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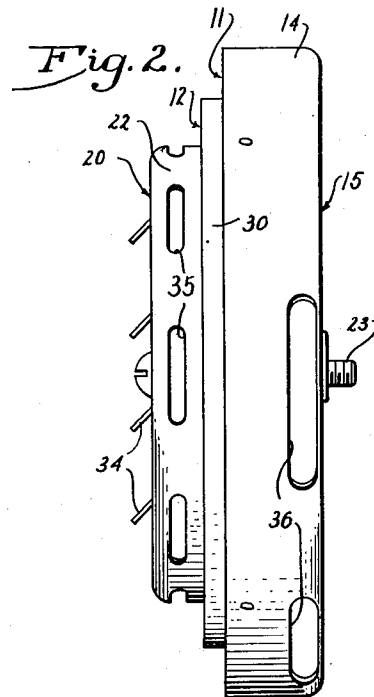
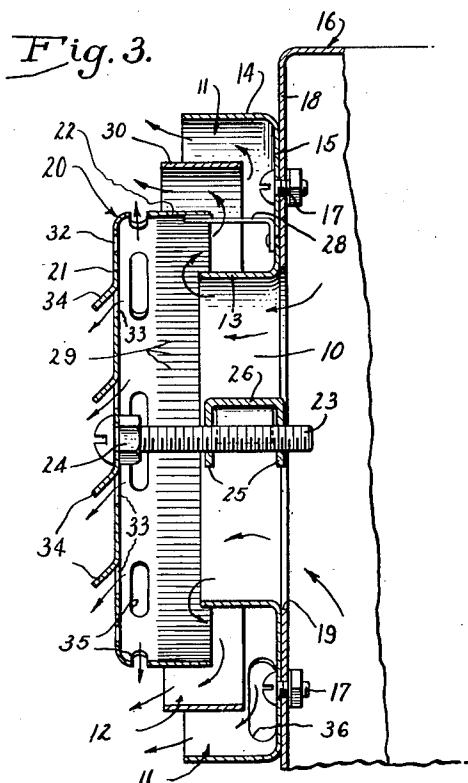
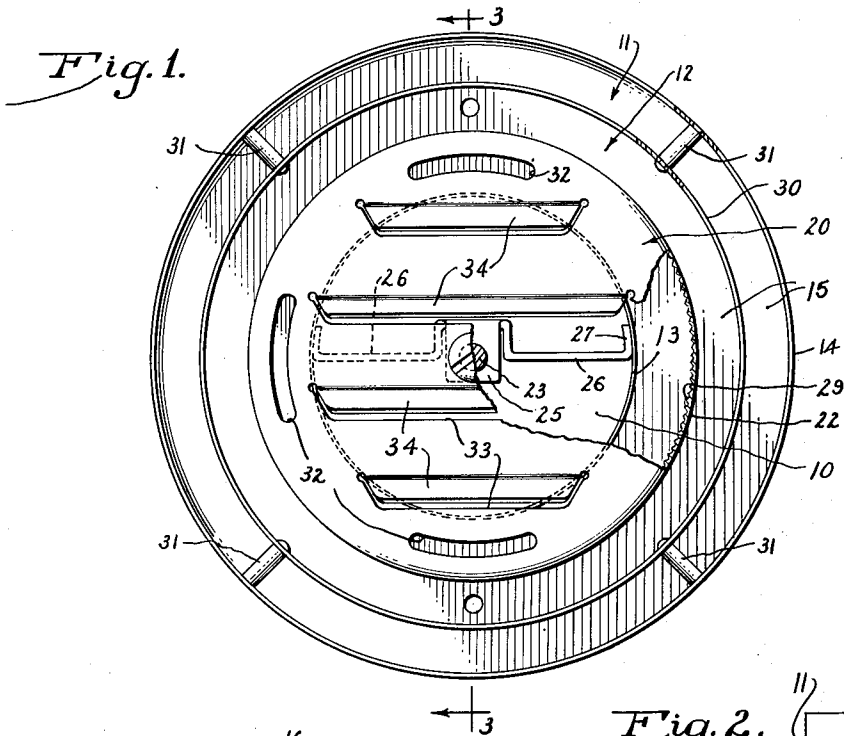
W. W. KENNEDY

2,392,393

AIR DISTRIBUTION OUTLET

Filed May 28, 1942

2 Sheets-Sheet 1



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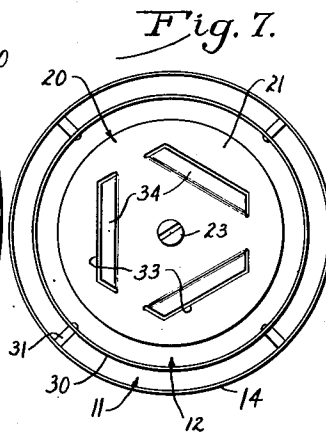
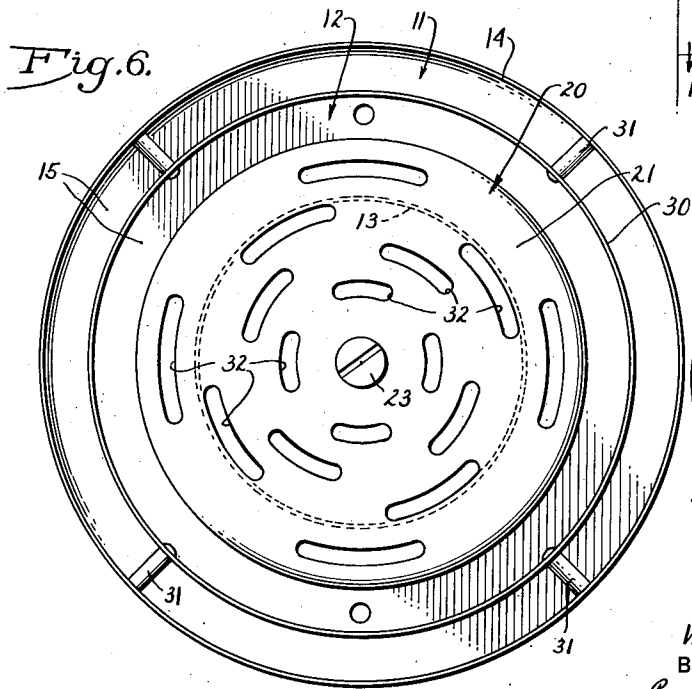
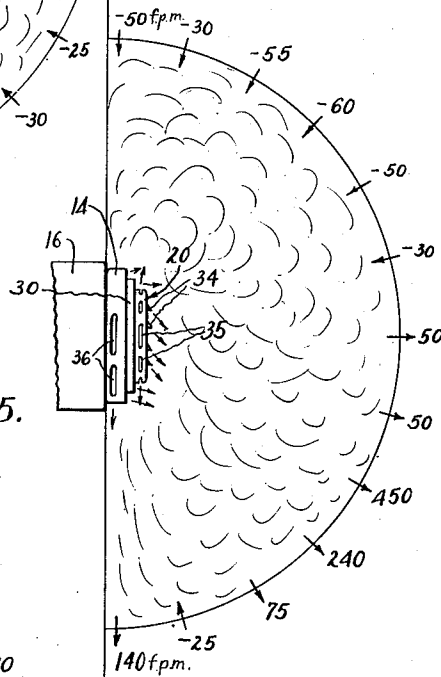
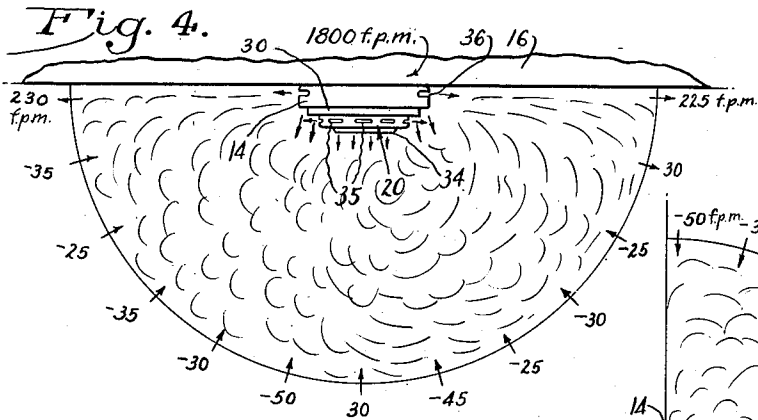
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AIR DISTRIBUTION OUTLET

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,392,393

AIR DISTRIBUTION OUTLET

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Application May 28, 1942, Serial No. 444,789

13 Claims. (Cl. 98—40)

This invention relates to outlets for distributing conditioned air to a room or compartment, and the general object is to provide a construction which will effect a rapid reduction in velocity to the end that a substantial volume of air may be delivered from a comparatively small unit without causing objectionable drafts even at relatively short distances from the outlet. In carrying out this object the invention provides for sub-dividing the incoming air in a novel manner into a multiplicity of streams or jets deflecting the latter in various directions.

The invention also resides in the novel character of the structure by which the incoming air is divided and deflected.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a face view of the improved distributing unit.

Fig. 2 is a side view.

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

Figs. 4 and 5 are top and side elevational views showing the air flow patterns produced by the unit.

Figs. 6 and 7 are face views of modified forms of the unit.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment. It is to be understood, however, that I do not intend to limit the invention by such disclosure but aim to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The distributing unit illustrated comprises generally a forced air inlet 10, a plurality of outlet passages 11 and 12 concentric with and larger than the inlet, and means for directing part of the incoming air forwardly and/or laterally relative to the inlet and deflecting the remainder of the air stream laterally in a circuitous path to the outlet passages 11 and 12.

In the present instance, the inlet 10 is defined by a tube comprising the inner one of two concentric flanges 13 and 14 on a ring 15 mounted on the side of a supply duct 16. Herein, the ring is clamped by bolts 17 to one wall 18 of the duct having an outlet opening 19 in register with the inlet tube 13.

Cooperating with the ring 15 to deflect the incoming air laterally is a baffle member in the

form of a cup 20 mounted concentrically with respect to the inlet 10 with its open end facing the latter. The bottom 21 wall of the cup is spaced from the end of the inlet tube 13, and the side wall 22 is larger than the tube 13 and axially spaced from the ring 15 so that the inlet tube, the cup, and the ring cooperate to form an annular passage which in cross section extends outwardly around the tube end, then reversely and finally radially and outwardly along the ring 15 as shown by the arrows in Fig. 3 indicating the direction of air flow.

In the present instance, the cup is supported for adjustment axially toward and from the ring 15 so that the effective area of the annular passage above mentioned may be varied as desired. Such mounting is provided by a screw 23 clamped by a nut 24 to the center of the cup and threading through spaced portions 25 of a bracket 26 the bent ends 27 of which are welded to the inlet tube 13. Thus, by turning the cup, it may be advanced or retracted relative to the ring 15. The cup is held yieldably in adjusted position by a spring detent 28 secured to the ring 15 and engaging serrations 29 formed around the interior of the cup.

The concentric outlet passages 11 and 12 are formed by the oppositely projecting flanges 14 and 22 of the ring and cup coacting with an intermediate cylindrical ring 30. This telescopes with both flanges and is axially spaced from the ring 15 so as to provide a passage extending outwardly along the ring and leading to the outer passage 11. Spacers 31 riveted at opposite ends to the flange 14 and the ring 30 support the latter approximately midway between the flanges 14 and 22.

Part of the air forced through the inlet 10 is discharged directly from the face of the unit described above. The flow is through slots 32 formed in the cup bottom and arranged in various patterns according to the distribution desired. To cause a flow directly forwardly, the slots may be arranged in a plurality of annular rows of different diameters as shown in Fig. 6. If lateral deflection in one direction is desired, the slots may be arranged in parallel as shown at 33 in Figs. 1 to 3 and associated with inclined louvers 34 acting to effect proper deflection of the air. Or slots and louvers of this character may be spaced circumferentially as shown in Fig. 7 so as to deflect the air streams from the different slots outwardly in several directions. In either of these forms open slots 32 may also be provided (see Figs. 1 and 3).

To further assist in reducing the discharge velocity, part of the air may also be directed through peripheral slots 35 formed in the side wall of the cup adjacent the bottom wall thereof. From the latter slots, separate air streams are directed radially into the annular streams flowing parallel to the axis of the unit from the passages 11 and 12. A similar effect and wider distribution of the air may be obtained by providing peripheral slots 36 in the outermost flange 14. These slots may be located at any one or more points around the unit according to the manner in which it is desired to distribute the air.

It will be apparent from the foregoing that the distributing unit above described divides the incoming air into a multiplicity of small streams or jets each having an extremely short throw. Also, that portion of the air which is discharged axially through the concentric passages 11 and 12 must travel a circuitous path around the flanges 13, 22, and 30. As a result, the unit has a high rate of secondary air entrainment and the velocity is reduced rapidly thereby permitting the desired volume to be delivered without objectionable drafts even in the immediate vicinity of the unit. This is illustrated by Figures 4 and 5 which show actual patterns of the air flow from the improved unit in horizontal and vertical diametrical planes respectively. The velocity figures are given in feet per minute at a radius of 18 inches from the unit for a velocity of 1800 feet per minute through the inlet 10. It will be observed that even at the short distance selected, the velocity is reduced to substantially negligible values at most points and the flow is even reversed in direction at many points. These negative values at so many points result from the high rate of secondary air entrainment obtained with the described subdivision of the incoming air.

I claim as my invention:

1. An air distribution unit having, in combination, two concentric tubes, the inner one of which constitutes a forced air inlet, a cup opening toward said inlet and coacting with the outer tube to define an axially facing outlet, a wall extending across the inner ends of said tubes and spaced from the lip of said cup so as to define an air passage extending radially across said lip, and a ring disposed between said cup and outer tube and dividing said outlet into concentric passages, the side of said cup and said outer tube being apertured for the discharge of air in radially directed jets and the bottom of the cup being apertured to direct a plurality of air jets forwardly from the unit.
2. An air distribution unit having, in combination, two concentric tubes, the inner one of which constitutes a forced air inlet, a cup concentric with said tubes coacting with the outer tube to define an axially facing outlet, an annular wall connecting the inner ends of said tubes and spaced from the lip of said cup, and a ring disposed between said cup and outer tube and dividing said outlet into concentric passages, the side of said cup being apertured forwardly of said tubes to permit the discharge of air radially across the face of said outlet.
3. An air distribution unit having, in combination, two concentric tubes, the inner one of which constitutes a forced air inlet, a cup opening toward said inlet and coacting with the outer tube to define an axially facing outlet passage, and an annular wall between the inner ends of said tubes operable to divert air from said inlet around

the lip of said cup to said outlet, said cup being apertured to direct a multiplicity of air jets both axially and radially therefrom.

4. An air distribution unit having, in combination, two concentric tubes, the inner one of which constitutes a forced air inlet, a cup opening toward said inlet and coacting with the outer tube to define an axially facing outlet, an annular wall between the inner ends of said tubes spaced from the lip of said cup and coacting therewith to define a radially extending passage between said inlet and outlet, and a ring disposed between said cup and outer tube and dividing said outlet into concentric passages, the bottom of said cup being apertured for the direct discharge of air there-through.

5. An air distribution unit having, in combination, two concentric tubes, the inner one of which constitutes a forced air inlet, a cup disposed opposite and opening toward said inlet and coacting with the outer tube to define an axially facing outlet, a wall across the inner ends of said tubes spaced from the lip of said cup and coacting therewith to define a radially extending passage between said inlet and outlet, and a ring disposed between said cup and outer tube and dividing said outlet into concentric passages, said ring projecting toward said wall beyond the lip of said cup so as to deflect outwardly flowing air into and through the inner one of said passages.

6. An air distribution unit having, in combination, two concentric tubes, the inner one of which constitutes a forced air inlet, a cup concentric with said tubes coacting with the outer tube to define an axially facing outlet, and a wall across the inner ends of said tubes and coacting with the lip of said cup to define a radially extending passage between said inlet and outlet, said cup being apertured for the discharge of a portion of the incoming air directly therethrough.

7. An air distribution unit having, in combination, radially spaced inner and outer tubes, the inner tube constituting a forced air inlet, a cup opening toward said inlet and having a flange disposed between said first tubes and coacting therewith to provide a circuitous passage for the air delivered through said inlet, the flange of said cup being apertured adjacent the closed end of the cup to permit the outward discharge of a substantial portion of the air delivered through said inlet, and means supporting said cup for adjustment axially of said inlet to vary the effective area of said passage.

8. An air distribution unit having, in combination, inner and outer tubes spaced apart radially, the inner tube constituting a forced air inlet, and a cup opening toward said inlet and having a flange disposed between and spaced from said tubes and coacting therewith to provide a circuitous passage for the air delivered through said inlet, said cup being apertured for the discharge of a portion of the incoming air directly there-through.

9. An air distribution unit having, in combination, a ring of U-shaped cross-section having concentric inner and outer flanges, the inner flange constituting a forced air inlet, and a cup concentric with and opening toward said inlet and having a flange concentric with and disposed between said first flanges and coacting therewith to provide a circuitous outlet passage for the air delivered through said inlet, the bottom of said cup being apertured for the discharge of a portion of the incoming air directly therethrough.

10. An air distribution unit having, in combi-

nation, concentric inner and outer flanges, the inner flange constituting a forced air inlet, and a cup concentric with and opening toward said inlet and having a flange concentric with and disposed between said first flanges, a wall between said flanges spaced from the lip of said cup and coacting therewith to provide a circuitous outlet passage for the air delivered through said inlet, the bottom of said cup being apertured to permit a portion of the incoming air to be discharged therethrough.

11. An air distribution unit having, in combination, concentric inner and outer flanges, the inner flange constituting a forced air inlet, and a cup concentric with and opening toward said inlet and having a flange concentric with and disposed between said first flanges, a wall connecting said inner and outer flanges and axially spaced from the lip of said cup so as to provide a circuitous outlet passage for the air delivered through said inlet, the side of said cup being apertured for the discharge of air radially therefrom.

12. An air distribution unit having in combination a plurality of concentric tubular members nested together to define a plurality of annular concentric passages, a wall member connecting the inner ends of a pair of said concentric tubular members which are disposed on opposite sides of an intermediate one of said tubular members, said wall member extending transversely of the axis of said tubular members in axially spaced relation to the inner end of said intermediate one of said tubular members to provide communication between the inlet ends of the annular passages on opposite sides of the intermediate tubular member, means providing an air inlet

opening axially within the inner one of said pair of connected tubular members, a transversely disposed baffle member positioned axially beyond the outer ends of said concentric tubular members and in opposition to the air inlet, and an annular inwardly directed wall member surrounding the baffle and terminating in axially spaced relation to said first mentioned connecting wall member and lying between said inner and said intermediate tubular members and cooperating with said baffle to deflect the air discharged from said air inlet, laterally around the outer end of said inner concentric tubular member and inwardly against said first mentioned wall member and thence laterally across said wall member into the inlet ends of said annular passages, said annular wall being apertured at points disposed between said baffle and the outer ends of the concentric tubular members to effect the discharge of a portion of the incoming air radially into the streams discharged from said annular passages.

13. An air distribution unit having, in combination, concentric inner, outer, and intermediate tubes axially spaced apart at one end with the outer tube projecting beyond the intermediate tube and the intermediate tube projecting beyond the inner tube, a fourth tube projecting into said inner tube and defining an air inlet, a wall closing the space between said outer and said fourth tubes and spaced from the end of said inner and intermediate tubes, and a baffle member axially spaced from the end of said fourth tube and operating to deflect air discharged from said inlet laterally and across said wall and the ends of said inner and intermediate tubes.

WALTER W. KENNEDY.