March 9, 1954 F. J. KURTH 2,671,394

AIR DISTRIBUTING DEVICE

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Fig. 1.

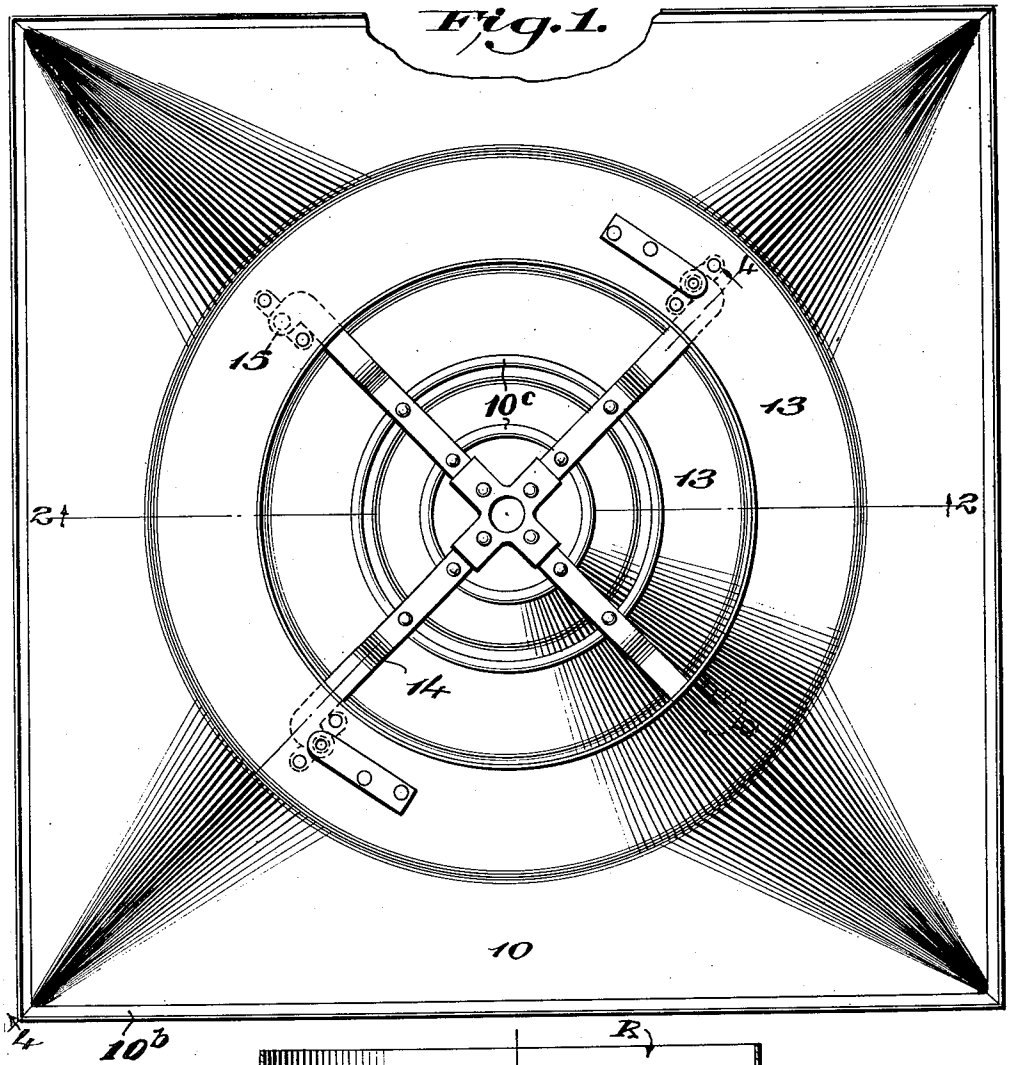

Fig. 2.

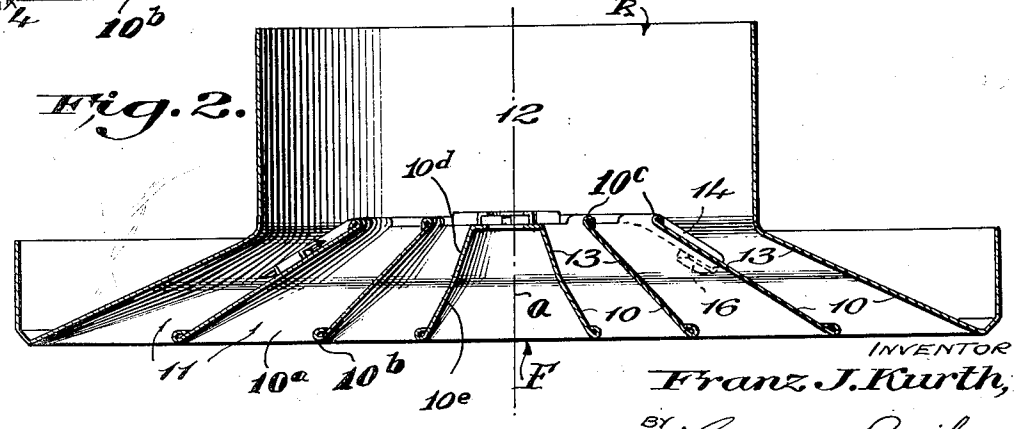

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Fig. 3.

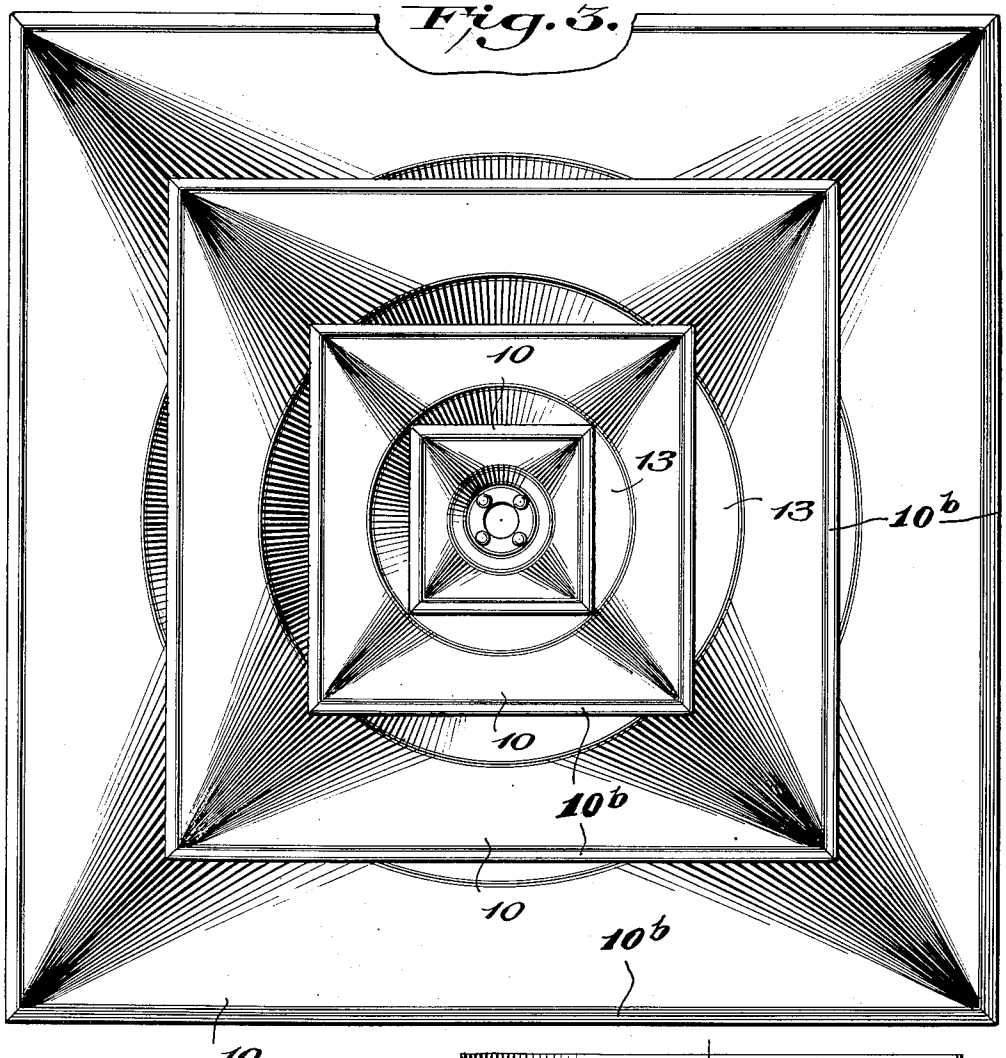
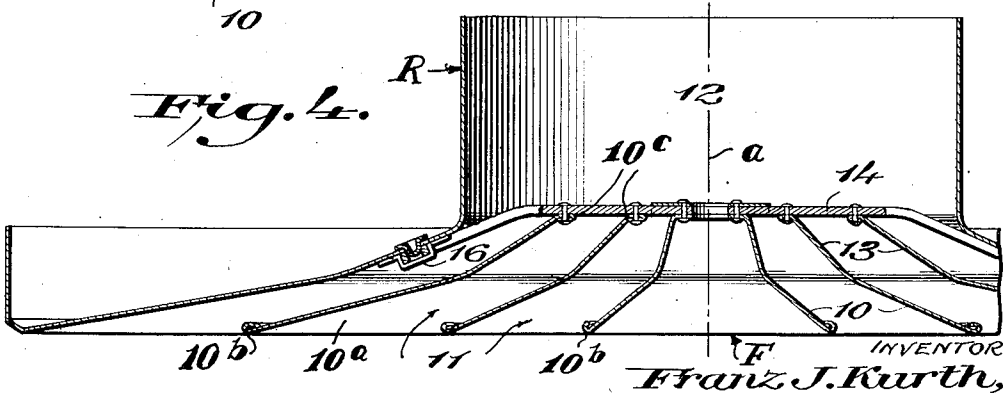


Fig. 4.



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UNITED STATES PATENT OFFICE

2,671,394

AIR DISTRIBUTING DEVICE

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15 Claims. (Cl. 98—40)

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This invention relates to air distributing devices for effecting diffused delivery of air from air supply ducts into rooms and other enclosures for heating, cooling, ventilating or other purposes, and has particular reference to improvements in air distributing devices of the known general type comprising a plurality of successively smaller, open-ended, hollow, forwardly flaring members which are disposed successively inwardly of and in spaced apart relationship to one another, whereby air delivered forwardly through the device is divided into a plurality of separate streams and is deflected more or less laterally from the device by said members so that the air is delivered into the room or other enclosure in diffused form over a substantial portion of the area thereof.

In devices of the type referred to the flaring members may be of either frustro-conical form or of frustro-pyramidal form. However, in instances where said members heretofore have been of frustro-pyramidal form they usually have had more or less sharply peaked ridges at their corners where the ends of their flat, inclined sides meet, and these ridges have had the effect of dividing the air which is delivered toward the corners of the devices and of deflecting it toward the adjacent sides of the devices. As a consequence, practically all of the air which has been supplied to devices of the type referred to which have flaring members of pyramidal form, have been delivered from the sides of the devices and there has been little or no air delivered from the corners of such devices, which has proven quite disadvantageous since it usually is desirable to have substantially equal amounts of air delivered in all directions laterally from such devices.

In many instances it is desirable to employ devices of the type referred to the flaring members of which have at least their front ends of square or other polygonal shape and which devices are effective to deliver substantially as much air from their corners as from their sides. Accordingly, the primary object of the present invention is to provide a device of the character referred to the flaring members of which are of square or other desired polygonal shape at their front ends and at least the rear, air deflecting faces of which develop gradually from square or other polygonal shape at their front ends to circular or substantially circular shape at their rear ends, whereby there are avoided any air deflecting ridges in said members and there is obtained practically as much flow of air from the corners of the devices as from the sides thereof so that the devices advantageously deliver practically equal

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volumes of air in all directions laterally therefrom.

Stated another way, the shapes of the flaring members of the present device, or at least the shapes of the rear, air deflecting surfaces of said members, are generated by a straight line one end of which moves along the circumference of a circle and the other end of which moves along the perimeter of a rectangle, or other polygon, under conditions where the circle and the rectangle or other polygon are spaced apart and are axially alined with each other and are disposed at right angles to their common axis. Thereby said members, or at least their rear, air deflecting surfaces, gradually develop, as aforesaid, from square or other polygonal shape at their front ends to circular shape at their rear ends with the advantages stated.

Another special and important object of the invention is to provide a device of the character referred to wherein the flaring members are of polygonal shape at their front ends, develop gradually to circular or substantially circular shape toward their rear ends, and have their rear end portions of frustro-conical or substantially frustro-conical form to initiate lateral deflection of the supplied air in all directions laterally from the device.

With the foregoing and other objects in view, as will become more fully apparent as the invention is better understood, the same consists in an air distributing device including the novel features of construction, combination and arrangement of parts as are illustrated by way of example in the accompanying drawings and as will be hereinafter more fully described and claimed.

In the accompanying drawings, wherein like characters of reference denote corresponding parts in the different views:

Fig. 1 is a rear elevation of an air distributing device constructed in accordance with the invention.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a front elevation of the device; and

Fig. 4 is a section on the line 4—4 of Fig. 1.

Referring to the drawings in detail, it will be observed that the present air distributing device, according to the specific illustrated embodiment thereof, is of a known general type comprising a plurality of successively smaller open-ended, hollow members 10 which flare toward the front end F of the device, taper toward the rear end R of the device and which are disposed successively inwardly of and in spaced apart relationship to each other to provide a plurality of successively

smaller, forwardly flaring air passageways 11 therebetween.

A neck 12 extends rearwardly from the smaller or rear end of the larger or outermost member 10 to adapt the device for connection with an air supply duct, and when air is supplied through said neck it is divided by the members 10 into a plurality of separate streams which flow forwardly through the passageways 11 and are deflected laterally from the device by said flaring members. The air thereby is delivered from the device in diffused form throughout a substantial area forwardly and laterally relative to the device.

The members 10, of which there may be as many as desired, may have equal or unequal amounts of flare, as desired, and their smaller or rear ends may be successively smaller so that they are disposed successively inwardly of one another, as shown, whereby air is delivered through each of the passageways 11. Alternatively, the rear end of any of the members 10 may, in accordance with known practice and as disclosed for example in Kurth Patent No. 2,142,134 of January 3, 1939, be smaller than the rear end of the next smaller member so that its rear end is disposed inwardly with respect to the rear end of the said next smaller member 10 to prevent supplied air from entering the passageway 11 between such members and to cause the supplied air to flow across the mouth or rear end of such passageway, thereby to cause a rearward or aspirating flow of air through such passageway and consequent mixing within the device of part of the supplied air with part of the room or other enclosure air. Moreover, the present device may be modified in various other ways in accordance with known practices. Essentially, however, each of the members 10 of the present device is of square or other desired polygonal shape at its front terminus 10^a, has its front, straight edges 10^b disposed in a common plane extending preferably at right angles or in any event, transversely relative to the longitudinal axis *a* of the device, and is of circular or substantially circular shape at its rear terminus 10^c. Moreover, each of said members 10, or at least its rear, air deflecting face 10^d, is formed so that it develops gradually from square or other desired polygonal shape at the front terminus 10^a of the member to circular or substantially circular shape toward the rear terminus 10^c of the member. Thus, as distinguished from prior devices of the present general type wherein the flaring members are of pyramidal form and have at the junctions of their sides sharp ridges which deflect the supplied air away from the corners and toward the sides of the members, due to the said developing of said members, there are avoided in the present flaring members 10 any such sharp ridges and instead said members are rounded at the junctions of their sides, with the result that the supplied air flows substantially as freely to the corners of the present flaring members as to the sides thereof. Consequently, practically as much air is delivered from the corners of the present device as from the sides thereof so that there is, advantageously, delivery of substantially equal amounts of air in all directions laterally from the present device.

Preferably the rear portions 13 of the present flaring members 10 are of frustro-conical or substantially frustro-conical form to initiate flow of the supplied air in substantially equal amounts in all directions laterally through the passageways 11. If desired, however, any or all of said members 10 may be devoid of a frustro-conical or substantially frustro-conical rear portion. Moreover, in instances where any of the present flaring members has a frustro-conical or substantially frustro-conical rear portion, such portion preferably has the same amount of flare as the front portion of the member in a plane which includes the longitudinal axis *a* of the device and which extends midway between the ends of any two adjacent corners at the front end of the member. However, the front and rear portions of the flaring members may have any desired different amounts of flare.

While ordinarily devices constructed in accordance with the present invention will be composed of more than two flaring members, it is apparent that, if desired, any device constructed in accordance with the invention may include only two members, the outermost of which may be of any suitable form and the innermost of which may be formed as described or the innermost of which may be of any suitable form to deflect air against the front face 10^e of the outermost member and the said front face of the latter member may be of the form described to deflect the air substantially uniformly in all directions forwardly and laterally outward from the device. Moreover, it will further be apparent that the present flaring member or members 10 may be formed from sheet material or may be cast from any desired material and that, in either case, it is essential only that the air deflecting face or faces of said member or members, as the case may be, shall be formed as hereinbefore described. Furthermore, it will be understood that the front ends of the members 10 may be disposed either in a common plane or in different planes, as desired, also, that the rear ends of said members 10 may likewise be disposed either in a common plane or in different planes, as desired.

The members 10 may be connected together in spaced apart relationship to each other by means of struts in accordance with known practice or in any other suitable manner. In this connection and as illustrated by way of example in the drawings, all except the larger or outermost of said members are connected together as a unitary assemblage by arms 14 which have hook-like outer ends 15 engageable in and disengageable from suitable keepers 16 carried by the larger or outermost member 10 by slight rotation of said unitary assemblage relative to said larger or outermost member 10. Thus, the unitary assemblage of the member 10 may readily be removed from and mounted in the larger or outermost member to facilitate installation of the device in accordance with the general teaching of Kurth Patent No. 2,229,747 of January 28, 1941.

From the foregoing description considered in connection with the accompanying drawings, it is believed that the construction of the present device will be clearly understood and that its advantages will be appreciated. It is desired to point out, however, that while only a single, specific structural embodiment of the device has been illustrated and described, the same is readily capable of various other specifically different structural embodiments within the spirit and scope of the invention as defined in the appended claims.

I claim:

1. An air distributing device including a member having a rear face flaring forwardly relative to the longitudinal axis of the device to effect lateral deflection of air delivered forwardly there-

against, and means for directing air forwardly against the rear face of said member, the front edge of said member being of polygonal shape, the rear face of said member developing continuously and progressively from polygonal shape at its front end to substantially circular shape toward its rear end.

2. An air distributing device as set forth in claim 1 in which the member is of rectangular shape at its front edge.

3. An air distributing device as set forth in claim 1 in which the member is of square shape at its front edge.

4. An air distributing device comprising a plurality of successively smaller, open-ended, hollow, forwardly flaring members, means mounting said members successively inwardly of and in spaced apart relationship to one another so that they are effective to divide air supplied to the rear end of the device into a plurality of separate streams and to effect lateral deflection of the streams, the front edges of said members being of polygonal shape, said members developing continuously and progressively from polygonal shape at their front edges to substantially circular shape toward their rear ends.

5. An air distributing device as set forth in claim 4 in which the members are of rectangular shape at their front edges.

6. An air distributing device as set forth in claim 4 in which the members are of square shape at their front edges.

7. An air distributing device including a member having a rear face flaring forwardly relative to the longitudinal axis of the device to effect lateral deflection of air delivered forwardly thereagainst, and means for directing air forwardly against the rear face of said member, the front edge of said member being of polygonal shape, the rear face of the rear portion of said member having the shape of the outer face of a frustrum of a cone, the rear face of the front portion of said member developing continuously and progressively from polygonal shape at its front edge to circular shape at its line of junction with the frustro-conical rear face of the rear portion of said member.

8. An air distributing device as set forth in claim 7 in which the member is of rectangular shape at its front edge.

9. An air distributing device as set forth in claim 7 in which the member is of square shape at its front edge.

10. An air distributing device as set forth in claim 7 in which the rear face of the front portion of the flaring member, in a plane including the longitudinal axis of said member and passing midway between the ends of any of its front edges, has the same angle of flare as the frustro-conical rear face of the rear portion of said member.

11. An air distributing device comprising a plurality of successively smaller, open-ended, hollow, forwardly flaring members, means mounting said members successively inwardly of and in spaced apart relationship to one another so that they are effective to divide air delivered forwardly through the device into a plurality of separate streams and to effect lateral deflection of the streams, the front edges of said members being of polygonal shape, the rear portions of said members being of frustro-conical shape, the front portions of said members developing continuously and progressively from polygonal shape at their front edges to circular shape at their lines of junction with said frustro-conical rear portions.

12. An air distributing device as set forth in claim 11 in which the members are of rectangular shape at their front edges.

13. An air distributing device as set forth in claim 11 in which the members are of square shape at their front edges.

14. An air distributing device including a member having a front face flaring forwardly relative to the longitudinal axis of the device to effect deflection of air delivered thereagainst, means for delivering air forwardly through the device, and means for deflecting the air so delivered against the said front face of said member, the front edge of said member being of polygonal shape, the rear edge of said member being of circular shape, and the said front face of said member developing continuously and progressively from polygonal shape at the front edge of the member to circular shape toward the rear edge of the member.

15. An air distributing device as set forth in claim 14 in which the member is of rectangular shape at its front edge.

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