axles to permit independent pivotal adjustment of said plates about said axles to permit selection of at least one of three partial flow ducts defined by said plates and side wall,

said plates being mounted on said axles with said second portions directed away from each other; and

means on said at least one wall near said outlet side for diminishing the area of said outlet side to form a flow constriction.

2. An air outlet according to claim **1** wherein said means for supporting said axles includes

first and second mounting blocks for receiving said axles, and

guide means for supporting said mounting blocks in slidable relationship toward and away from said outlet side.

3. An apparatus according to claim **1** wherein

said means for mounting further comprises means for supporting the axes about which said plates are rotatable, said means being movable toward and away from said open side to permit translation of said axes.

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