May 8, 1951 R. N. TRANE ET AL 2,552,236

ADJUSTABLE AIR DISTRIBUTOR

Filed Oct. 19, 1946 4 Sheets-Sheet 1

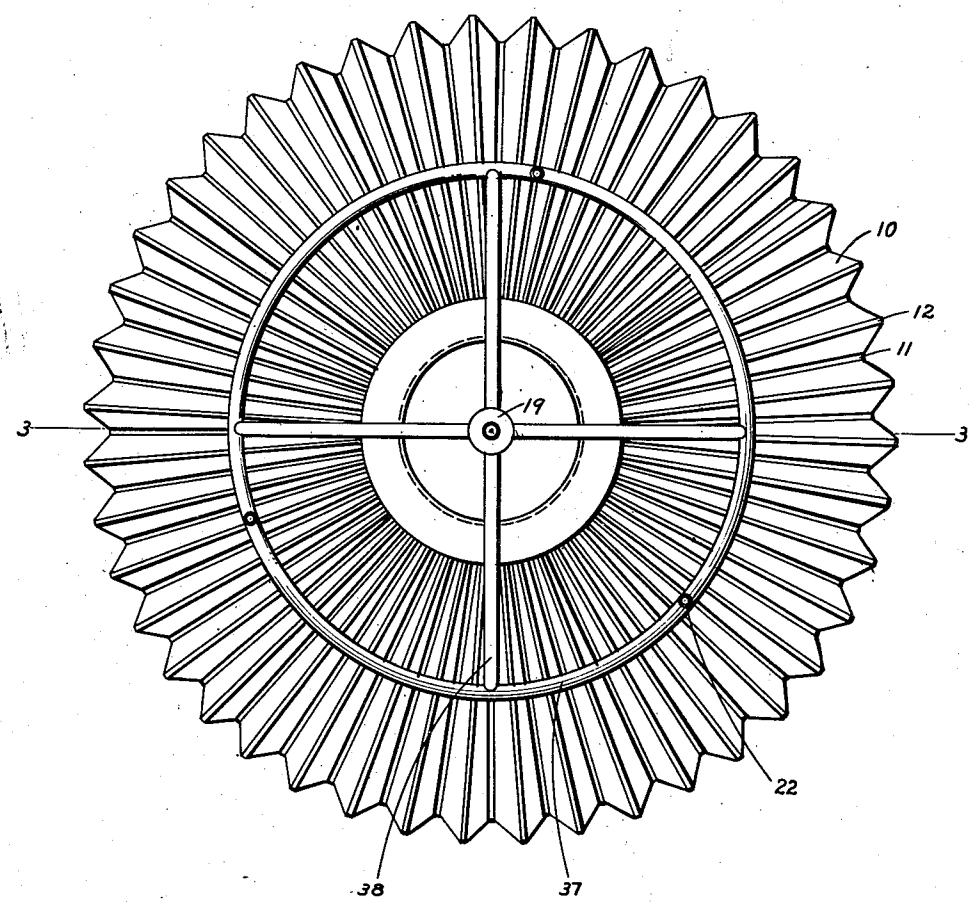



FIG. 1

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ADJUSTABLE AIR DISTRIBUTOR

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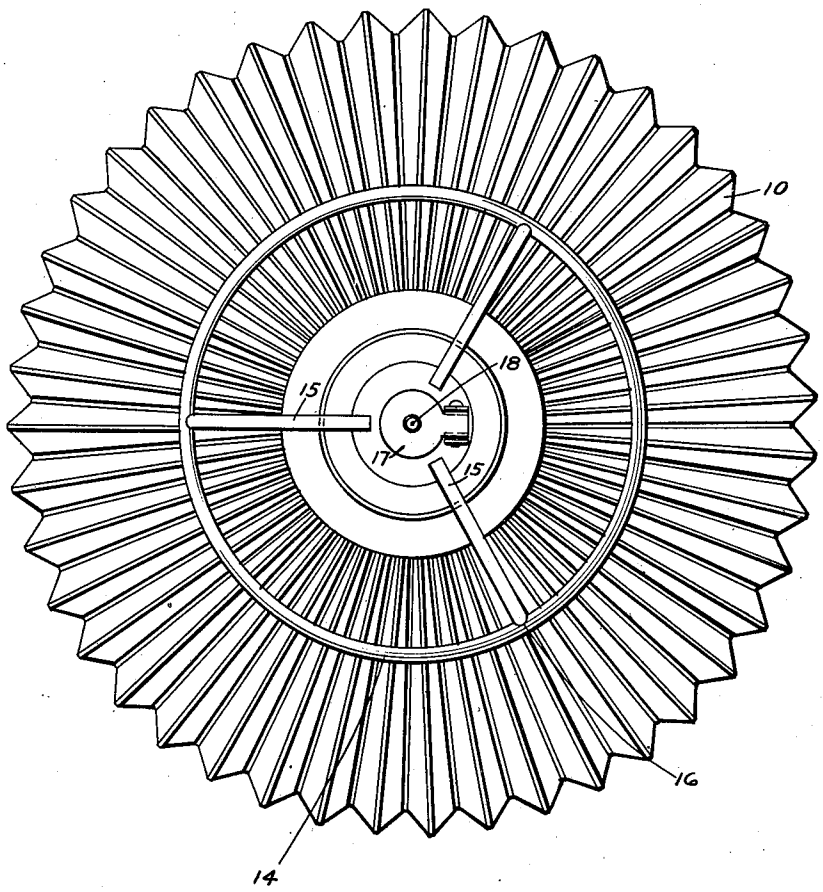



FIG. 2

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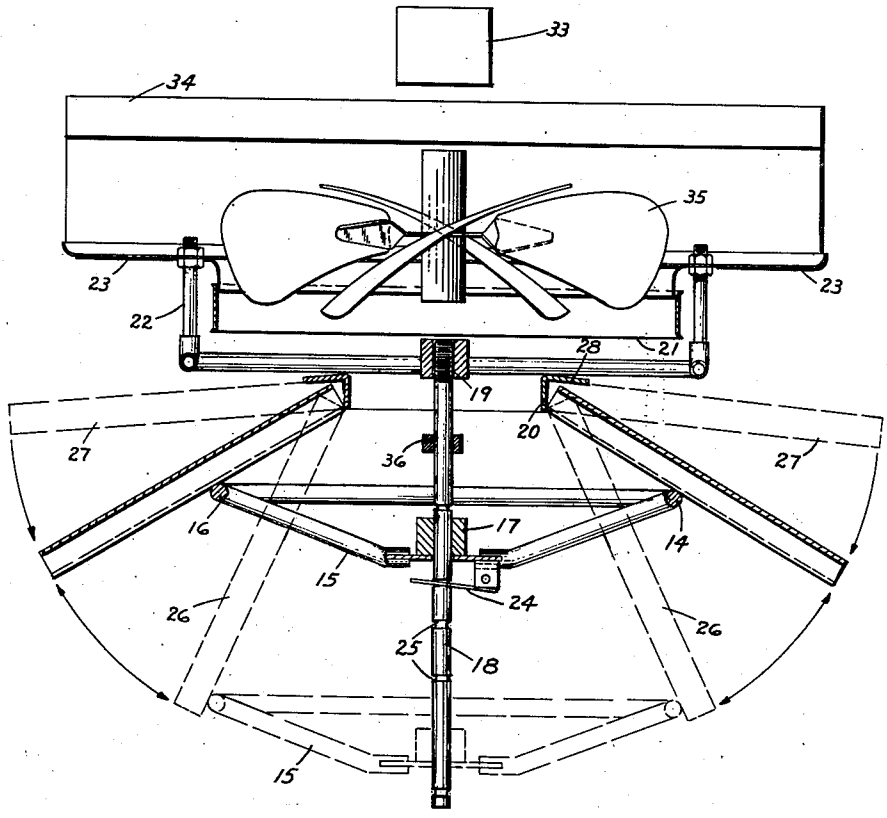



FIG. 3

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ADJUSTABLE AIR DISTRIBUTOR

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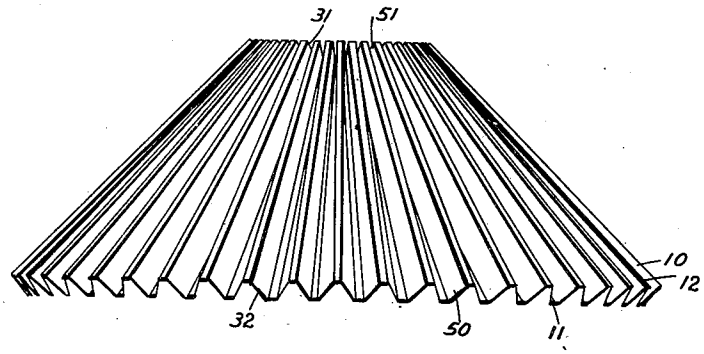



FIG. 4

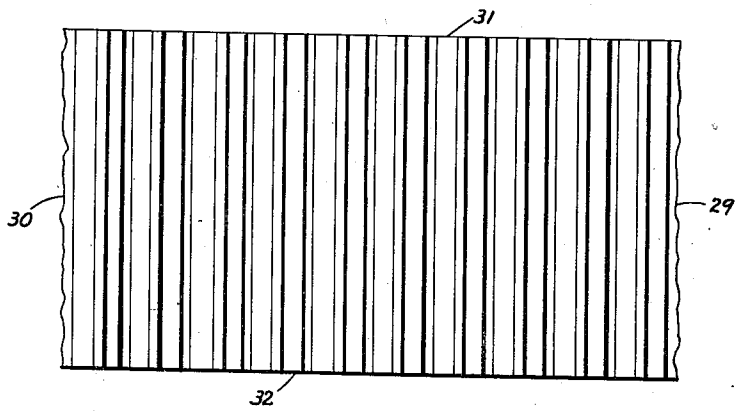



FIG. 5




FIG. 6

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2,552,236

# UNITED STATES PATENT OFFICE

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## ADJUSTABLE AIR DISTRIBUTOR

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11 Claims. (Cl. 98—40)

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This invention relates to an adjustable metal distributor particularly adapted for the use of high velocity air in heating and cooling, and is adapted to be mounted either on unit heaters or ducts emitting conditioned air.

One of the objects of this invention is a metal distributor of durable type, adaptable to be easily adjusted to vary the deflection of the air from the path of discharge.

Another object of this invention is a construction of a cheap annular distributor in the form of a frustum of a cone which can be easily adjusted to an arc of substantially 60°.

The above and other objects of this invention will be apparent in the following specification and drawings, in which:

Fig. 1 is a top plan view.

Fig. 2 is a bottom plan view.

Fig. 3 is a cross section taken on the line 3—3 of Fig. 1.

Fig. 4 is a side view of the distributor.

Fig. 5 is a plan view of the corrugated sheet before the ends are secured together to form a conical shape.

Fig. 6 is a side view of the edge of the corrugated sheet shown in Fig. 5.

The adjustable distributor 10 comprises a flat sheet of metal which has been corrugated to form ribs 11 and 12, and the ends of the corrugated sheet are fastened together at 13 so that the corrugated sheet tends to assume the position of a truncated cone, shown in Fig. 4, in which the furrows 50 at the outer edge have a larger distance between the ribs than the furrows 51 at the inner edge, and the furrows become progressively larger toward the outer edge.

Referring to Figure 5, which shows the corrugated sheet with its ends 29 and 30, and its side edges 31 and 32. When its ends 29 and 30 are bonded together there is formed a tube with a longitudinal corrugated wall with the corrugations lying within circles of equal diameter, which are hereafter referred to as the normal diameter of the tube. Then the corrugations on the side 31 are compressed whereby all of the corrugations lie within a circle of predetermined diameter less than said normal diameter. The diameter of the figure formed by compressing the corrugations of the side 31 determines the diameter of the figure formed by the corrugated side 32, the corrugations of which will lie within a circle with a diameter larger than said normal diameter. The spring tension of the metal in the corrugations when compressed at one end of the furrows, will tend to widen or extend the furrows at the other

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end, and the distributor will assume the shape of a truncated cone due to the said spring tension, which shape will be retained until deformed by another force.

The predetermined circumference of the circle, enclosing the figure formed by the corrugated side 31, when compressed, would be substantially equal to the circumference of the annular yoke 20, into which the corrugated distributor formed by the side 31 is positioned; and the yoke positions and restricts the movement of the corrugated distributor. The distributor as above described, assumes the shape of a truncated cone with top fitting into the annular yoke 20. The corrugated surface or side of the cone comprising the distributor may be moved through an arc having as its axis the annular yoke 20. The arc would be of the order of 50°. In this distributor, with the shape of a truncated cone, the side 32 would be in a plane forming the base of the cone; and the corrugated side 31, the top, would be in a plane parallel with the base.

The distributor is made of relatively thin metal so that when it has assumed the shape of a truncated cone as shown in Fig. 4, it will tend to retain that shape without other force, and when other force is used to deform the shape, and then withdrawn, the distributor will return to the original cone shape without the use of other force than the spring tension of the metal.

For example, the movable yoke 14, operating on the stem 18, may be manually moved axially toward the yoke 20 which will move the sides of the distributor upward, deforming the shape of the truncated cone, and decreasing the angle formed by the side of the cone, with the base of the cone. When the yoke 14 is moved axially away from the yoke 20, the distributor will move downward due to the spring tension, tending to restore the distributor to its original position; thus increasing the angle formed by the side of the cone with the plane of the base of the cone.

The corrugated distributor as has been described, may be attached to duct work or to the outlet of the unit heater, and when it is attached to duct work it would be supported by an annular yoke 14 with radial strut members 15 attached to the annular yoke at 16, and to a collar 17, which is slidably mounted upon the stem 18, which stem is fixably mounted into a portion of the structure of the heat exchanger at 19.

In Fig. 3, the bottom portion of the unit heater is shown which has a fan 35 and outlet 21, a supporting spider 22, a portion of the casing 23,

and in which the conventional motor 33 and heating element 34 are shown.

The collar 17 is slidably mounted on the stem 18 and when moved axially, the yoke 14 in conjunction with the yoke 20 will cause a movement of the distributor 10, whereby the furrows in the outer edge 32 will be increased. This movement also changes the angle of deflection of the air emitting from the fan outlet.

The position of the collar 17 on the stem 18 may be fixed by the latch 24, co-acting with the grooves 25 in the stem 18, so that the collar 17 will remain in a fixed position until it is released by the latch 24; and when the collar 17 is so released and moved axially away from the yoke 20, the yoke 14 will move away from the yoke 20 and the distributor 10 will follow the yoke 14 because of the spring tension in the corrugations without any other force, and will assume the position shown by the dotted line 26. When the yoke 14 is moved to its upper limit, the distributor 10 will be shown by the dotted line 27.

The annular yoke 20 has a flange 28 which defines the upper limit of movement of the distributor 10. There is also a stop 36 on the stem 18 which limits the axial movement of the yoke 14 so as to prevent the movement of the distributor 10 above the dotted lines shown at 27.

Attached to the supporting means 22 is an annular ring 37, with spokes 38, attached to a collar 19, into which is secured the stem 18.

In operation it is obvious that there has been shown an adjustable distributor, adaptable to be positioned in different radial planes with respect to the flow of air from the outlet 21, whereby the air from the outlet 21 will be deflected radially as desired within the limits of the adjustment.

One of the main advantages of the corrugations in the distributor 10 is the individual air streams that are generated thereby. Another advantage of the corrugated edge 32, whereby the corrugations at that point are extended, is to increase the peripheral edge of the distributor which increases the amount of induced air.

Having thus described our invention what we claim is:

1. An air distributor comprising a sheet metal deflector having generally the shape of a truncated cone and having corrugations extending substantially in the direction of the elements of the truncated cone, said corrugations increasing in width from the small end to the large end of the truncated cone, means supporting the sheet metal deflector at its small end and an annular member inside the sheet metal deflector and substantially concentric therewith for supporting the same at portions spaced from the small end.

2. An air or gas distributor comprising a hollow corrugated member having the general shape of the conical surface of a truncated cone, a frame supporting the hollow corrugated member at its small end, an annular member having a diameter greater than that of the small end of said hollow corrugated member and supporting said hollow corrugated member internally at portions spaced from its small end, said annular member being mounted on said frame for adjustment toward and from the small end of said hollow corrugated member to adjust the cone angle of said hollow corrugated member.

3. An air or gas distributor comprising a corrugated sheet metal member having the general shape of the conical surface of a truncated cone, a frame, a first annular member secured to said frame and supporting the corrugated sheet metal member at its small end, a second annular member inside of and supporting said corrugated sheet metal at portions spaced from said first annular member, said second annular member having an outside diameter greater than that of said first annular member, and means supporting said second annular member on said frame for adjustment toward and from said first annular member to adjust the cone angle of said corrugated sheet metal member.



4. A distributor for a heat exchanger comprising a corrugated sheet metal tube having open ends and having the general shape of a truncated cone, a frame adapted to be secured to a heat exchanger, a first annular member secured to said frame and supporting the corrugated sheet metal tube at its small end, said frame having an extension passing through the opening of the small end of said corrugated sheet metal tube, a second annular member mounted on said extension of said frame and supporting said corrugated sheet metal tube at points spaced from the small end of said corrugated sheet metal tube.

5. An air distributor for directing the flow of air from an outlet comprising a sheet metal deflector having generally the shape of a truncated cone and having corrugations extending substantially in the direction of the elements of the truncated cone and increasing in size from the small end to the large end of the truncated cone, an annular member adapted to be secured to the outlet and supporting said sheet metal deflector at its small end, and a second annular member inside the sheet metal deflector and mounted for adjustment toward and from said first annular member to adjust the sheet metal deflector to a different cone angle.

6. An air distributor for a heat exchanger comprising frame means adapted to be fastened to a heat exchanger, annular means fixed to said frame means, elongated means having notches and being fixed to said frame means, supporting means slidably mounted on said elongated means, detent means on said supporting means and engageable with one of the notches of said elongated means to hold the supporting means in adjusted position on the elongated means, and a corrugated hollow deflector having generally the shape of the conical surface of a truncated cone and supported at its small end by said annular means and being further supported by said supporting means at portions spaced from its small end.

7. An air distributor for directing the flow of air from an outlet comprising a corrugated elastic tube which in its normal free position assumes a substantially cylindrical shape, means supporting one end of said elastic tube to a size having a predetermined diameter, and means spaced from said one end of said elastic tube and supporting said elastic tube at a portion spaced from said one end of said elastic tube to a size having a diameter greater than said predetermined diameter so that the tube has generally the shape of the frustum of a cone.

8. An air distributor for directing the flow of air from an outlet comprising a corrugated resilient metal tube having a free shape such that its normal diameter is substantially constant along the length of the tube, means supporting one end of the tube to a size having a predetermined diameter, and means spaced from said one end of the tube and supporting the tube at

a portion spaced from said one end of the tube to a diameter greater than said predetermined diameter.

9. An air distributor for directing the flow of air from an outlet comprising a corrugated resilient metal tube having a free shape such that its normal diameter is substantially constant along the length of the tube, means supporting one end of the tube to a size having a predetermined diameter, and means spaced from said one end of the tube and supporting the tube at a portion spaced from said one end of the tube to a diameter greater than said normal diameter so that the tube has generally the shape of a frustum of a cone.

10. An air distributor for directing the flow of air from an outlet comprising a resilient tube having corrugations extending generally in the direction of the length of the tube, said tube being generally circular in cross-section and having a free shape such that the normal diameter is substantially the same along the length of the tube, means supporting one end of said resilient tube to a size having a diameter less than said normal diameter of said resilient tube, and means spaced from said one end of said resilient tube and supporting said resilient tube at a portion spaced from said one end to a diameter greater than the normal diameter of said resilient tube so that said resilient tube has generally the shape of a frustum of a cone.

11. An air distributor for directing the flow of air from an outlet comprising a resilient tube having longitudinal corrugations, said resilient tube having a free shape such that its normal diameter is substantially the same along its length, frame means adapted to be secured to the outlet, annular means on said frame means and supporting one end of said resilient tube to a predetermined diameter, and means mounted for adjustment on said frame means and supporting said resilient tube at a portion spaced from said one end so that the diameter of said resilient tube at said portion is greater than said normal diameter of said resilient tube so that said resilient tube has generally the shape of the frustum of a cone.



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