April 4, 1944. F. J. KURTH ET AL 2,345,938

AIR OUTLET DEVICE

Filed March 27, 1942

Fig. 1.

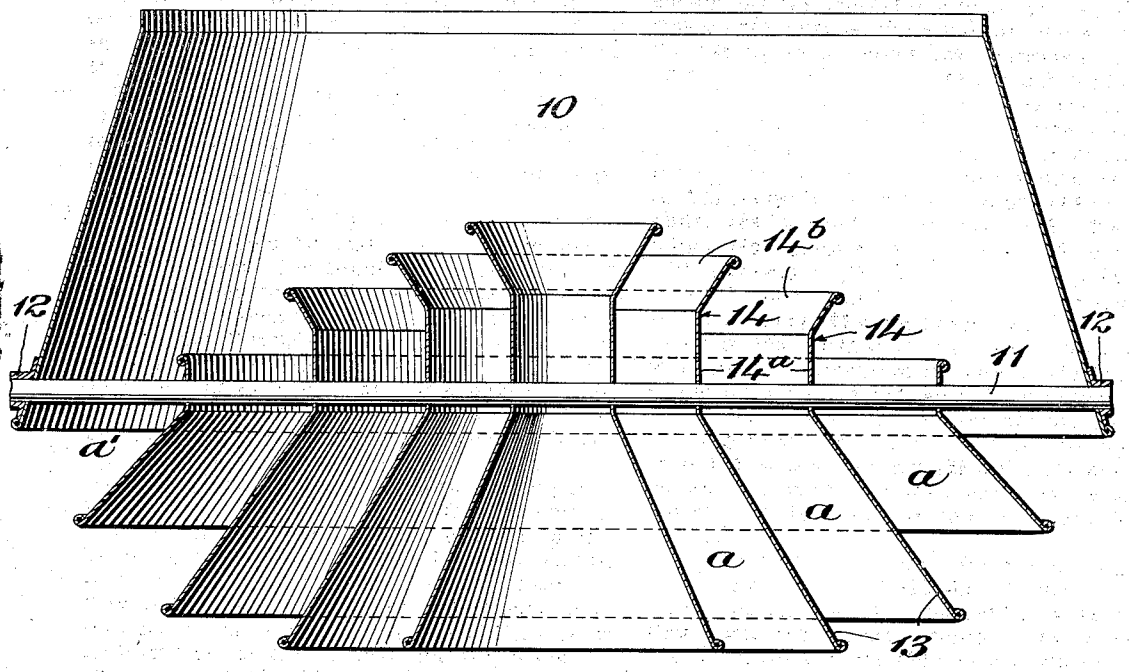


Fig. 2.

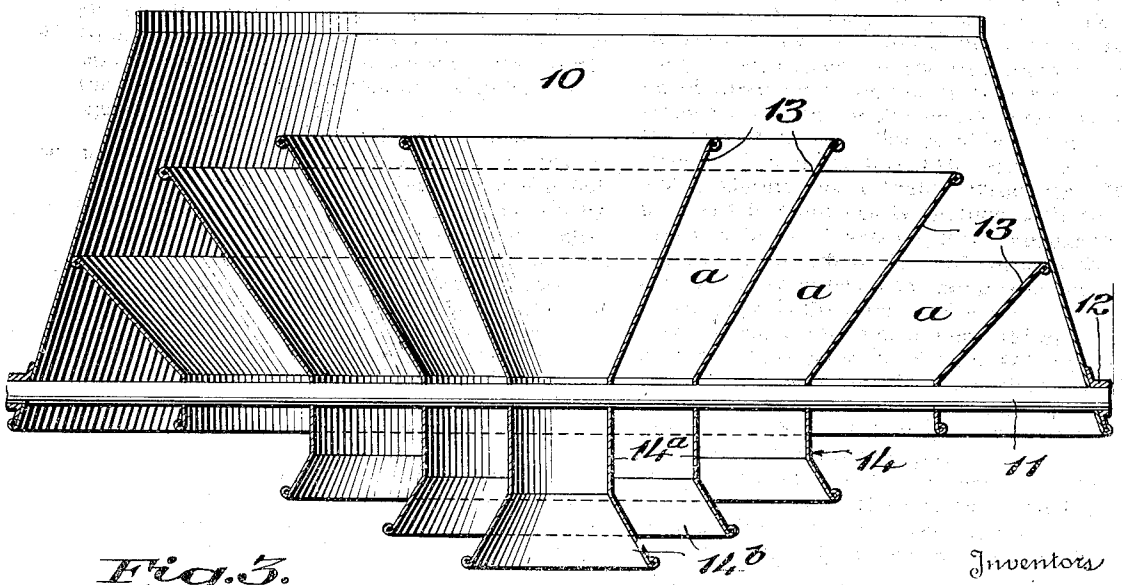
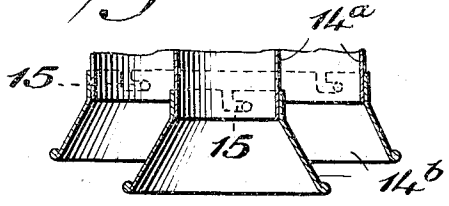


Fig. 3.



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UNITED STATES PATENT OFFICE

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AIR OUTLET DEVICE

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10 Claims. (Cl. 98—40)

This invention relates to air outlet devices for the delivery of air from air supply ducts into rooms or other enclosures, and has particular reference to an improved air outlet device of the same general type and for the same general purposes as the air outlet devices illustrated, described and claimed in our prior application, Serial No. 401,662, filed July 9, 1941 now Patent No. 2,326,858.

As in the case of the air outlet devices illustrated, described and claimed in our said prior application, our present air outlet device comprises, generally speaking, an outermost, open-ended, hollow, flaring member to be connected at its smaller or upper open end to an air supply duct, and a series of successively smaller, open-ended hollow, flaring members spaced inwardly from said outermost flaring member and also successively inwardly from one another to provide a plurality of open-ended flaring air passageways. Moreover, said series of flaring members are mounted for unitary rotation relative to said outermost flaring member to dispose either the smaller or the larger ends of said passageways upwardly to receive air supplied to the outermost flaring member through the smaller or upper end thereof, whereby, in the first instance, fresh or treated supplied air for cooling, ventilating or air conditioning purposes expands and has its velocity reduced in flowing through said flaring passageways and thereby is delivered from the device in diffused, substantially draftless form and whereby, in the second instance, warm supplied air for heating purposes is delivered from the device more or less directly downwardly so as to reach a low level in the room or other enclosure and thus effectively accomplish its intended purpose.

In connection with air outlet devices as illustrated, described and claimed in our aforesaid prior application, it has been found that, regardless of the amounts of flare of the flaring members for most effective diffusion of fresh or treated air for cooling, ventilating or air conditioning purposes when said members have their smaller ends disposed upwardly, they usually act, when their smaller ends are disposed downwardly, to direct warm air for heating purposes downwardly with too great a blast effect. Accordingly, while the general objects of our present invention are the same as the objects of the invention constituting the subject-matter of our aforesaid prior application, the special object of our present invention, as distinguished from the invention of our aforesaid prior application, is to provide an air outlet device of the character stated embodying a construction whereby the flaring members may have any desired amounts of flare for most effective diffusion of fresh or treated air for cooling, ventilating or air conditioning purposes in any particular instance, and whereby, regardless of the amounts of their flare for most effective fresh or treated air diffusion purposes, the device is effective, when the smaller ends of its rotatable flaring members are disposed downwardly, to deliver warm air for heating purposes without too great a blast effect and in a desired manner to cause it most effectively to serve its room or enclosure heating purpose without causing discomfort to occupants of the room or enclosure.

With the foregoing and other objects in view, which will become more fully apparent as the nature of the invention is better understood, the same consists in an air outlet device of the general 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:

Figure 1 is a central, vertical section through an air outlet device constructed in accordance with one practical embodiment of the invention and showing the rotatable flaring members positioned with their smaller ends disposed upwardly for air diffusion purposes.

Figure 2 is a view similar to Fig. 1 showing the rotatable flaring members positioned with their smaller ends disposed downwardly for delivery of warm air from the device in more or less blast form; and

Figure 3 is a detail view illustrating an alternative feature of the invention.

Referring to the drawing in detail, 10 designates an open-ended, hollow, flaring member to be connected in any suitable manner at its smaller or upper open end to an air supply duct (not shown) and 11 designates a horizontal shaft extending diametrically across the larger or lower open end of said member and mounted for rotation in any suitable manner as, for example, in suitable bearings 12 carried by opposite sides of said member 10 at or near the said lower end thereof.

Suitably fixed to the shaft 11 for rotation therewith as a unit is a series of successively smaller, open-ended, hollow, flaring members 13 which are spaced successively inwardly of one another to provide therebetween a series of flaring air passageways *a*.

The smaller end of the larger or outermost of

the series of flaring members 13 is of such a diameter, and is located with respect to the shaft 11, so that when said shaft is rotated to a position to dispose the smaller ends of said members 13 upwardly, as shown in Fig. 1 of the drawing, the said smaller end of the larger or outermost of said members 13 is spaced inwardly from the member 10. Accordingly, when the members 13 have their smaller ends disposed upwardly, an air passageway a' is defined between the member 10 and the said outermost of the series of members 13. Therefore, under such condition, some of the air supplied to the member 10 through the smaller or upper end thereof flows through said passageway a' and is deflected laterally outward from the device by the said larger or outermost of the flaring members 13, while the remainder of the supplied air flows through the downwardly diverging passageways a and is deflected more or less outwardly by the remaining flaring members 13, at the same time expanding in said passageways a and a' and having its velocity reduced whereby it is delivered from the device in diffused form. On the other hand, the larger end of the said larger or outermost of the series of members 13 is of such a diameter, and is spaced such a distance from the shaft 11, that when said shaft is rotated to a position to dispose the larger ends of said members 13 upwardly, as shown in Fig. 2 of the drawing, the larger end of the said larger or outermost of said members either contacts with or is disposed closely adjacent to the inner face of the member 10. Therefore under such condition, air supplied to the member 10 through its smaller or upper open end is required to flow through the passageways a between the members 13 and is directed inwardly by said members 13 due to their downward convergence when their larger ends are disposed upwardly.

In practice it has been found that, regardless of the amounts of flare of the members 13 to most effectively diffuse fresh or treated air for room cooling, ventilating or air conditioning purposes when said members are disposed with their smaller ends upwardly as shown in Fig. 1, they usually act, when they are disposed with their smaller ends downwardly, as shown in Fig. 2, to direct warm air for heating purposes downwardly with too great a blast effect to permit the warm air effectively to accomplish its purpose without causing discomfort to occupants of the room unless the said smaller end portions of said members have provision to intercept air flowing from the passageways a and to deflect it relatively outwardly. Therefore, in accordance with the present invention, the members 13 include at their smaller ends air intercepting and deflecting extensions 14 of suitable form so that when said members 13 have their smaller ends disposed downwardly, said extensions act on the air as it is about to leave the passageways a to intercept same and to deflect it either directly downwardly or downwardly and to a certain extent outwardly, whereby its tendency to follow its original direction of flow through the passageways a and to issue from the device in blast form is avoided or at least is reduced to such an extent that it is caused best to serve its intended purpose.

In the present instance the extensions 14 are illustrated as including cylindrical portions 14^a having flared free end portions 14^b to direct the air outwardly. Obviously, however, the cylindrical portions 14^a may be used if desired without flared free end portions, or flared portions such as the flared portions 14^b may be used if desired to the exclusion of cylindrical portions such as the cylindrical portions 14^a. In other words, the members 13 may simply be provided with cylindrical necks such as the necks 14^a or they may be of double frustro-conical or equivalent form with the smaller ends of its respective frustro-conical or equivalent portions directly connected with each other. In any event, the important difference between the members 13 of the present device and the corresponding mmbers of the device of our aforesaid prior application is that the members 13 of the present device are provided at their smaller ends with air intercepting and deflecting means to insure that when said members have their smaller ends disposed downwardly, warm air for heating purposes is delivered from the device practically without blast effect and yet a sufficient distance either directly downwardly or downwardly and outwardly from the device to cause it to accomplish its desired purpose. Of course, the velocity of the supplied air, the distance the device is located above the floor of a room or other enclosure and other factors must be considered in order to determine the proper form of the extensions 14, but in any given instance said extensions may be of proper form in consideration of the factors involved to insure delivery of warm air for heating purposes from the device in a manner best to accomplish the heating purpose and without causing discomfort to occupants of the room or other enclosure into which the warm air is delivered. For example, if the distance from the device to the floor of the room or other enclosure is great, air deflecting extensions such as the cylindrical extensions 14^a may be used without flaring free end portions such as the flaring portions 14^b. On the other hand, if the distance from the device to the floor of the room or enclosure is not so great, flaring deflecting portions such as the portions 14^b may be used either at the free ends of cylindrical or equivalent neck portions such as the neck portions 14^a or such portions 14^b may be directly connected at their smaller ends to the smaller ends of the members 13.

When the members 13 have their smaller ends disposed upwardly they serve to deflect supplied air downwardly and outwardly, and when they have their smaller ends disposed downwardly they serve to deflect supplied air downwardly and inwardly. Therefore, the invention resides essentially in the provision of air intercepting and deflecting means at the smaller ends of said members 13 so that when said members have their smaller ends disposed downwardly the air as it leaves the passageways a is prevented from continuing in the same downward and inward direction as during its flow through said passageways and is deflected either downwardly or downwardly and outwardly to a greater or lesser extent than it is deflected downwardly and outwardly by the members 13 when said members have their smaller ends disposed upwardly, depending upon circumstances in particular instances. In short, the members 13 include air deflecting portions at both ends thereof, but usually these portions are different from each other in one way or another so that when said members have their smaller ends disposed downwardly the supplied air is caused to flow more directly downwardly and to a lesser extent outwardly than when said members have their smaller ends disposed upwardly.

Obviously, the essential difference in the air deflecting end portions of the members 13 may be obtained in different ways. For example, cylindrical or equivalent neck portions such as the neck portions 14a may, as aforesaid, be used to the exclusion of flared portions such as the flared portions 14b. On the other hand, if flared portions such as the flared portions 14b are used, either in conjunction with or to the exclusion of neck portions such as the neck portions 14a, such flared portions 14b may have lesser amounts of flare than the members 13 and may be of any suitable length either the same as or different from the lengths of the members 13, or, alternatively, such portions 14b may have the same or even greater amounts of flare as the members 13 and may be either shorter or longer than said members 13 depending, as aforesaid, upon circumstances in particular instances.

Obviously, the flaring members 10 and 13 may be of straight-wall, frustro-conical form as shown or of any other generally equivalent form. Moreover, any suitable means may be employed to rotate the shaft 11 to reverse the members 13 and likewise any suitable means may be employed to hold said members 13 in either of their two operative positions. Furthermore, the air deflecting portions 14 may be provided either as fixed parts of the members 13 or as parts separate from said members and may be detachably connected thereto in any suitable manner so as to be interchangeable with similar but specifically different portions to obtain best results in any given instance. For example, the portions 14b may be removably, replaceably mounted on the necks 14a as by means of bayonet joints 15 as illustrated in Fig. 3 of the drawing.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

We claim:

1. An air outlet device comprising an open-ended hollow flaring member for connection at its smaller or upper open end to an air supply duct, a series of successively smaller open-ended hollow flaring members spaced inwardly from said first mentioned flaring member and from each other to provide a series of flaring air passageways therebetween, pivot means having a fixed location with respect to said first mentioned member and mounting said series of flaring members for rotation to dispose either the smaller or the larger ends of said passageways upwardly in receiving relationship to air supplied to said first mentioned flaring member through the smaller or upper end thereof, and air deflecting means at the smaller ends of the flaring members of said series effective, when said series of flaring members have their smaller ends disposed downwardly, to intercept air flowing downwardly and inwardly through said passageways and to deflect it outwardly relative to its direction of flow through said passageways.

2. An air outlet device comprising an open-ended hollow flaring member for connection at its smaller or upper open end to an air supply duct, a series of successively smaller open-ended hollow flaring members spaced inwardly from said first mentioned flaring member and from each other to provide a series of flaring air passageways therebetween, pivot means having a fixed location with respect to said first mentioned member and mounting said series of flaring members for rotation to dispose either the smaller or the larger ends of said passageways upwardly in receiving relationship to air supplied to said first mentioned flaring member through the smaller or upper end thereof, and substantially cylindrical extensions at the smaller ends of the flaring members of said series effective, when said series of flaring members have their smaller ends disposed downwardly, to intercept air flowing downwardly and inwardly through said passageways and to deflect it outwardly relative to its direction of flow through said passageways.

3. An air outlet device comprising an open-ended hollow flaring member for connection at its smaller or upper open end to an air supply duct, a series of successively smaller open-ended hollow flaring members spaced inwardly from said first mentioned flaring member and from each other to provide a series of flaring air passageways therebetween, pivot means having a fixed location with respect to said first mentioned member and mounting said series of flaring members for rotation to dispose either the smaller or the larger ends of said passageways upwardly in receiving relationship to air supplied to said first mentioned flaring member through the smaller or upper end thereof, and flared extensions at the smaller ends of the flaring members of said series effective, when said series of flaring members have their smaller ends disposed downwardly, to intercept air flowing downwardly through said passageways and to deflect it outwardly relative to the vertical axis of the device.

4. An air outlet device as set forth in claim 3 in which the flared extensions at the smaller ends of the series of flaring members have lesser amounts of flare than said member, respectively.

5. An air outlet device as set forth in claim 3 in which the flared extensions at the smaller ends of the series of flaring members are of lesser length than said flaring members, respectively.

6. An air outlet device as set forth in claim 2 including flared extensions at the free ends of the cylindrical extensions.

7. An air outlet device as set forth in claim 1 in which the air deflecting means at the smaller ends of the flaring members of the rotatable series are removably replaceably mounted on the said smaller ends of said members.

8. An air outlet device as set forth in claim 3 in which the amounts of flare of the flared extensions at the smaller ends of the series of flaring members are different from the amounts of flare of said flaring members.

9. An air outlet device as set forth in claim 3 in which the lengths of the flared extensions at the smaller ends of the series of flaring members are different from the lengths of said flaring members.

10. An air outlet device as set forth in claim 3 in which the flared extensions at the smaller ends of the series of flaring member differ in amounts of flare and in length from said flaring members, respectively.

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