

Feb. 12, 1952

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2,585,666

DISTRIBUTION UNIT FOR VENTILATING SYSTEMS

Filed Oct. 30, 1948

4 Sheets-Sheet 1

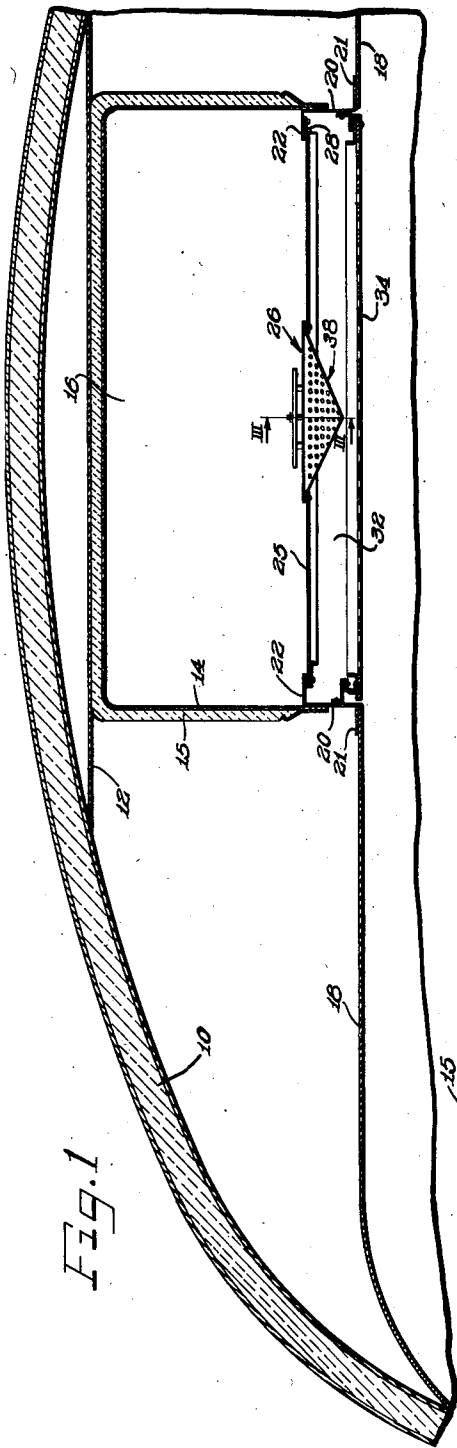


Fig. 1

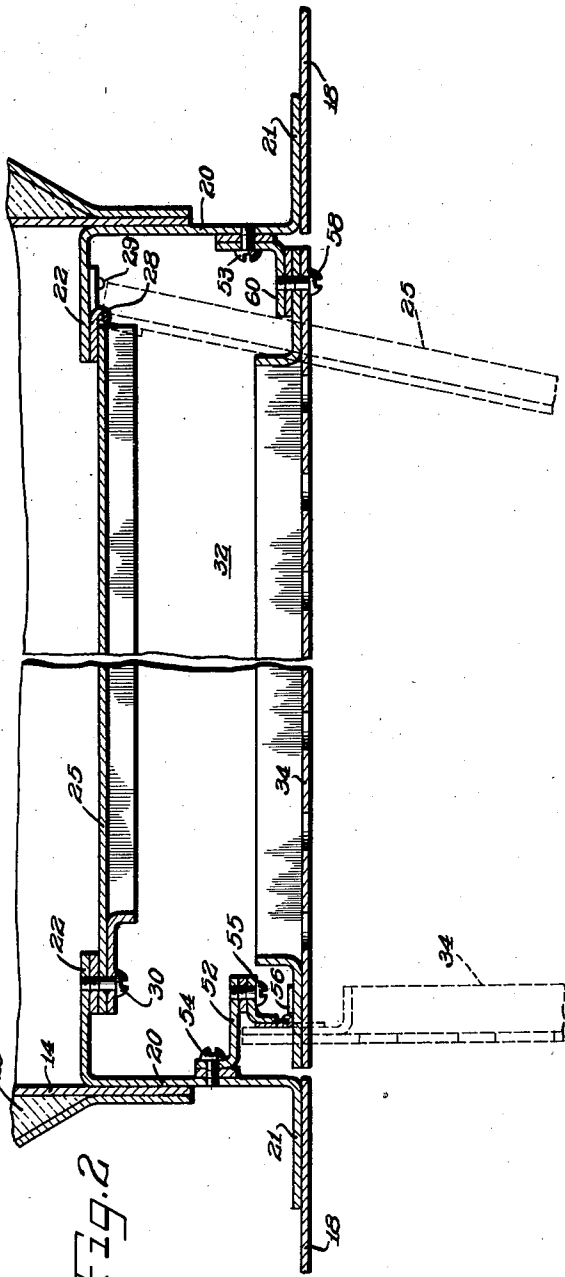


Fig. 2

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4 Sheets-Sheet 2

Fig. 3

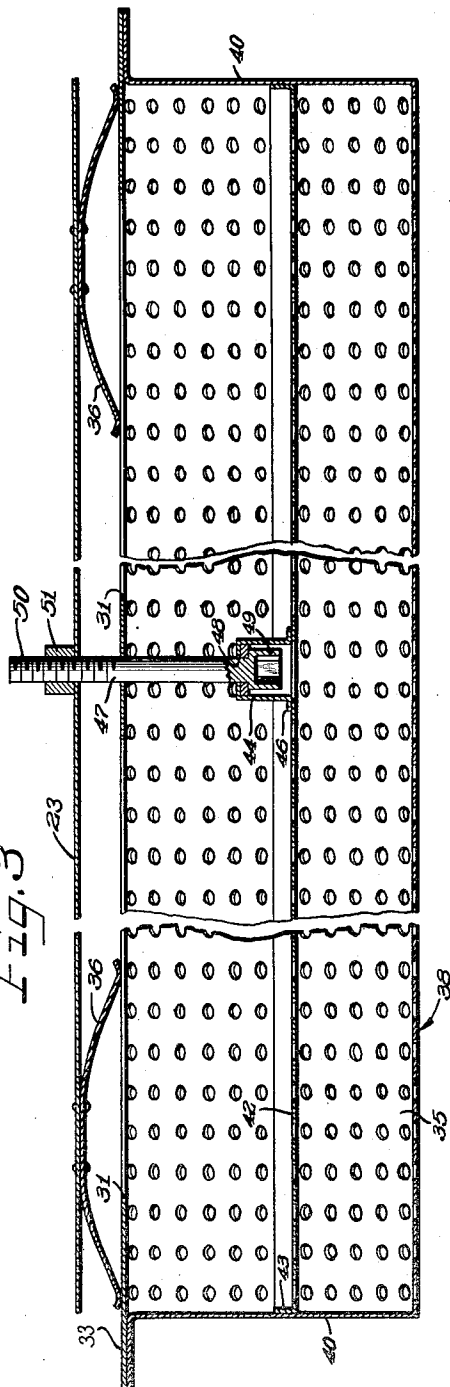
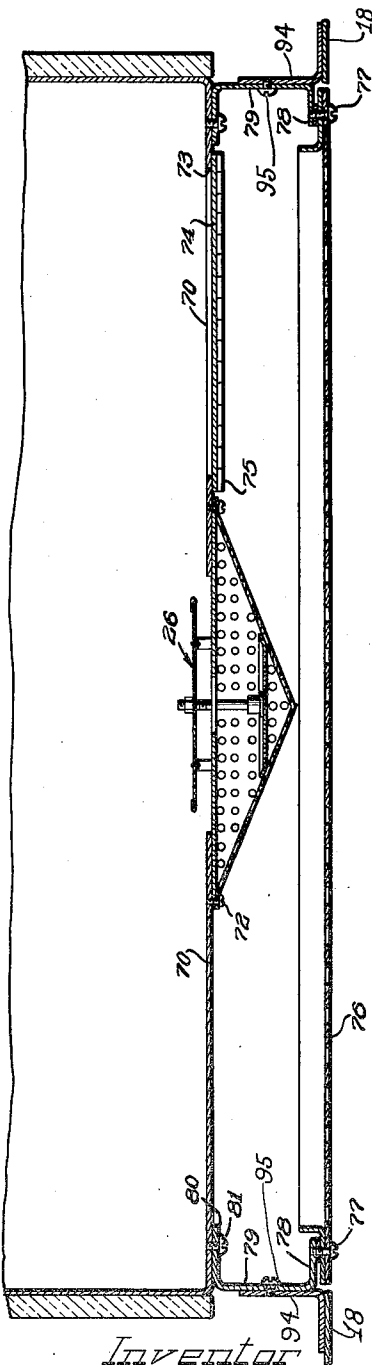


Fig. 6



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4 Sheets-Sheet 3

Fig. 4

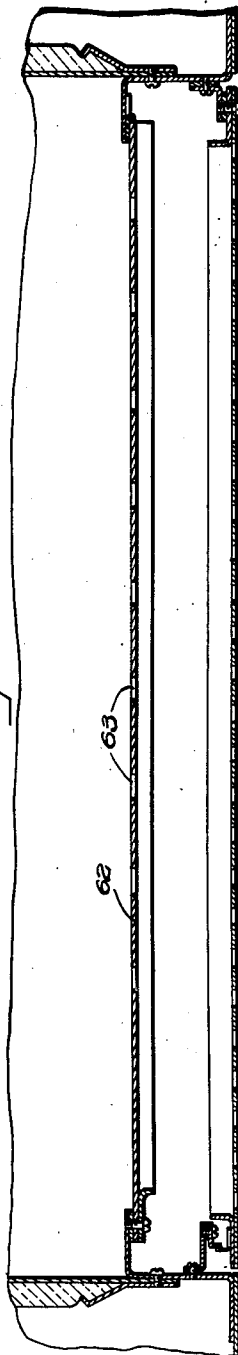


Fig. 5

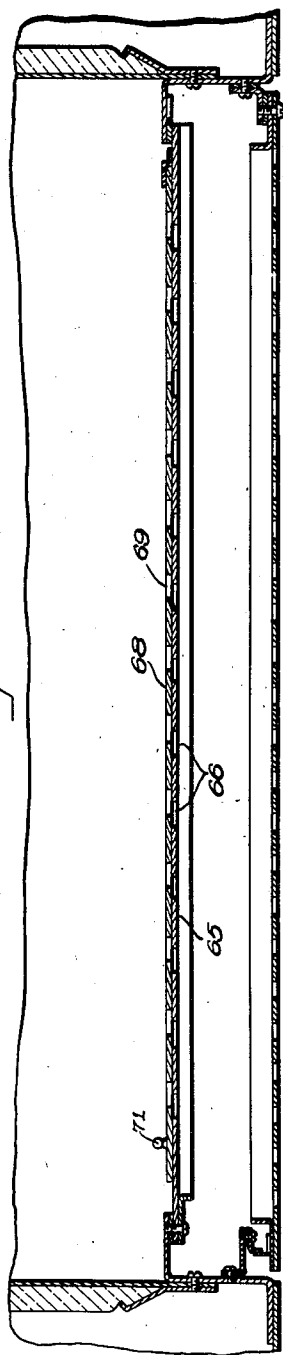
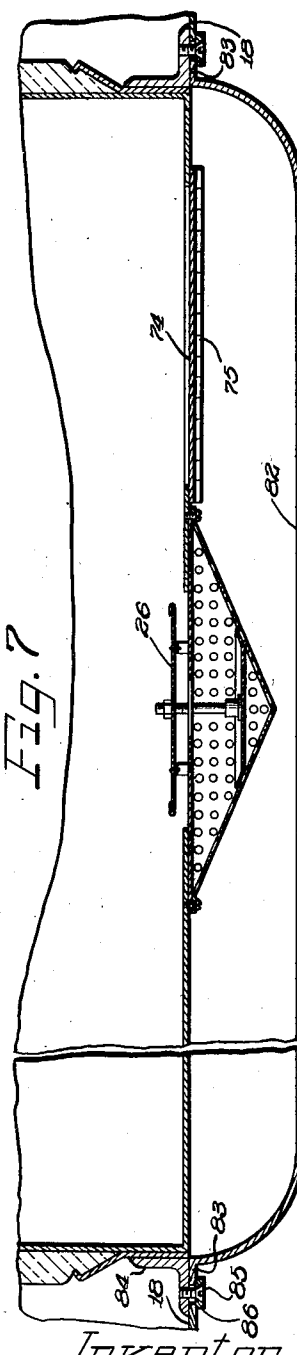


Fig. 7



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4 Sheets-Sheet 4

Fig. 8

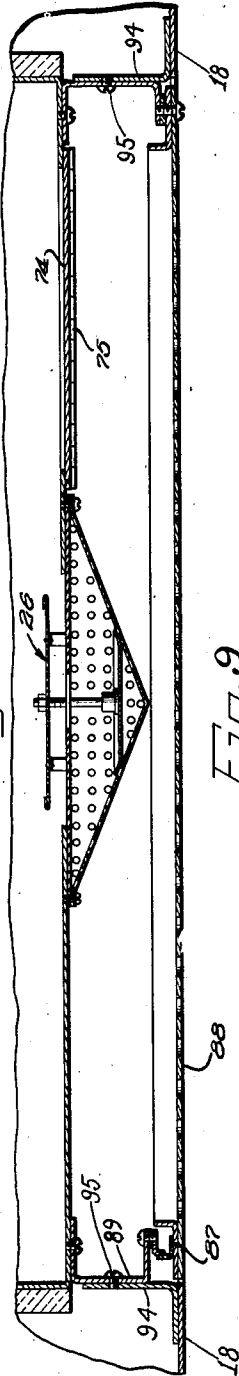


Fig. 9

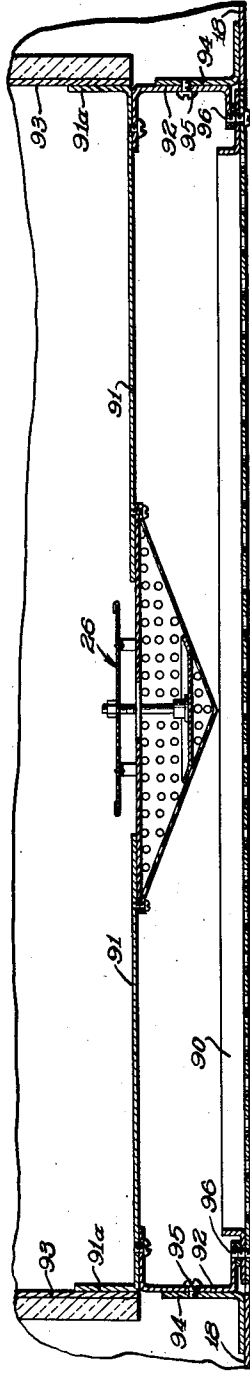
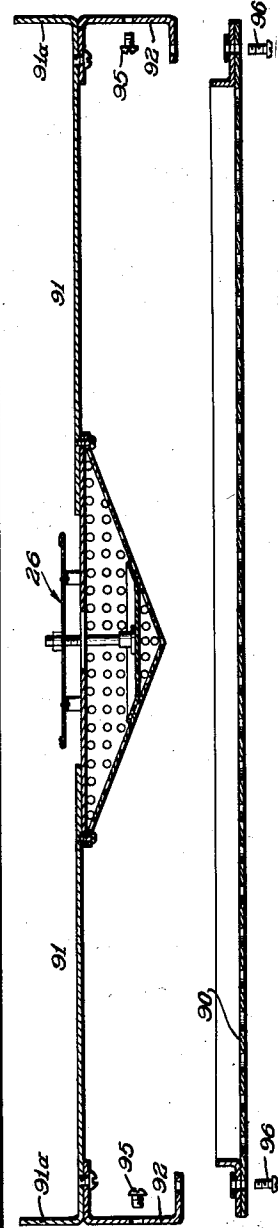


Fig. 10

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UNITED STATES PATENT OFFICE

2,585,666

DISTRIBUTION UNIT FOR VENTILATING
SYSTEMS

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Application October 30, 1948, Serial No. 57,469

1 Claim. (Cl. 98—40)

1

This invention relates to air distributing systems operable on the so-called pressure displacement principle. More particularly, this invention is concerned with a novel closure plate equipped with orifice means and arranged to form the bottom panel member of a pre-installed duct in a ventilating system for a vehicle, such as a railway coach.

In vehicles such as railway coaches and motor buses, air distributing apparatus is currently being used which includes a plenum chamber generally located overhead with a double-panel air distributor assembly forming at least a portion of the ceiling of the enclosure. The upper panel, which is not visible from below, is provided with a number of holes or with an air control valve and performs the function of restricting the flow of air from the plenum chamber to the enclosure. A perforated facing member, generally referred to as a distribution panel, forms a portion of the ceiling of the enclosure as well as the final outlet for the air, effecting uniform and draftless air movement in the enclosure thereunder.

Heretofore, it has been customary for the air control valve and its distribution plate in a railroad car ventilating system to be furnished as integral or built-in parts of the ventilating duct works. Thus, completion of the ceiling of a car must often be held up until the ventilating contractor appears and installs the duct works. This procedure is also inconvenient to the ventilating contractor since he must bring sheet metal workers out to the job and must work in close cooperation with the plans of the carpenters and mechanics installing the ceiling. It would, therefore, be a great advantage if the air control valve were furnished as part of a plate that could be quickly and easily installed as the bottom panel of an open-bottomed duct previously installed by sheet metal men and other tradesmen of the car builder.

The air distribution panel could, of course, be furnished for quick installation spaced below the duct in an opening left in the ceiling of the car.

It is, therefore, an important object of the present invention to provide an air control unit for a ventilating system in which the air control panel and the control valve are furnished as a unit for quick, ready installation in a pre-installed duct.

2

Another object of the present invention is to provide a panel which can be quickly installed across the open bottom of a pre-installed duct in a railroad car ceiling for controlling the uniform and draftless movement of air in the enclosure therebelow.

A further object of the present invention is to provide air control and distribution plates that are swingably mounted to provide easy access to the ductwork for cleaning.

A still further object of the present invention is to provide an air control valve having new, efficient means for adjusting the volume of air passing therethrough.

According to one embodiment of the present invention, there is provided an air control valve in the form of a plate having elongated rectangular openings therein and an adjustable member movable over said openings to vary air passage therethrough. The control valve is mounted on a panel which is of a size to fit into the open bottom of a duct and to be connected at marginal portions to angle members which are spaced upwardly and extend laterally inwardly from the lower end of the duct. The connection on one side of the plate may be made to the angle member by means of a hinge so that by disconnecting the securing means at the other marginal edge, the plate can be swung downwardly for access to the plenum chamber thereabove.

The distribution panel may be similarly mounted on angle members at the lower end of the duct.

Another feature of the present invention is the provision of a novel air control valve including two apertured plates slidable relative to each other for varying the alignment of the apertures in the plate from full air delivery when the apertures are aligned to no delivery when the apertures are completely out of alignment.

A still further feature of the present invention is the provision of an air control valve which comprises a plate having apertures therein sized to provide the required air delivery at a definite distance from the blower.

Other and further features, objects and advantages of the present invention will be apparent to one skilled in the art from the following detailed description of the attached drawings.

On the drawings:

Figure 1 is a fragmentary vertical sectional view taken across the ceiling portion of a railway car and disclosing an air distribution system constructed according to the teachings of the present invention.

Figure 2 is an enlarged fragmentary vertical sectional view of the lower end of the ductwork of the air distribution system disclosed in Figure 1;

Figure 3 is a fragmentary vertical sectional view taken along the line III—III of Figure 1;

Figure 4 is a fragmentary vertical sectional view showing a modification of the air distribution of the present invention;

Figure 5 is a fragmentary vertical sectional view showing a second modification of the air distribution system of the present invention;

Figure 6 is a fragmentary vertical sectional view of another modification of the air distribution system of the present invention;

Figure 7 is a fragmentary vertical sectional view of another modification of the air distribution system of the present invention;

Figure 8 is a fragmentary vertical sectional view of still another modification of the air distribution system of the present invention;

Figure 9 is a fragmentary vertical sectional view of another modification of the air distribution system of the present invention; and

Figure 10 is a fragmentary vertical sectional view of the air distribution system of Figure 9 shown in an exploded form.

As shown on the drawings:

In Figure 1 the reference numeral 10 indicates generally the arched roof of a railroad car. A structural plate 12 is suitably secured across the roof providing a substantially horizontal support. An open-bottomed duct 14, having a covering 15 of insulating material suitably secured thereon, is positioned longitudinally along the ceiling of the car defining an open-bottomed plenum chamber 16.

The duct 14 is supported from the structural plate 12 being secured thereto by any suitable means. The lower edges of the side walls of the duct 14 carry Z-angle members 20 which are secured, as by welding, thereon. These angle members 20 have upper ledge portions 22 extending into the plenum chamber substantially normal to the wall of the duct and lower ledges 21, to which side ceiling panels 18 are suitably attached.

A panel 25, carrying an air control valve assembly 26, is pivotally secured at one marginal edge by means of a plurality of hinges 28 and cap screws 29 to one upper ledge member 22, while the opposite marginal edge is removably held by cap screws 30 to the upper ledge member 22 on the Z-angle member 20 directly opposite.

Thus, the panel 25 may be pivoted downwardly for cleaning the plenum chamber when necessary.

The air control valve assembly 26 comprises an adjustable plate 23 (Figure 3) which is arranged to overlap openings 31 in the panel 33. These openings 31 permit air to flow from the plenum chamber 16 to a secondary plenum chamber 32 (Figure 1) located immediately below the panel 33. A distribution panel 34, to be described fully hereinafter, closes the open bottom of the secondary plenum chamber and provides uniform air distribution.

It is desirable in such an air distribution system to have approximately the same amount of air flowing through the control panel openings in each air distribution unit throughout the length

of the car in some cases, while in other installations it is desirable to provide varying quantities of air to different parts of the passenger compartment. To provide such adjustment, the plate 23 may be moved toward or away from the openings 31 to vary the passage defined by the peripheral edge of the plate 23 and the panel 33. The closer the plate 23 is moved toward the panel 33, the smaller the amount of air that will be delivered to the secondary plenum chamber for subsequent delivery to the enclosure therebelow. The peripheral passageway also provides a substantial amount of resistance to the flow of air from the plenum chamber into the secondary plenum chamber. Thus, while air might be maintained in the first plenum chamber at a substantial pressure head, it will be delivered to the secondary plenum chamber at a relatively low velocity, and consequently the velocity of the air passing through the distribution plates 34 will be proportionately reduced.

A plurality of leaf springs 36 are secured as by riveting to the underside of the plate 23. These springs, which abut at their lower ends against the panel 33, serve to stabilize the plate 23 and to prevent any possible rattle of the parts.

In Figures 1 and 3 a diffuser unit 38 is illustrated disposed longitudinally of the railroad car. This unit serves to distribute air into all parts of the secondary plenum chamber to prevent drafts being produced by the emission of air from localized parts of the distribution panel 34 into the passenger compartment. This unit may suitably comprise a trough-shaped member 35, Figure 3. While the trough 35 is illustrated as extending lengthwise of the car, it is to be noted that it can be mounted in most any position depending on the installation. This trough member may be formed of perforated sheet metal, the total effective open area of which should be such that its resistance to air flow is not more, and preferably is less, than that of the openings 31 in the panel 33. The trough has perforated end plates 40 suitably secured thereon.

A perforated cross baffle 42 extends the length of the trough, secured thereto by welding at an upright flange 43 and affording a support for an inverted cup-shaped member 44 which is secured to the baffle 42 as by welding at marginal flanged portions 46. A bolt 47 projects through an opening 48 in the upper end of the cup-shaped member 44 having a socket-type head 49 disposed in the cup itself with the threaded shank 50 of the bolt in threaded engagement with a collar or nut 51 secured to the upper surface of the plate 23 over a suitable opening therein. It will be understood that apertures are provided in the cross baffle 42 and in the trough to permit the insertion of a key (not shown) upwardly into engagement with the socket head of the bolt for turning the bolt to adjust the position of the control plate 23 relative to the panel 33 and to the openings 31 therein.

The distribution panel 34 (Figure 2) is hung at one side from a marginal ledge 52 which projects inwardly from a Z member 20 and which is secured thereto by a plurality of capscrews 54. An angle member 55 depends from the under side of the ledge 52, being arranged to receive a plurality of hinges 56 secured to one marginal side edge of the panel 34. The opposite marginal side edge of the panel 34 is removably attached by cap screws 58 to an angle member 60 which is secured to the Z angle member by cap screws 53. The panels 34 may be swung downwardly as shown

5

in Figure 2 for inspection of the lower plenum chamber.

It is to be particularly noted in Figure 2 that the air distribution panel 34 and the air control panel 25 are hinged on opposite sides of the duct and, therefore, they will not interfere with each other when they are opened for inspection or maintenance of the plenum chambers.

It is evident, of course, that in place of the hinges on one marginal side edge of the air control panel and the air distribution panel there may be provided simple, screw type means such as the cap screws 58 and that with this type of construction the air control panel and the air distribution panel may be completely removed before inspection of the chamber as desired.

Thus, there is provided in this invention an air distribution system including a control panel and a control valve assembly. It is contemplated in this invention that these two members be furnished as a unit for quick, accurate installation on the Z-angle of a pre-installed ceiling. The distribution panel will, of course, be furnished for installation on the pre-installed ledges 52 and 60, which project inwardly from the Z angle members 20.

Figure 4 discloses a modification of the air distribution system of this invention and is similar in all respects to that described in connection with Figure 1, except that the air control panel in this case takes the form of a plate 62 which has a series of holes 63 the number and size of which can be arranged for proper air delivery depending upon the distance the panel 62 is from the blower. Thus, for any installation where equal quantities of air are to be distributed at each panel, the control panel farthest from the blower will have larger openings 63 to compensate for the reduced pressure.

The modification of the present invention shown in Figure 5 is similar to that of Figures 1 and 4 with the exception that the air control valve takes the form of a lower plate 65 having a series of openings 66. An upper plate 68 having an equal number of openings 69 is slidably mounted on the plate 65. By sliding the plate 68 relative to the plate 65, the volume of air passing through the air control plate may be regulated from a maximum delivery when the holes are in alignment to no delivery when the holes are completely out of alignment. A knob 71 is provided to facilitate adjusting the plate 68.

In Figure 6 another modification of the air distribution system of the present invention is shown wherein the air control panel itself is eliminated and the side walls of the ductwork are extended to form bottom closure plates 70 extending substantially across the open bottom of the duct to define an outlet. The air control valve assembly 26 is identical to that disclosed in Figure 1 and is secured by screws 72 to the underside of the closure plates 70 so as to be freely removable as a unit from the duct outlet. An opening 73 is provided in one of the closure plates 70 providing an inspection opening over which a trap door 74 is arranged to close by pivoting on a hinge 75.

A distribution plate 76 is secured by screws 77 to the lower legs 78 of channel members 79 which have their upper leg portions 80 secured by cap screws 81 to the closure plates 70 and their spans secured by screws 95 to support brackets 94. It is to be noted in this modification that the air control panel is completely eliminated, that a trap door is provided in the ductwork itself for inspection purposes and that the air distribution plate

6

76 has no hinge connection but is secured by cap screws.

In Figure 7 another modification of the air distribution system of the present invention is disclosed which is similar to that of Figure 6 in that the ductwork itself provides mounting means for the air control valve assembly 26 and a pivoting trap door 74 is provided in the ductwork for inspecting purposes. However, this modification features an air distribution panel 82 which is held in place at side flanged portions 83 against angle member 84 suitably secured to the duct. At each marginal edge a screw member 85 is threaded into the angle member 84 and urges a molding strip 86 toward the angle member 84 with the flanges 83 of the air distribution plate 82 and a portion 18 of the car ceiling pressed therebetween.

The modification disclosed in Figure 8 is similar to that of Figure 6 except that the air distribution plate 88 is pivotally mounted from the lower flange of the channel member 89 on a hinge 87. This construction, of course, facilitates access to the trap door 74 for access to the plenum chamber.

An additional modification of the present invention is illustrated in Figures 9 and 10 wherein an air distribution plate 90, air control plates 91, and a pair of channel members 92 are suitably secured by cap screws one to another to provide an air distribution unit, which may be removed as a unit from the open end of the duct. The air control panel 91 has upstanding side flanges 91a which are sized to slide inside the pre-installed duct work 93. Likewise, the channel members 92 are arranged to slide inside an angle member or support bracket 94 supported by a ceiling panel 18 and to be secured thereto by cap screws 95. Thus, the side ceiling panel members 18, through the cap screws 95, support the entire unit in the ductwork. The air distribution panel 90 is removably secured to the channel members 92 by cap screws 96. This construction, therefore, provides an assembly which may be readily removed from the duct and permits a maximum of access space for convenient cleaning of the walls of the plenum chamber. Thus, no pivoting panels or trap doors are required in this modification.

It will, of course, be understood that the air control panel and the air distributor panel of any of the modifications of the apparatus of the present invention could be provided with hinged trap doors for access purposes.

I have heretofore described various modifications of my invention. However, it will be understood that numerous other variations may be made in the character, construction, and arrangement of the component parts and in the general assembly without departing from the principle and scope of the invention, and I, therefore, contemplate by the attached claim to cover all such modifications as come within the true spirit and scope of my invention.

I claim as my invention:

In a ventilating system for a compartment having a roof, ceiling panels defining a generally rectangular opening to the roof, and support brackets secured to said ceiling panels, an integral air duct having a top wall and side walls defining an open-bottomed plenum chamber, said duct adapted to be dependently carried by the roof in vertically spaced relation to said ceiling panels and dimensioned to register vertically with said panel opening, bottom plates extending inwardly from the lower edges of the duct side walls without meeting to define an outlet, valve means for throttling air flow through said outlet detachably

secured to the underside of said bottom plates across said outlet to be removable as a unit from said outlet, channel members detachably hung from each of said bottom plates and detachably secured to the support brackets of the respective subjacent ceiling panels, and an air distribution panel detachably secured to said channel members for support at a height even with said ceiling panels, said air distribution panel substantially closing off said panel opening beneath said bottom plates to define with said plates and said channel members an accessible secondary plenum chamber for receiving throttled air from said duct prior to its distribution into the compartment.

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