Sept. 26, 1961 J. P. MOORE 3,001,464

AIR DIFFUSER CONSTRUCTION

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Fig. 1.

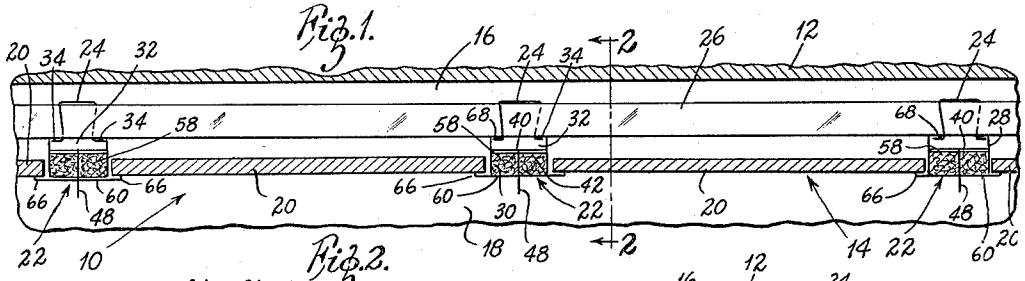


Fig. 2.

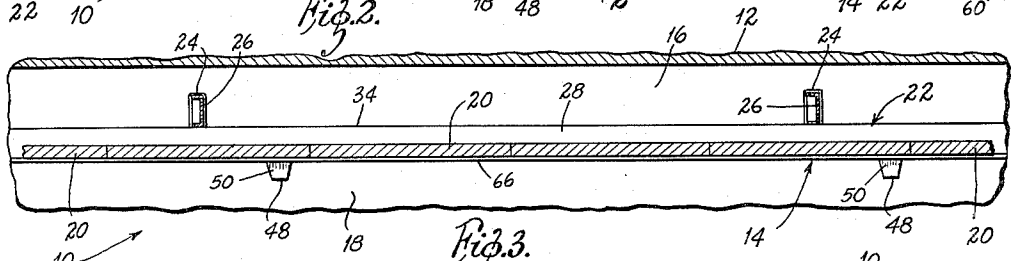


Fig. 3.

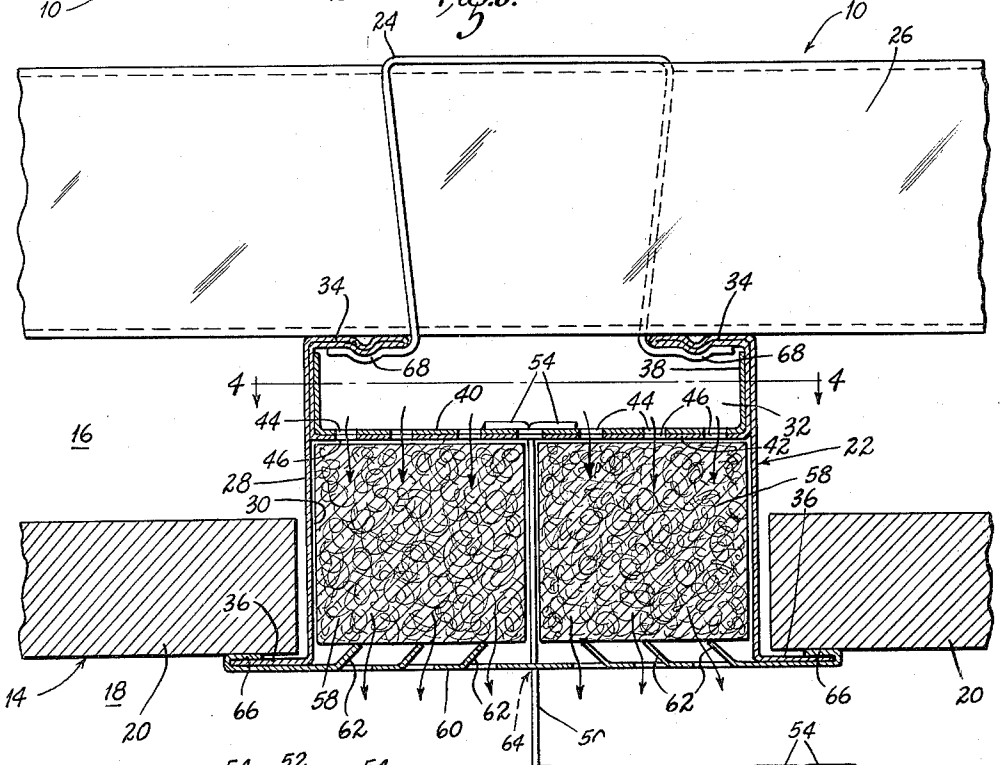


Fig. 6.

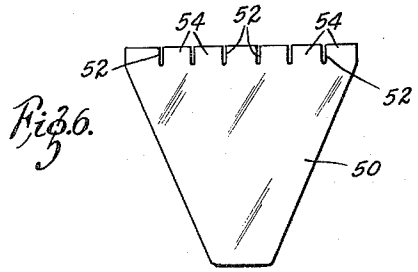
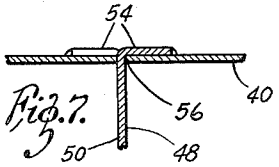


Fig. 7.



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Fig. 4.

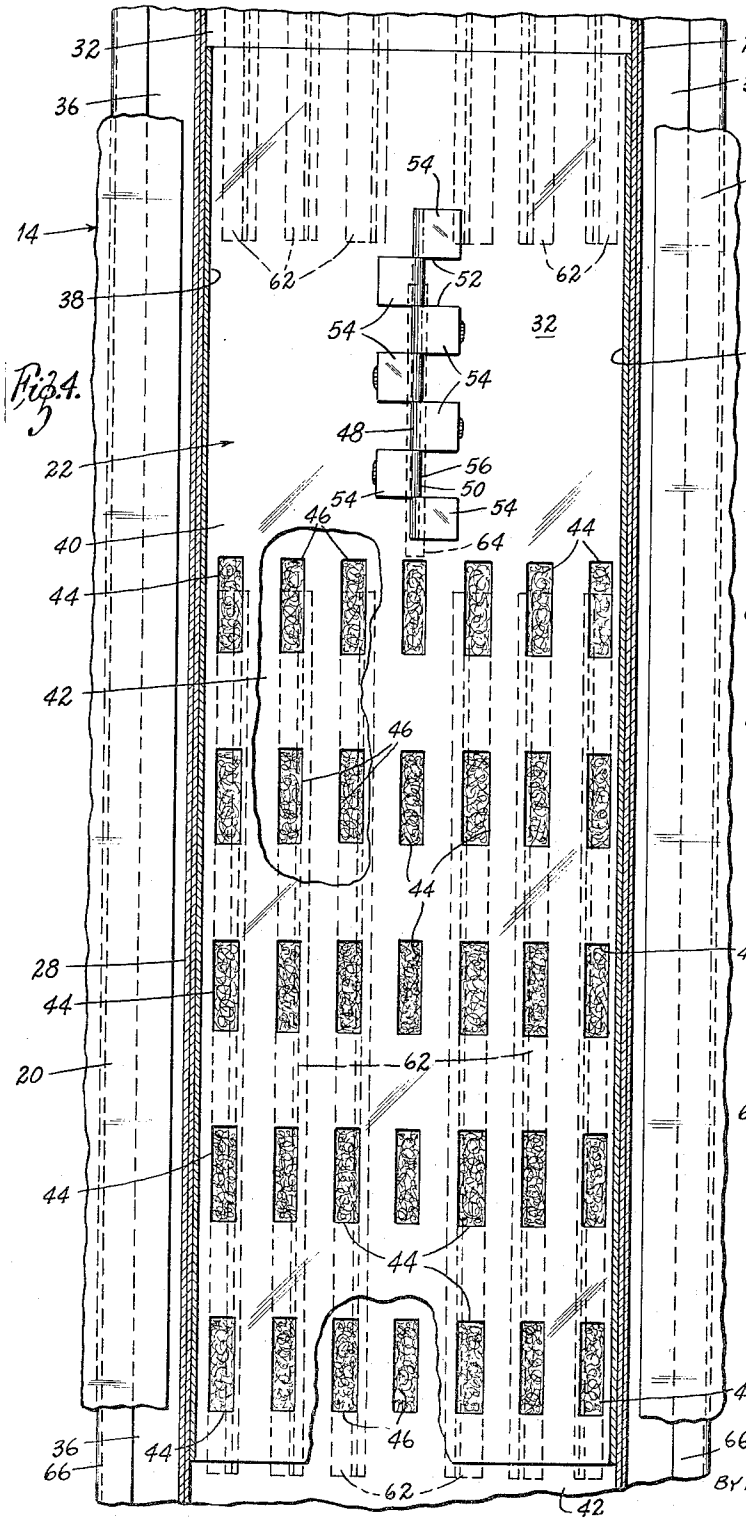
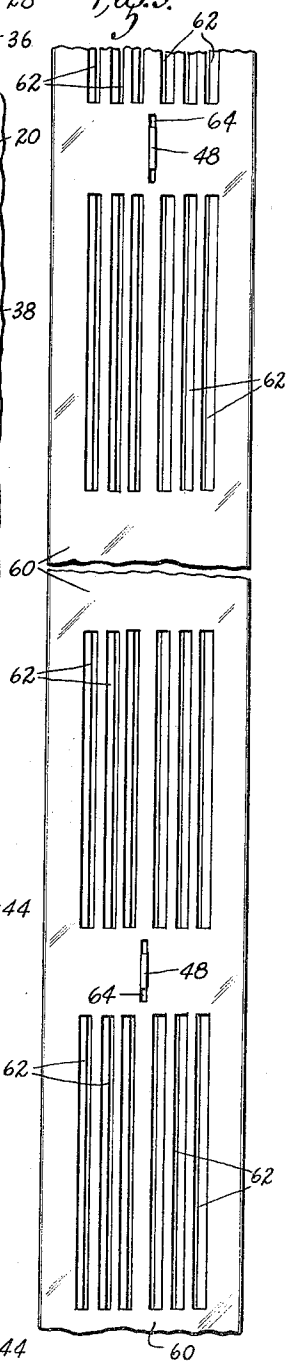


Fig. 5.



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AIR DIFFUSER CONSTRUCTION

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3 Claims. (Cl. 98—40)

The present invention relates generally to air distribution systems, and more particularly to a novel air diffuser construction for distributing ventilating air in rooms and offices.

In brief, the invention contemplates an arrangement which utilizes as a plenum that space which normally exists between the ceiling of one room and either the floor of the room next above or the main roof structure. This plenum is communicated with the room immediately therebelow through adjustable air diffusers. The diffusers, disposed in a uniform pattern which extends over substantially the whole ceiling area, incorporates filters which serve, not only to filter the air, but also to prevent blasting and unequal distribution of air through the several diffusers.

It is an object of the invention, therefore, to provide a novel air distributing construction which utilizes normally unoccupied space as a plenum.

It is another object of the invention to provide a novel air distributing construction which employs a plenum extending over substantially the whole ceiling area of a room to be ventilated.

It is another object of the invention to provide a novel air distributing construction which incorporates a plurality of air diffusers disposed in a uniform pattern in a room ceiling.

It is another object of the invention to provide a novel air distributing system which incorporates a plurality of air diffusers each provided with a filtering medium.

The foregoing, along with additional objects and advantages, will be apparent from the following description of a specific embodiment of the invention as depicted in the accompanying drawings, in which:

FIGURE 1 is a fragmentary vertical section showing a structural arrangement defining a plenum and including air outlets comprising part of an air distributing system;

FIGURE 2 is a fragmentary vertical section taken generally along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary vertical section similar to FIGURE 1, but showing only a single air diffuser in greater detail;

FIGURE 4 is a fragmentary horizontal section taken generally on the line 4—4 of FIGURE 3, portions being broken away to reveal details of underlying structure;

FIGURE 5 is a fragmentary bottom plan view, drawn to intermediate scale, of a removed air diffuser;

FIGURE 6 is a side elevation of a tab prior to its incorporation in an air diffuser assembly; and

FIGURE 7 is a fragmentary section view showing the manner in which the tab of FIGURE 6 is incorporated in the air diffuser assembly.

Referring more particularly to the details of the drawings, the numeral 10 designates generally an air distributing arrangement conforming to the present invention. The general arrangement 10 includes a horizontal overlying structure 12 and a horizontal lining or ceiling assembly 14 in spaced relation below the structure 12. Thus related, the parallel structures 12 and 14 define a plenum 16 which will be understood to extend over substantially the entire area of an associated room space 18 below the ceiling 14.

The structure 12, depicted in FIGURE 1 without detail, may take any convenient form, but normally will be a part either of a roof construction or of a sub-floor

construction of an overhead room. The principal requirement is that it be continuous and generally impervious to air.

The ceiling assembly 14, shown in FIGURES 1, 2 and 3 of the drawings, comprises rectangular panels 20 supported on rows between alternating parallel rows of elongated diffusing outlets 22. The outlets or diffusers 22 are suspended by means of hangers 24 from parallel spaced beams 26 extending in a direction transverse to that of the alternate rows of panels 20 and diffusers 22.

While the beams 26 employed to support the ceiling assembly 14 are shown in the drawings as channel members, it is obvious that they may take any of various forms. For example, where trusses or bar joists are used to support the overlying structure 12, the lower tension elements of such members may well serve also as the ceiling support in place of separate beams 26.

Inasmuch as the manner of mounting the beams 26 is not shown in the drawings, it is to be understood that these members may be supported in any appropriate manner, such as by bearing engagement (not shown) on walls or columns, or by suspension ties (not shown) from the overlying structure 12.

The outlets or diffusers 22, as is clear from FIGURE 2, take an elongated configuration and preferably extend the full length (or width) of the room space 18. A preferred sheet metal construction is clearly illustrated in FIGURE 3, it being understood, however, that the parts may be constructed wholly or partly of other materials. The illustrated outlet 22 includes a main box member 28 formed from a single sheet of material to provide an inverted box-like compartment 30 surmounted by an open channel 32. FIGURE 3 shows clearly the manner in which sheet material may be bent to define these spaces and at the same time to provide opposed inwardly extending flanges 34 along the top of the channel 32, as well as opposite outwardly extending flanges 36 at the lower opening of the compartment 30.

A plurality of elongated slide members 38 having U-shaped cross sections (FIGURE 3) are slidably disposed in the channel 32 of each of the box members 28. Although the length and spacing of the slide members 38 may be widely varied, a length of five or six times the width of the channel 32 and a spacing of approximately twice such length may be regarded as typical.

The channel-like slide members 38 are disposed with their web portions 40 in flush, slidable engagement with the upper panel portion 42 of an associated box member 28, and these engaged elements are both provided with a plurality of uniformly spaced openings. These openings, designated 44 and 46 in the elements 40 and 42, respectively, may be of rectangular shape, as illustrated in FIGURE 4, or of any other appropriate shape. They are arranged in matching patterns for selective alignment or misalignment. Each slide member 38 is provided with a tab 48 for moving it longitudinally of the box member 28. The illustrated tabs 48 each comprise a blank 50 (FIGURE 6) having slits 52 which define tab-like portions 54 which may be bent over and secured to the web portion 40 of the slide member 38 as illustrated in FIGURE 7. A slot 56 is provided in the panel portion 40 to accommodate the depending tab 48, which extends down below the bottom of the box member 22, as clearly shown in the drawings.

The compartment 30 is substantially filled with a mechanical filter 58 comprising a material such as spun glass or the like. This filter 58 is retained in place by an elongated grill 60 disposed across the lower opening of the compartment 30. An appropriate pattern of louvers 62 is provided in the grill 60 as clearly indicated in FIGURES 3 and 5, and slots 64 are also provided for accommodation of the shifting tab 48. The grill 60 is supported

by the lower side flanges 36 of the box member 28 by bending over the side edges of the former as illustrated at 66 in FIGURE 3.

In use, the diffusers 22 are, as previously mentioned, suspended by hangers 24 from the supporting beams 26. While the hangers 24 are here illustrated as straddling the beams 26 and engaging deformed ends 68 under the beaded flanges 34 at the top of the box member 28, it is obvious that other means of suspension would be satisfactory. With the diffusers supported as described, the panels 20 may rest in rows upon the horizontal lower flanges 36 of adjacent parallel diffusers 22.

It will of course be understood that the plenum 16 defined between the overlying structure 12 and the ceiling assembly 14 is communicated by conventional duct means with a source of ventilating air under sufficient pressure, not only to fill the plenum 16, but also to expel air through the diffusers 22 into the room space 18.

The filters 58, in addition to filtering the air which is discharged into the room space 18, also provide sufficient restriction to the flow of air to prevent "blasting" at any point. There is thus produced a tendency toward equalized inflow from the ceiling area which, coupled with the over-all pattern of arrangement of the diffusers 22, assures low velocities of air entrance and prevents localized drafts. The slide members 38 may be adjusted by means of their tabs 48 to provide complete uniformity of inflow as well as to control the volume of air admitted to the room space 18.

Clearly, there has been provided an air distributing construction which fulfills the objects and advantages sought therefor.

It is to be understood that the foregoing description and the accompanying drawings have been given only by way of illustration and example. It is further to be understood that changes in the form of the elements, rearrangement of parts, and the substitution of equivalent elements, all of which will be apparent to those skilled in the art, are contemplated as being within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. In a room having an overlying, substantially air impervious structure, an air distributing ceiling assembly comprising a plurality of parallel horizontal panels, each panel having parallel sides and opposite ends and having a plurality of air openings through it with vanes adjacent each opening for directing air laterally as well as downwardly as the air passes through the openings, each panel having ceiling supporting side edge flange means defined by an extension of the sides of each panel beyond the openings, a pair of spaced, substantially vertical side wall plates extending between the ends of and upwardly from each panel, each pair of side wall plates being joined to its respective panel along a line located horizontally inwardly of the side edge flange means, a substantially horizontal top plate suspended between each pair of side wall plates and extending between the ends of the side wall plates in spaced relation to the tops and bottoms of the side wall plates, a plurality of slots through each top plate for admitting air to the panels from the space above each top plate, a slidable closure plate slidably overlying each top plate, each closure plate having a plurality of slots through it and alignable with the slots through the top plate below it in one position of the closure plate, each closure plate being slidable to another position for covering the top plate slots, closure plate sliding means connected to each closure plate and accessible from below the panels for sliding the closure plates to adjust the amount of air passing through the top plate, a filter mass disposed within the spaces between each pair of side wall plates and between the corresponding panel and top plate, a suspension system for supporting each pair of side wall plates, and a ceiling panel supported between each pair of adjacent panels by the opposing side wall edge flange means of each pair of adjacent panels.

2. The combination of claim 1 wherein the suspension system comprises a plurality of beams spaced along the length of the panels, and positioned above the side wall plates, each pair of side wall plates having opposed inwardly directed flanges at the tops of the side wall flanges, and hook means supported by the beams and having extensions underlying the last mentioned flanges, the flanges and extensions having cooperative projections for preventing inadvertent lateral sliding movement of the extensions inwardly of the last-mentioned flanges.

3. The combination of claim 1 wherein each closure plate sliding means comprises a vertical actuator plate connected to each closure plate and extending downwardly from the closure plate, each top plate and each panel having elongated slots through which the actuator plate extends, the elongated slots extending beyond the actuator plate to permit horizontal movement of the actuator plate to slide the closure plate.

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