

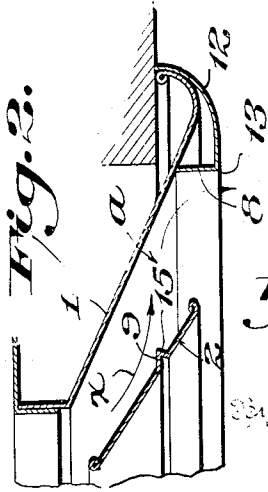
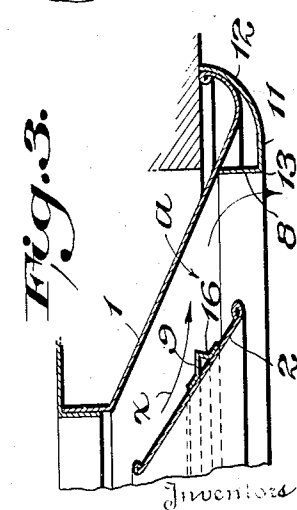
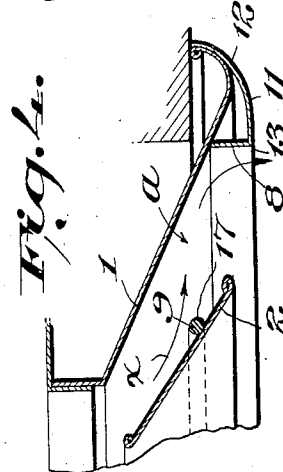
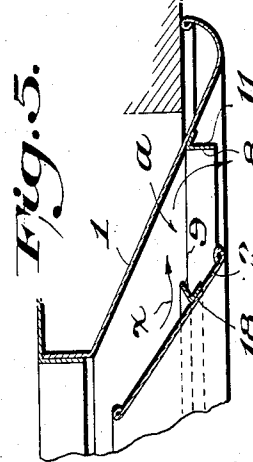
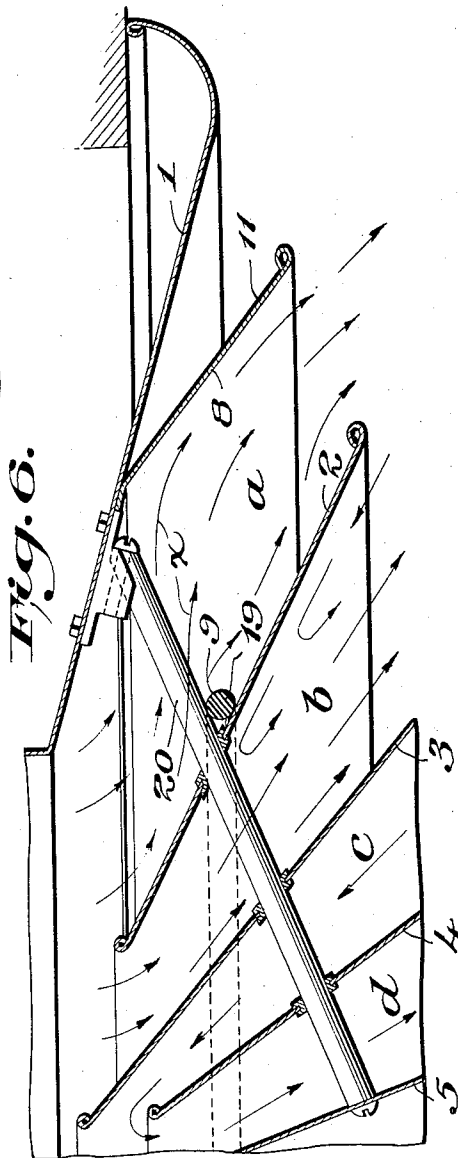
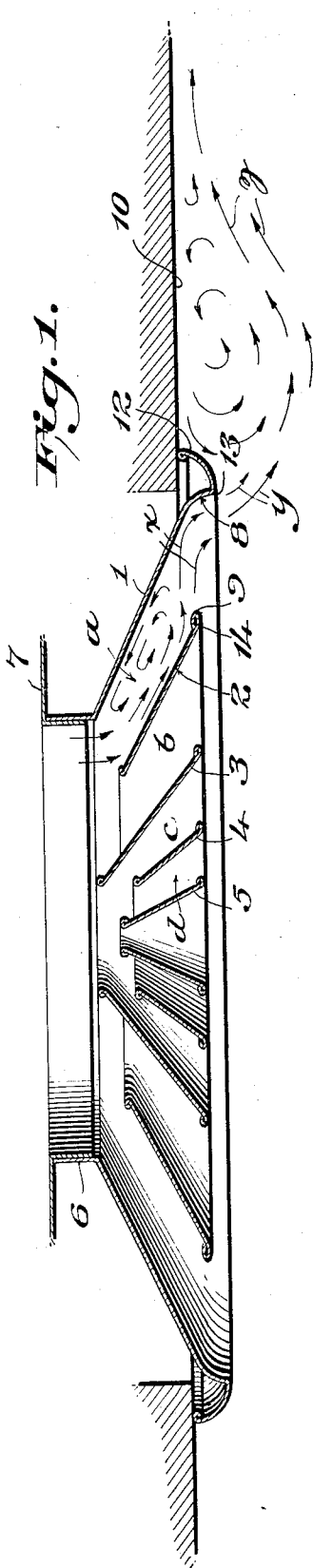
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M. SERRE ET AL

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AIR OUTLET DEVICE

Original Filed March 28, 1941



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UNITED STATES PATENT OFFICE

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AIR OUTLET DEVICE

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Original application March 28, 1941, Serial No. 385,754. Divided and this application May 22, 1942, Serial No. 444,074

7 Claims. (Cl. 98—40)

This invention relates to ventilating apparatus, and has particular reference to improvements in outlet devices for the delivery of fresh or treated air from air supply ducts into rooms or other enclosures, this application being a division of prior application, Serial No. 385,754, filed March 28, 1941 which is a continuation in part of the application of Maurice Serre, John B. Hewett and Edward A. Schaefer, Serial No. 326,100, filed March 26, 1940.

The invention relates more particularly to air outlet devices of the type comprising an outermost, open-ended, hollow, flaring member and at least one other flaring member therein and spaced inwardly therefrom to provide between said members an open-ended, flaring passageway through which supplied air flows from the smaller to the larger end thereof, and in accordance with the invention the outermost flaring member is suitably formed or provided at its front or larger end with wall means disposed at a lesser angle to the longitudinal axis of the device than the rear portion of said member to intercept supplied air flowing through the outer side portion of said passageway and to direct it from said passageway at a lesser angle to the longitudinal axis of the device than during its flow through the rear portion of said passageway. Also in accordance with the invention, the smaller or inner flaring member has extending outwardly therefrom air intercepting and deflecting means which is spaced rearwardly relative to the air intercepting and directing wall means at the front end of the outermost flaring member and which is disposed at more nearly a right angle to the longitudinal axis of the device than said smaller or inner flaring member, whereby supplied air flowing through the inner side portion of said passageway is deflected across said passageway toward the air intercepting and directing means at the front end of the outermost flaring member. Thus, aspiration in the outer side portion of the passageway is prevented and the supplied air is caused to travel a considerable distance forwardly from the device before, by its lateral expansion, it contacts the ceiling or other wall with which the device is associated. Accordingly, by the time the supplied air finally contacts the ceiling or other wall its velocity has become so negligible and its direction of flow so nearly parallel to the ceiling or other wall that little or no smudging of the ceiling or other wall results, elimination of smudging so far as possible being the ultimate purpose of the invention.

This application is directed to the smaller or

inner flaring member and particularly to the air intercepting and deflecting means extending outwardly therefrom, and in that connection the general object of the invention is to provide said member with such means in a simple, practical, inexpensive manner.

With the foregoing general object in view, the invention consists in an air outlet device of the character stated embodying the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawing and defined in the appended claims.

In the accompanying drawing, wherein are illustrated certain practical embodiments of the invention:

Figure 1 is a central section through an air outlet device of the type with which the invention is concerned and embodying the features of the invention according to one practical form thereof; and

Figures 2 to 6 are fragmentary views similar to Fig. 1 illustrating alternative, practical forms of the invention.

Referring to the drawing in detail, it will be observed that the device is of a well known type comprising a series of successively smaller, open-ended, hollow, flaring members disposed in spaced apart relationship successively inwardly of one another to provide therebetween a series of open-ended, flaring passageways. It will further be observed that the device includes, as usual, a neck extending rearwardly from the smaller or rear end of the larger or outermost flaring member to be connected with a duct for supplying air to the device.

In a device of the type illustrated the number of flaring members is arbitrary. Five flaring members is, however, a usual number. Accordingly, the device completely illustrated in Fig. 1 is shown as comprising five flaring members which are designated as 1, 2, 3, 4 and 5, respectively, while the passageways between said members are designated as *a*, *b*, *c* and *d*, respectively, the neck at the rear end of the larger member 1 being designated as 6 and the air supply duct to which said neck is connected being designated as 7.

In accordance with common practice the smaller or rear end of the second largest flaring member 2 is smaller in diameter than the neck 6. Therefore, some of the air supplied from the duct 7 through the neck 6 is deflected by the member 2 through the larger or outermost flaring passageway *a*. As to the rear ends of the re-

maintaining flaring members, their relationship to each other is arbitrary, depending upon the flow of air desired in the smaller passageways. In other words, the present invention is concerned primarily with the flow of air through the passageway *a* and with the results of such flow. Therefore it is not necessary to dwell herein on any particular relationship to each other of the rear ends of the smaller flaring members. On the contrary, it will suffice to say that the rear ends of the smaller members may be of successively smaller diameter, in which event some of the air supplied through the neck 6 will enter each of the flaring passageways; or, the rear end of any one or more of the flaring members may be as small as, or smaller than, the rear end of the next larger flaring member to permit supplied air to flow forwardly across the mouth of any one or more of the flaring passageways except, as previously indicated, the larger or outermost passageway *a*, in which event a suction effect and a consequent aspirating flow of air in any passageway across the mouth of which supplied air flows, will result.

In any passageway of a device of the type under consideration through which supplied air flows, there also will occur a certain amount of aspiration in the absence of some special means to prevent its occurrence. In other words, when supplied air is deflected laterally outward through any given passageway of a device of the type under consideration its tendency is to hug the wall defining the inner side of that passageway, because its natural tendency is to flow directly forwardly through the device. As a result, it will tend to produce a negative pressure and, consequently, a certain amount of aspiration in the outer side portion of the passageway.

Known devices of the type under consideration have not had embodied therein means to prevent aspiration in any passageway through which supplied air flows. Consequently, since in all prior devices supplied air flows through the larger or outermost passageway *a*, there has always occurred heretofore a certain amount of aspiration in the outer portion of said outermost passageway.

Air leaving any passageway of a device of the type under consideration expands rapidly. Moreover, air in motion tends to seek surfaces adjacent to which it flows, due possibly to frictional resistance to and retardation of its flow by such surfaces. In the case of a device of the type under consideration mounted with the front end of the outermost flaring member thereof adjacent to a ceiling or other wall, the ceiling or other wall and the front end portion of the outermost flaring member 1 are the surfaces which affect the air leaving the passageway *a*. In known devices of the type under consideration the outermost flaring member 1 usually is straight in cross section from its rear end to its forwardmost end portion and then is curved gradually outwardly and rearwardly to provide a marginal finishing portion. Air leaving the passageway *a* of known devices in seeking and tending to follow the rearwardly curved marginal finishing portion of said flaring member 1 and in seeking and in tending to follow the ceiling or other wall, thus takes a direction of motion more or less sharply rearwardly. Besides, it is drawn rearwardly and toward the marginal portion of the flaring member 1 by the aspiration occurring in the outer portion of the passageway *a*. It

thus impinges with considerable velocity upon the ceiling or other wall in a direction somewhat normal thereto and not far distant outwardly from the device, where most pronounced smudging is observed. Theoretically, therefore, the velocity of the air and the direction of its flow when it impinges upon the ceiling or other wall are important factors insofar as concerns the causes of smudging. Theoretically, too, if aspiration in the outer portion of the outermost passageway *a* is prevented, thereby eliminating this cause of drawing the air leaving the passageway *a* sharply outwardly and rearwardly, and if the air leaving the said passageway *a* is given a direction of motion such that it does not strike the ceiling or other wall until it is well outward of the device, when it has lost most of its velocity and when its direction of flow is nearly parallel to the ceiling or other wall, little or no smudging will occur. Experiments have demonstrated the truth of these theories. Therefore, the improved device is constructed to prevent aspiration in the outer portion of the outermost passageway *a* and to impart to air leaving said passageway *a* a direction of motion such that it does not contact with the ceiling or other wall until it is well outwardly of the device and its velocity is negligible and its direction of flow is nearly parallel to the ceiling or other wall.

In accordance with each of the illustrated forms of the invention the larger or outermost flaring member 1, at its larger or front end, is suitably provided with a wall portion 8 which is disposed at a lesser angle to the longitudinal axis of the device than the straight-walled rear portion of said member. Moreover, the next smaller flaring member 2, at a point spaced rearwardly from the wall portion 8, is provided with a suitable means 9 extending outwardly therefrom to deflect supplied air flowing through the inner side portion of the passageway *a* laterally outward and across said passageway toward the wall portion 8, as indicated by the arrows *x*. Aspiration in the outer side portion of the passageway *a* thus is prevented. The supplied air then is directed forwardly by the wall portion 8, as indicated by the arrows *y*, so that when leaving, and after leaving the passageway *a*, it flows forwardly in a path at a lesser angle to the longitudinal axis of the device than when flowing through the rear portion of said passageway. The result is that the air in leaving the passageway *a* is directed more forwardly than in known devices and therefore travels a considerable distance laterally outward from the device, as indicated by the arrows *z*, before it contacts with the ceiling or other wall 10 which is disposed in a plane at right angles to the longitudinal axis of the device a short distance rearwardly of the front end of the member 1. Moreover, by the time the air finally contacts with the ceiling or other wall 10, it has assumed a direction of flow nearly parallel to said ceiling or other wall and its velocity has become negligible, so that little or no smudging of the ceiling or other wall results.

The wall portion 8 may be comprised by an integral part of the member 1, as shown in Fig. 1, or by a ring-like element or part of a ring-like element 11 separate from said member 1 and attached thereto in any suitable manner, as indicated for example in Figs. 2 to 6 of the drawing. In any event, the device preferably includes a marginal finishing portion 12 extending outwardly and rearwardly from the wall portion 8, as shown in Figs. 1 to 4. Preferably, too, a sharp

corner 13 is provided at the junction of the wall portion 8 with the marginal finishing portion 12, all as more fully described and claimed in our aforesaid prior application and with which the present application is not directly concerned. However, neither the marginal finishing portion 12 nor the sharp corner at the junction of same with the wall portion 8 is essential, as will be apparent from the illustrations in Figs. 5 and 6 of the drawing.

According to the form of the invention illustrated in Fig. 1, the air deflecting means 9 extending outwardly from the flaring member 2 and with which the present application particularly is concerned, is comprised by a bead or flange 14 integral with and turned outwardly from said member 2 at the front or larger end thereof, the said front or larger end of said member 2 being disposed rearwardly with respect to the wall portion 8 of the member 1 in order properly to position said bead or flange to deflect supplied air across the passageway *a* toward said wall portion 8. On the other hand, Fig. 2 of the drawing illustrates that the second largest flaring member may have suitably formed thereon at a suitable point intermediate its ends and outwardly projecting integral rib 15 to provide the air deflecting means 9 projecting outwardly from said member, in which event the disposition of the front end of said member relative to the wall portion 8 obviously is immaterial.

Alternatively, Fig. 3 illustrates that the air deflecting means 9 extending outwardly from the second largest flaring member 2 may be provided by an outwardly extending rib on a band 16 of any suitable material separate from said member and attached thereto at a suitable point in any suitable manner.

As a further alternative, Fig. 4 of the drawing illustrates that the air deflecting means 9 extending outwardly from the second largest flaring member 2 may be comprised by a ring or band 17 of any suitable material, such for example, as rubber separate from said member and attached thereto at any suitable point in any desired manner, said ring or band 17 being either of circular shape in cross section as shown or of any other suitable or desired cross sectional shape.

As a still further alternative, Fig. 5 of the drawing illustrates that the air deflecting means 9 extending outwardly from the second largest flaring member 2 may be comprised by a flange of a ring or band 18 of any suitable material separate from said member and attached thereto at any suitable point in any desired manner.

As a still further alternative, Fig. 6 of the drawing illustrates that the air deflecting means 9 may be in the form of a ring or band 19 of rubber or other suitable material, of circular or other suitable shape in cross section, and may be held operatively positioned relative to the member 2 by being disposed in the acute-angled corner spaces between the outer face of the member 2 and the usual strut 20 by which the flaring members of the device are secured together in spaced apart relationship.

Without further description it is thought that the features and advantages of the invention will be clearly understood, particularly in view of the description contained in parent application, Serial No. 385,754. It is desired to point out, however, that while various different form of air de-

fecting means carried by the second largest flaring member have been illustrated and described, the invention is not limited to any such specific form of said means other than by the terms of the appended claims.

We claim:

1. In an air outlet device, an open-ended hollow flaring member, a second flaring member within said first mentioned member and spaced inwardly therefrom to provide between said members an open-ended air passageway flaring forwardly relative to the longitudinal axis of the device, means for the supply of air to said passageway through the open rear end thereof, wall means at the front end portion of said first mentioned flaring member disposed at a lesser angle to the longitudinal axis of the device than the rear portion of said member to intercept supplied air flowing through the outer side portion of said passageway and to cause it to flow from the front end of said passageway at a lesser angle to the longitudinal axis of the device than during its flow through the rear portion of said passageway, and means separate from said second mentioned flaring member mounted against the outer side thereof and projecting outwardly therefrom into said passageway at a point spaced rearwardly from said wall means to intercept supplied air flowing through the inner side portion of said passageway and to deflect it across said passageway toward said wall means.

2. An air outlet device as set forth in claim 1 in which the air deflecting means extending outwardly from the second mentioned flaring member comprises a band having a rib extending outwardly therefrom.

3. An air outlet device as set forth in claim 1 in which the air deflecting means extending outwardly from the second mentioned flaring member comprises a band having a flange extending outwardly therefrom.

4. An air outlet device as set forth in claim 1 in which the air deflecting means extending outwardly from the second mentioned flaring member comprises a band of circular shape in cross section.

5. An air outlet device as set forth in claim 1 in which the air deflecting means extending outwardly from the second mentioned flaring member comprises a band of rubber.

6. An air outlet device as set forth in claim 1 including a strut connecting the flaring members together and in which the air deflecting means extending outwardly from the second mentioned flaring member comprises a member disposed in an acute-angled corner between said strut and said second mentioned flaring member and thereby held operatively mounted against the outer side of said second mentioned flaring member.

7. An air outlet device as set forth in claim 1 including a strut connecting the flaring members together and in which the air deflecting means extending outwardly from the second mentioned flaring member comprises a ring of circular shape in cross section disposed in an acute-angled corner between said strut and said second mentioned flaring member and thereby held operatively mounted against the outer side of said second mentioned flaring member.

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