# United States Patent

[11] 3,548,735


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[54] AIR DISTRIBUTOR
4 Claims, 17 Drawing Figs.


[52] U.S. Cl. ..... 98/40, 98/121
[51] Int. Cl. ..... F24f 13/06
[50] Field of Search ..... 98/40, 114, 121



[56] References Cited

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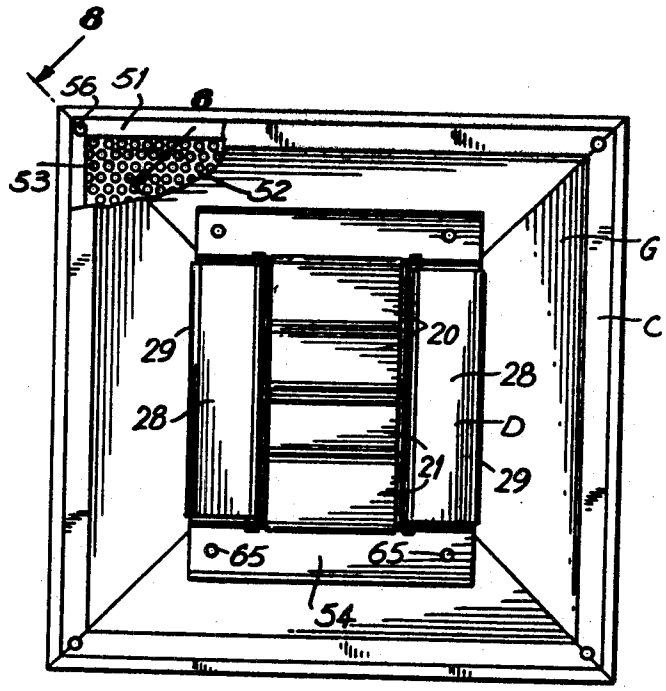
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*Primary Examiner*—William E. Wayner
*Attorney*—Parrott, Bell, Seltzer, Park & Gibson



**ABSTRACT:** The present invention relates to an air distributor for controlling the outflowing ventilating or conditioning air from an internal duct system through the ceiling of a room or enclosure which has an outer perforated outlet plate. The interior of the device has replaceable units which may be fitted into place upon removal of the perforated outlet plate and which may give a one-way, two-way, three-way or four-way or vertical down blow of air and which also may be adjusted so as to give a damping effect. No additional damper may be used. The units are replaceably held in position by means of friction rivets serving as pivot pins.

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FIG. 1

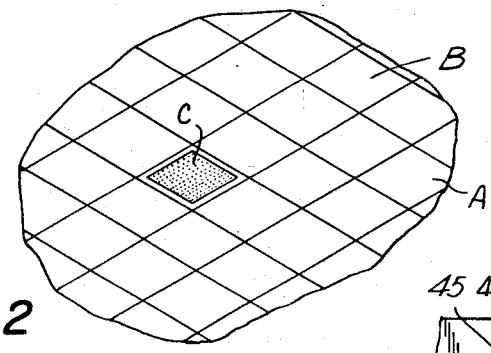



FIG. 2

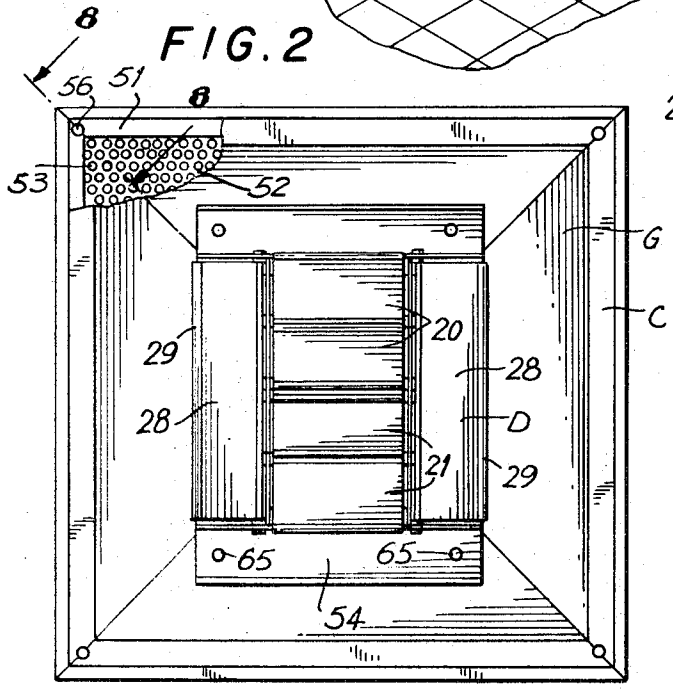



FIG. 7

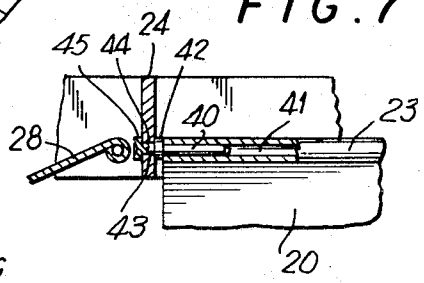



FIG. 8

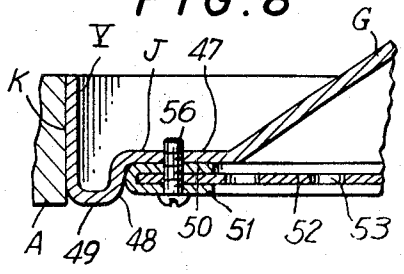



FIG. 3

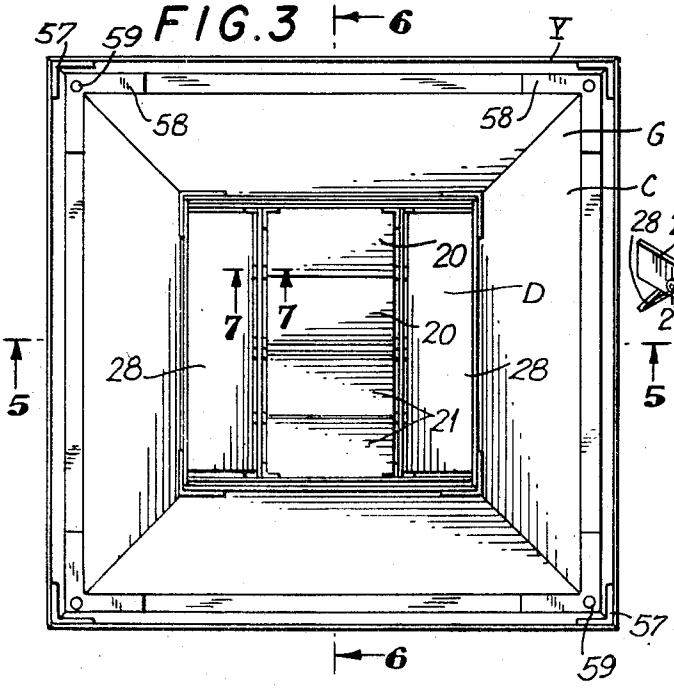
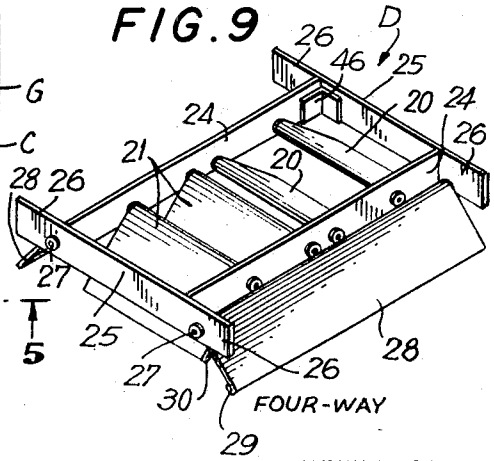



FIG. 9





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FIG. 4

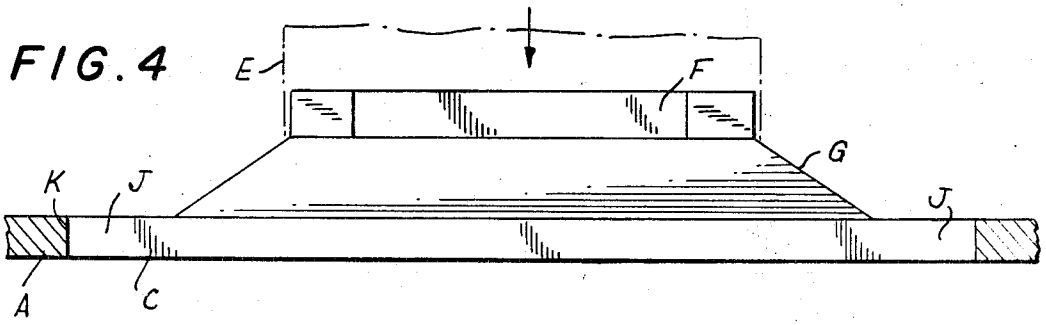



FIG. 5

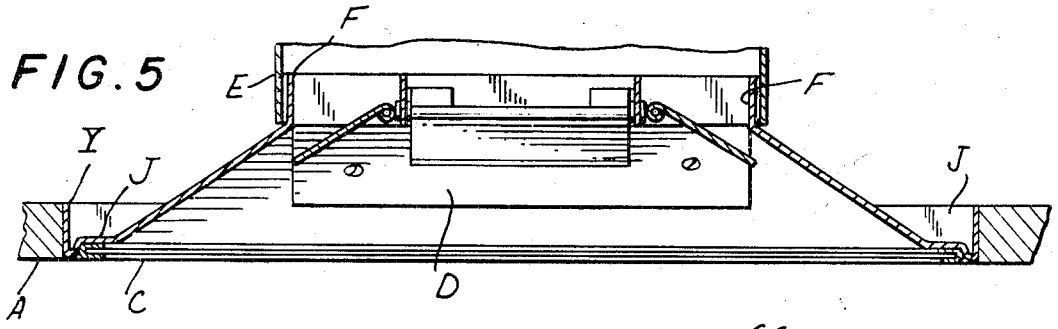



FIG. 6

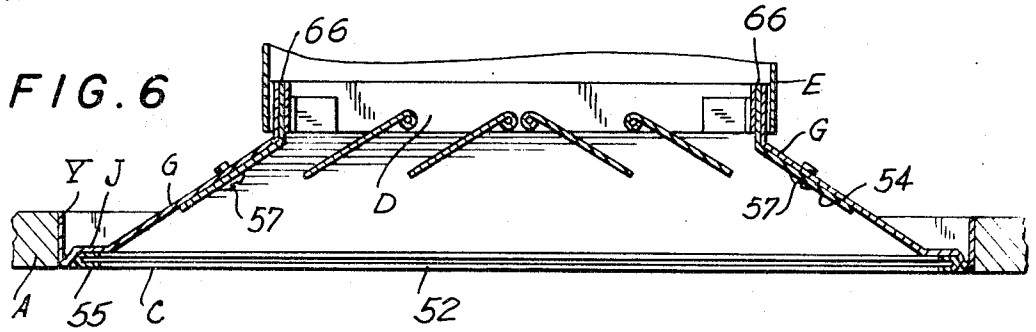



FIG. 10

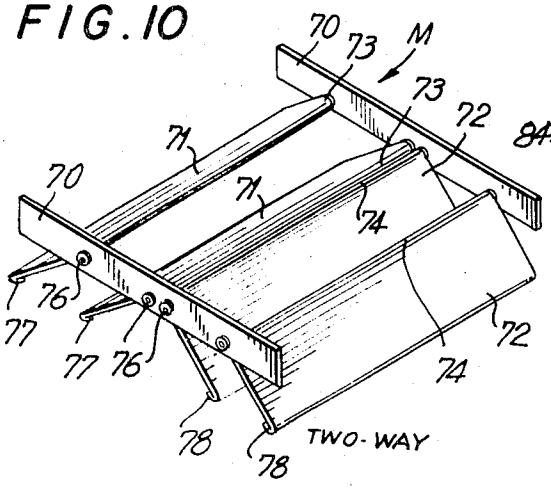
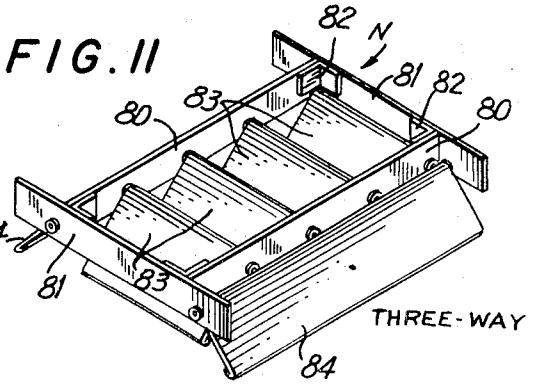



FIG. 11




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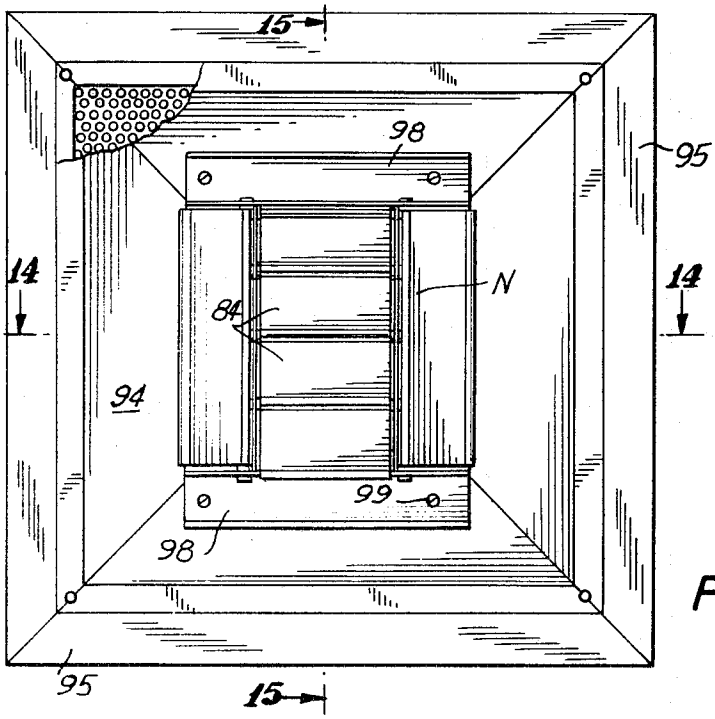



FIG. 12

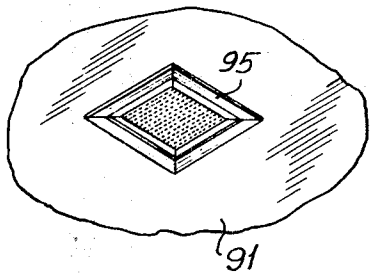



FIG. 13

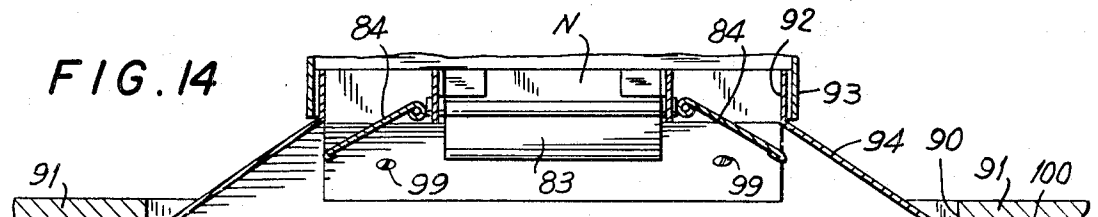



FIG. 14

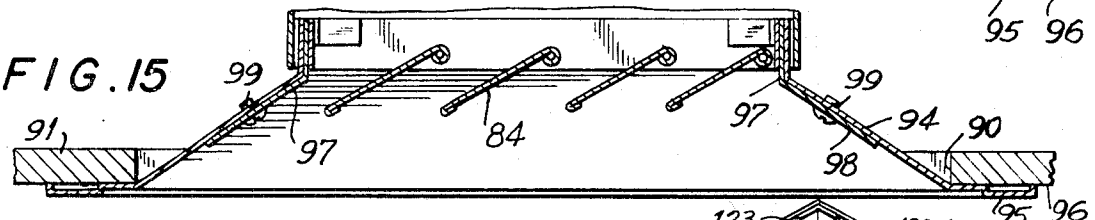



FIG. 15

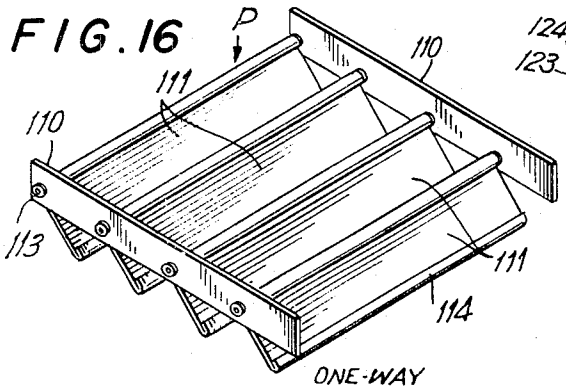



FIG. 16

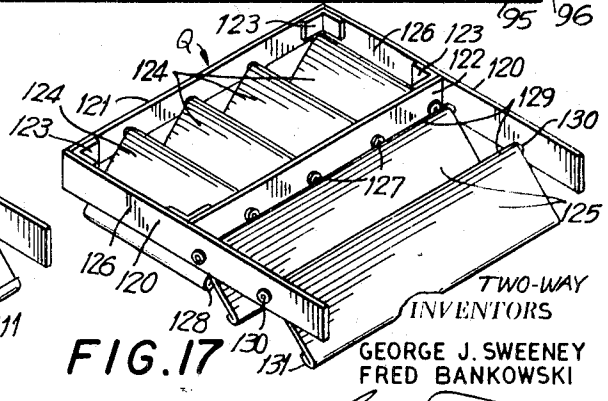



FIG. 17

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# AIR DISTRIBUTOR

The present invention relates to an air distributor having a perforated outlet with a replaceable internal directional core in which the incoming ventilating or conditioning air may be regulated to flow outwardly in various directions, to achieve a one-way, two-way, three-way or four-way or vertical down blow, as may be desired.

It is among the objects of the present invention to provide a novel air distributor which may be conveniently constructed of inexpensive materials and which may be inserted in a wall or ceiling to give a desired air distribution effect for incoming conditioning or ventilating air.

Another object of the present invention is to provide a simple air diffuser arrangement which may be readily inserted in the wall or ceiling without marring or changing the appearance thereof and which will nevertheless determine the control and distribution of the incoming air into the room or enclosure.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects it has been found most satisfactory according to the preferred embodiment of the present invention to provide a flaring enclosure unit, the outlet base of which will be flush with the ceiling and have a perforated closure plate with an inwardly converging neck portion which terminates in a square, rectangular or circular projection connected to an internal duct system. Internally there are provided readily replaceable detachable units having adjustable vanes which will provide both for directional flow of outgoing ventilating and/or conditioning air and also provide for any necessary damping without an extra damper being positioned at the inlet of the diffuser.

Desirably these adjustable vanes should be readily adjusted by elongated members which may be inserted through the perforated outer plate, and they will permit the internal combined damping and deflecting unit to be readily clipped into the inwardly projecting narrow throat of the diffuser. In general the replaceable units may give a one-way, two-way, three-way, four-way or vertical down blow and the baffles or vanes are held in position by means of friction pins so as to retain an adjusted deflecting or damping position.

The perforated face plate which is flush with the ceiling should preferably have a large number of openings therein which will desirably occupy from 65 to 85 percent of the area.

The air is delivered in one, two, three or four directions or vertically downwardly. These directions are each subject to adjustment from below through the perforated screen without removing the face. The cases are available in patterns designed for one, two, three or four-way and vertical flow downwardly. There is a minimum of an increase of pressure drop, and noise level is kept down, due to alteration of discharge pattern. The basic pattern designs may be chanted readily without costly rearrangement of fixed vanes by removing the face plate. Damping of total volume delivered by the unit may be accomplished by closure or moving vane toward horizontal position.

## BRIEF DESCRIPTION OF DRAWINGS

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:



FIG. 1 is a fragmentary perspective lower view of a tiled ceiling, showing the mounting of the air distributor of the present invention.

FIG. 2 is a bottom plan view with most of the perforated facing plate removed, showing interior construction of the ventilator.

FIG. 3 is an inside top plan view showing the distributor from the inside above the constricted neck and above the combined damper and deflector arrangement.

FIG. 4 is a side elevational view of the diffuser.

FIG. 5 is a transverse sectional view upon the line 5–5 of FIG. 3.

FIG. 6 is a transverse sectional view upon the line 6–6 of FIG. 3.

FIG. 7 is a fragmentary transverse sectional view upon the line 7–7 of FIG. 3.

FIG. 8 is a fragmentary transverse sectional view upon the line 8–8 of FIG. 2.

FIG. 9 is a top perspective view of the removable insert unit showing the four way blow combination.

FIG. 10 is a top perspective view similar to FIG. 9 of a removable insert, showing a two-way blow combination.

FIG. 11 is a top perspective view showing a three-way blow combination.

FIG. 12 is a lower perspective fragmentary view, showing a deflector inserted into a plain ceiling without tiles.

FIG. 13 is a bottom plan view with the screen broken away, showing the unit of FIG. 11 in position.

FIG. 14 is a transverse sectional view upon the line 14–14 of FIG. 13.

FIG. 15 is a transverse sectional view upon the line 15–15 of FIG. 13.

FIG. 16 is a top perspective view showing an alternative form of insert with a one-way blow.

FIG. 17 is a view similar to FIG. 16 of an insert unit, showing in top perspective the removable damper and deflector unit and showing a variation of a two-way blow arrangement.

Referring to FIGS. 1 to 6, there is shown a ceiling A having a plurality of square or rectangular sound absorptive tiles B mounted therein, with an air distributing device C mounted in the ceiling in the place of said tiles.

The air distribution unit D shown in detail in FIGS. 2 to 6 is detachably mounted on the internal duct or conduit system E by the inside telescoping throat F which may be clipped, spot-welded or screwed thereto. The inside straight throat portion F which connects to the conduit system has a flaring outer portion G which terminates in an outwardly extending substantially flush flange portion J having an up-turned outside flange Y fitting in the opening K in the ceiling A, which normally accommodates the ceiling tiles B.

The internal unit D which is shown in assembly in FIGS. 2, 3, 5 and 6 is shown removed from the ceiling in FIG. 9 and it has a central row of oppositely directed turnable vanes 20 and 21 which have in-turned or curled upper pivotal ends 23 pivotally mounted on the transverse vertical crossbars 24, which in turn are mounted by welding or other suitable means on the transverse end bars 25. These transverse end bars have extensions at 26 which may receive pivotal connections at 27 for two transverse adjustable members 28. If desired, the outer ends of these adjustable vanes 20, 21 and 28 may be folded inwardly at 29 and 30 to give a smooth edge.

A particular feature of the present invention resides in the use of friction pins or rivets 40, which tightly fit within the openings 41, as shown in FIG. 7, and, together with the collars or head 42, hold the blade 20 in its adjusted position. The extension 43 extends through the opening 44 and the support member 24, which may be peaned or hammered down at 45 to hold it permanently in position.

There will be two of these pins in each side of the adjustable blades 21 and 22 and they will permit the adjusting movement of the vanes but at the same time will hold them in position once they are adjusted to the proper deflecting or damping position, as the case may be.

The structural bars 24 and 25 in FIG. 9 are shown as held together by corner braces 26. Referring to the diffuser itself, particularly as shown in FIGS. 2, 3 and 8, the downwardly diverging part G of the diffuser structure first is formed into a horizontal portion 47 and then is turned downwardly at 48 into a semicircular portion 49, terminating in the upwardly extending contact flange Y, which is secured to the opening K in the ceiling.

This will form a recess 50 into which may be positioned the U-shaped frame member 51 in which is inserted the perforated face plate 52 having the spaced openings 53. These openings will be sufficiently wide to permit insertion of an outlet to adjust the position of the swinging vane members 20, 21 and 28. For example, in FIG. 9 both vane members 28 could be pushed upwardly, damping the air from the sides and permitting the air to flow downwardly over the vanes 20 and 21 in both directions, obliquely downwardly and outwardly, or the vanes 20 and 21 may be partly elevated for damping purposes, while the vanes 28 might be used primarily to control the flow of air. Various other combinations are readily apparent.

The unit of FIG. 9 is readily clipped by the projecting end portions 26 in the throat of the diffuser and desirably these end portions 25 extend the full width of the throat of the diffuser.

The screws 56 through the corners of the frame 51 serve to hold the perforated frame 51 and perforated plate 52 may be removed and the unit D may be replaced by another unit to give it a different directional effect or different damping effect, as may be desired. Interiorly the outer frame has the angular reenforcing members 57 (see FIG. 3) and the frame holder has the reenforcements 58, which also carry the screw hole 59 for the screw 56.

In mounting the replaceable diffuser interiorly or the neck E, there is provided additional mounting members 54 which are held in position by the screws 65 on the flaring portion G of the outer enclosure of the diffuser.

The oblique plates 54 then have extensions which extend upwardly at 66 interiorly of the neck F and form a convenient means for attachment by clip, soldering or otherwise to the members 26 of the combined deflector and damper unit of FIG. 9.

In FIG. 10 is shown an alternative form of insert in which the two side elements 70 carry the opposite adjusting plates and vanes 71 and 72, with the curled pivot portions 73 and 74 receiving the friction pin or rivet pivots 76. These blades are provided with the turned up end portions 77 and 78 to give a smooth edge.

It will be noted that the side plates 70 are solely held together by the friction pin connections at 76 and the pivotal portions of the vanes 72 and 73. This device will give a two-way blow.

In the device of FIG. 11 is shown an insert structure having the side elements 80 and the end elements 81 joined together by the angle members 82. There are a series of blades 83 designed to give a one way blow through the middle of the device, with outside blades 84 designed to give an outside blow on each side. This device is particularly desirable for achieving a three-way blow or to achieve various forms of damping in connection with such a three-way blow.

Referring to FIG. 13, there is shown the installation of a unit, such as indicated in FIG. 11, in an air distributor. This air distributor is desired to be installed in an overlapping ceiling relationship without necessary replacement of a tile.

As shown in FIG. 14, an opening 90 is cut into the ceiling 91 and the throat 92 of the diffuser mounted on the end of the conduit system 93 has a flaring portion 94 with an outstanding flange 95 to contact the underside 96 of the adjacent periphery of the ceiling. The unit N of FIG. 11 may be mounted inside of the diffuser by attachment to the upstanding portions 97 of the additional plates 98, which are attached to the flaring element 94 by the screws 99.

In FIG. 12 is shown the diffuser in bottom perspective, indicating how it is mounted in the ceiling with the overlapping frame encircling the same. The recess 100 to the rear of the flange 95 may receive suitable packing material or otherwise aid in sealing the outstanding flange 95 to the ceiling to prevent any passage of air around the diffuser which would tend to cause marring of the face 96 of the ceiling 91.

It will be noted in FIGS. 14 and 15 that the device is shown as prepared for a three-way blow, but by adjustment of the combined damping and deflecting vanes 83 and 84 suitable damping as well as distribution effects may be obtained.

Two other forms of distributor units are shown in FIGS. 16 and 17. In FIG. 16 there is shown an alternative unit P having the side support members 110 with the vanes 111 designed to be turned in one direction to give a one way blow or suitably damping effects. These vanes have coiled pivot sides 112 which receive the friction pins or rivets 113 projecting through the side bars 110 and their lower ends are folded in as indicated at 114 so as to form a smooth lower edge.

This fold also aids in manipulation by a tool which can open or close the vanes. In the structure indicated in FIG. 17 as Q there are the side members 120 and the transverse members 121 and 122. The transverse members 121 and 122 are held in position on the side members 120 by the corner brackets 123. The box formed by the side members 120 and the transverse members 121 and 122 carries the vanes 124 which will give a one way blow to that area of the diffuser.

At the other side there will be a transverse one-way blow achieved by the vanes 125. The vanes 124 are mounted pivotally in position by the curled pivot edges 126 and the friction pin or rivets 127. They also have the folded-in layer edges 128. The wide vanes 125, two of which are shown by example, are also held in position by the curled edges 129 receiving the friction pins or rivets 130. The edges of the vanes are folded as indicated at 131 to give a smooth edge.

It is thus apparent that the applicants, by the arrangement shown, can give a wide variety of different directions of blow for a distributor with a perforated face which may be at the same time damped, depending upon the position of the various vanes. These vanes, due to the action of the friction pins, will retain their position against vibration and gravity. They will hold the desired adjusted position, and if desired the vanes may be used for damping, as well as for directional effect.

We claim:

1. A ceiling air diffuser for distributing air from an internal duct system for mounting in the ceiling of a room, having an interior vertical attachment collar connected to and fitting within a vertically depending metal collar of the internal duct system, an obliquely outwardly flaring throat, extending downwardly and outwardly from the lower end of the collar to the ceiling, a replaceable unit mounted within said collars having elongated rectangular vertical side mounting strips pivotally and adjustably carrying a plurality of adjustable transversely extending vanes to control the direction of air flowing into the upper narrow part of said flaring throat, said vanes being frictionally pivotally mounted in respect to the unit so as to retain their adjustment and a removable framed perforated cover plate flush with the ceiling and covering the outlet end of said throat, said mounting of the vanes consisting of horizontal friction pins and the upper pivotally mounted edge of said vanes consisting of cylindrically curled portions to frictionally receive said friction pins and hold said vanes in adjusted position, said pivotal connections to said vanes being positioned at the level of the junction between the first mentioned collar and said vanes at maximum lowering extending only into the top space within the flared throat and a minimum lowering being at the level of the top of the throat and the top edge of the flaring throat, said units having adjustable vanes arranged to give one-way two-way, three-way, four-way or vertical down flow or a damping effect, the unit being clipped in the attachment collar throat of the diffuser and the diffuser having the same outside width at its lower end to replace a ceiling tile.

2. The control of claim 1, said flaring throat being provided with opposite mounting plates for said unit, said plates having

oblique portions mounted on the inside face of the flaring throat and upwardly extending attachment portions extending upwardly interiorly of the collar.

3. The control of claim 1, said unit consisting of two side members and a plurality of adjustable damper and deflector vanes extending transversely therebetween and each of said vanes at its upper end fictional pivot reception portions and frictional pivot members inserted in said portions, the lower portions of said vanes being bent upwardly to make a smooth edge, said unit having a plurality of vanes to control the direction of flow centrally of the diffuser and transverse outside vanes to control the direction of air on the outside of the diffuser.

4. The control of claim 1, said flaring throat portion terminating in an outwardly extending flange having a recess extending entirely around the outer edge of the diffuser having an upstanding flange to fit into and be attached to the ceiling and a frame received in said recess carrying said perforated face plate having a plurality of closely spaced circular openings occupying 65 to 85 percent of the outlet area opening of the diffuser, the openings in said perforated face plate being sufficiently wide to permit the insertion of an adjusting tool.