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3,401,623

LINEAR AIR DIFFUSING DEVICE

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FIG. 1

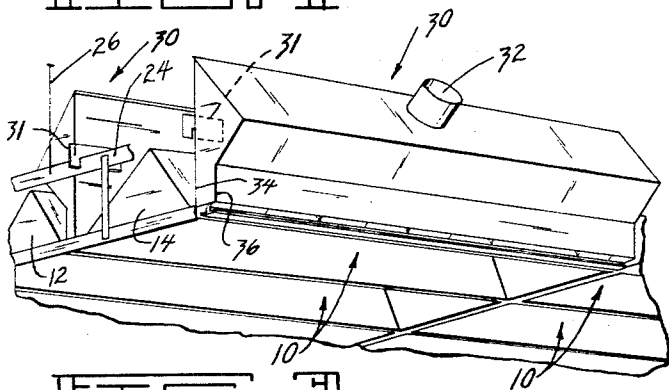


FIG. 2

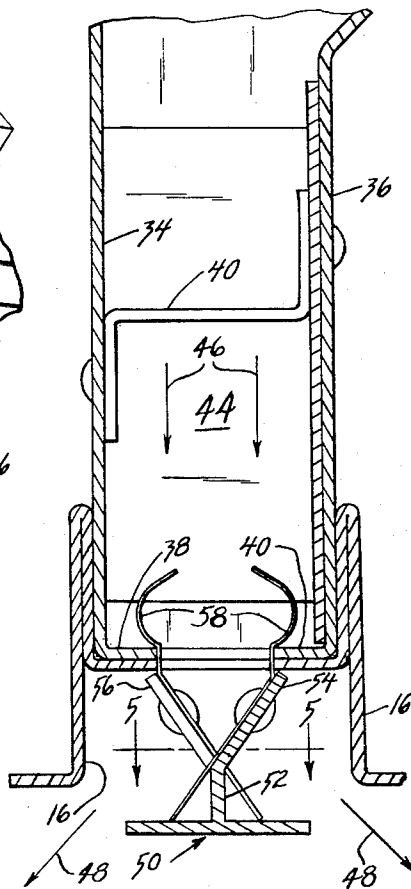


FIG. 3

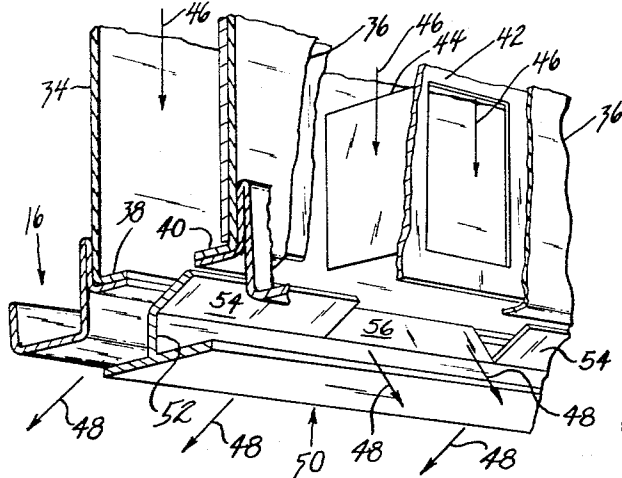


FIG. 4

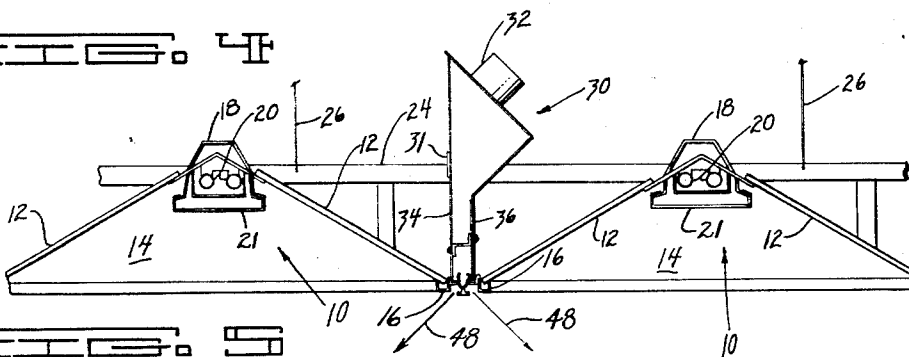
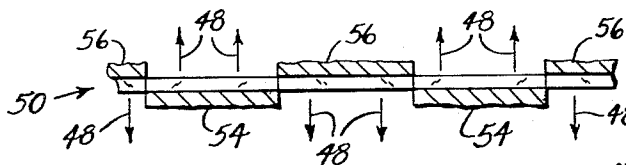


FIG. 5



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1

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LINEAR AIR DIFFUSING DEVICE

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ABSTRACT OF THE DISCLOSURE

The disclosure relates to a ceiling type linear air diffuser which is especially adapted for insertion between conventionally mounted light troffers. The air diffuser includes an elongated T-shaped air splitter plate which has alternately off-set vane portions so that the air entering the room is directed in relatively opposite directions along the longitudinal length of the diffuser. The flow splitter is mounted relative to side walls of the diffuser by spring clips for ease of attachment.

This invention relates to air diffusers for use in the ceiling of a room or other space to be ventilated, and deals more particularly with a linear air diffusing device for use between two adjacent light troffers of the open type.

A general object of the present invention is to provide an air diffusing device of improved design capable of generating a stable air flow pattern comprising a plurality of distinct flow segments, each of which is diagonally directed intermediate a vertical downward discharge which is objectionable from the point of view of creating drafts or the like, and a horizontal sidewise discharge which can be objectionable with open type light troffers as a result of undesirable temperature effects on the adjacent fluorescent lamps.

Still another object of the present invention is to provide a diffusing device for use between adjacent light troffers of the open type, which device contains no movable air deflecting vanes which require initial or periodic adjustment, with the result that the device of the present invention is well adapted to high quantity, low cost production.

Still another object of the present invention is to provide an air diffusing device for use between adjacent light troffers of the open type, which device fits into the side frames of the light troffers, and which cooperates therewith to create the desired air flow pattern.

The drawing shows a preferred embodiment of the invention and such embodiment will be described, but it will be understood that various changes may be made from the construction disclosed, and that the drawing and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing:

FIG. 1 is a perspective view partly broken away of a ceiling having a plurality of light troffers, with linear air diffusers of the present invention interposed therebetween.

FIG. 2 is a vertical cross section through the device of FIG. 1 drawn to a somewhat larger scale.

FIG. 3 is a perspective view of a portion of the device shown in FIG. 1 drawn to a somewhat larger scale.

FIG. 4 is a vertical cross section through the ceiling of FIG. 1.

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 2.

Turning now to the drawing in greater detail, FIG. 1

2

shows a ceiling comprising a plurality of open type light troffers 10, 10 of the type adapted to include elongated tubular lamps of the fluorescent type, as best shown at 20, 20 in FIG. 4. Each of the light troffers 10, 10 is of elongated rectangular outline with inclined side panels 12, 12 and end panels 14, 14 all of which are held in a generally pyramidal-shape by longitudinally extending side frame members 16, 16 and a lamp housing at the apex of the pyramid as indicated generally at 18. The tubular lamps 20, 20 are retained in the downwardly open housing 18 in a conventional manner. The lower portion of the housing 18 may be closed with a suitable lens as indicated generally at 21. However, it should be noted that the light troffer 10 is intended to be of the open or exposed type with the side panels 12, 12 being made from a suitable sound-absorbing material of the type heretofore used in false ceilings generally.

With reference to FIG. 1, it will be apparent that the side frame members 16, 16 are supported at either end on a truss 24 which extends generally perpendicularly with respect to the longitudinal axis of the various light troffers and said truss 24 is in turn supported from an overhead structure (not shown) as indicated by the wire hangers 26, 26.

As best shown in FIG. 4, the adjacent light troffers 10, 10 and more particularly the side frame members 16, 16 thereof are spaced apart and are so shaped as to receive a linear type air diffusing device. While a conventional linear type air diffusing device might be inserted in the space between the adjacent light troffers, it has been found that with conventional air turning vanes of the longitudinally extending variety such as are normally provided in linear air diffusers generally, the discharge air tends to follow the ceiling contour, which in this case comprises the inclined upwardly sloped sides 12, 12 of the light troffer. As mentioned hereinabove, this air pattern is objectionable because it subjects the lamps 20, 20 to the undesirable effect of changing the temperature of the air surrounding the lamps, thereby causing said lamps to flicker or to produce undesirable color variations. As will be seen from the description to follow, an air diffusing device of the present invention is so constructed as to generate an air flow discharge pattern which is not characterized by this tendency for the discharge air to follow along an adjacent ceiling structure. The present design accomplishes this result without creating drafts or the like in the subadjacent room to be ventilated as would be the case for example if the ventilating air were discharged vertically downwardly.

Turning now to a more detailed description of an air diffusing device of the present invention, FIGS. 1 and 4 show a plurality of such devices 30, 30 in a false ceiling construction. The device shown comprises an elongated housing or enclosure having a suitable inlet opening 32 for receiving ventilating air from an overhead supply duct or the like (not shown). The upper portion of the air diffusing device may take any convenient shape and includes means such as the clips 31, 31 for supporting the same from the truss 24. The lower portion thereof preferably comprises first and second longitudinally extending side walls as indicated at 34 and 36. Suitable means is provided for supporting the side walls 34 and 36 in laterally spaced relation to define an elongated downwardly open air discharge outlet therebetween. Preferably, and as best shown in FIGS. 2 and 3, inwardly protruding lips 38 and 40 are provided along the lower edge portions of the side walls 34 and 36 respectively, and the sub-

adjacent side frame members 16, 16 will be seen to define similarly projecting lips or flanges which are adapted to receive the lips 38 and 40 of an associated diffusing device. While the flange defining portion of each side frame member 16 is provided some distance above the channel-shaped portion of the side frame member, it will be apparent that the precise construction of the side frame member 16 is not critical. It will also be seen from the description to follow that the side frame member construction adopted herein does, however, provide a conveniently recessed discharge opening below which suitable means in the form of member 50 can be mounted for splitting the air flow emanating from the elongated discharge outlet to generate an air flow pattern in accordance with the present invention.

Still another advantage to utilizing a recessed discharge outlet as shown in FIG. 2 can be attributed to the fact that only the side frame member 16, or more particularly the channel-shaped lower portion thereof, and to an extent the member 50 can be seen from below the integrated ceiling construction shown in FIG. 4. As best shown in FIG. 3, each side frame member 16 will be seen to define an upwardly open channel for receiving the lower edge of a side panel 12 of the light troffer 10 and to have a flange for receiving the lower edge portion of the air diffusing device 30.

The side walls 34 and 36 of the device 30 are held in laterally spaced relation by a plurality of Z-shaped clips 40, 40 which clips are preferably riveted to the side walls as best shown in FIG. 2. Suitable means are provided in the diffusing device for guiding the discharge air in a vertical or downward direction, and as best shown in FIG. 3 said means comprises an elongated member 42 riveted to the side wall 36 of the device as shown and having a plurality of laterally protruding tabs or guides 44 punched from the member 42 and extending across the space between the side walls 34 and 36 so as to guide the air in the direction of the arrows 46.

In accordance with the present invention the means for splitting the discharge air emanating from the elongated outlet comprises an elongated one-piece member 50 which extends the length of the discharge outlet and which includes suitable vanes for diverting the discharged air into a plurality of segments each of which is deflected laterally outwardly in a direction opposite to that of the adjacent air flow segment. More particularly, the member 50 has a lower portion which is of inverted T-shape as shown so that its lower surface is generally rectangular in plan form and conforms generally with the shape of the discharge outlet defined by the turned lips 38 and 40. The upper portion of the member 50 defines the above-mentioned vanes each of which is integrally connected along one edge to the rectangularly-shaped lower portion or more particularly to the stem portion 52 located at the centerline thereof. The vanes 54, 56 are inclined upwardly and laterally outwardly with respect to the centerline of the member 50 so that the respective edges of the vanes opposite the integrally connected edges thereof lie in closely spaced relation to the lower edge portions of the side walls 34 and 36, and more particularly to the lips 38 and 40 respectively. The vanes 54 and 56 are oppositely inclined so that adjacent air flow segments generated thereby are diverted in opposite directions in the manner described above. The air flow pattern generated by the member 50 is best shown in somewhat schematic form in FIG. 5 wherein a plurality of air flow segments are diverted in opposite directions throughout the length of the diffusing device in such a manner that no large areas of negative pressure are created tending to deflect the air flow either upwardly inside the light troffer, or downwardly in a vertical direction so as to create undesirable drafts in the space therebelow. While the actual dimensions of the diffusing device are not critical, it should be noted that the longitudinal length of each of the vanes 54 and 56 is on the order of two or three times the

lateral width of the discharge opening defined by the lips 38 and 40. Suitable means is provided for mounting the member 50 beneath the discharge outlet and as shown said means comprises a plurality of leaf springs 58, 58 each of which is attached to a vane and extends upwardly thereabove so that its arcuate contour firmly engages the innermost edge portion of an adjacent lip 38 or 40.

It is also noted that the member 50 can be very economically manufactured from a conventional T-shaped extrusion with the vanes 54 being bent in one direction and the vanes 56 being bent in the opposite direction so as to provide a one-piece vane defining member suitable for creating a plurality of air flow segments deflected in opposite directions as described above. While a longitudinal extending slot significantly longer than the vanes just described might be so constructed as to direct a stream of air at the same angle as that shown in FIG. 2 at 48, 48, such an elongated stream would not exhibit the same stable characteristics as that of the plurality of alternately deflected air flow segments depicted in FIG. 3. It is the stability of the air flow pattern produced by the construction of the present invention which accomplishes the desirable results achieved.

The invention claimed is:

1. A ceiling construction comprising in combination a plurality of open type light troffers having tubular illuminating lamps disposed therein, truss means for supporting said troffers in spaced parallel relation to one another, a plurality of linear air diffusing devices between at least some of said light troffers, each of said light troffers having a longitudinally extending side frame member which defines a protruding flange, each of said troffer side frame members including a depending channel shaped portion along its inside edge generally opposite said outwardly protruding flange along its outside edge, each of said troffers including elongated side panels of acoustical resistance material and a lower side edge of each such panel removably received in said channel shaped portion, each of said diffusing devices having first and second longitudinally extending side walls the lower edge portions of which rest on said troffer defined flanges to define an elongated air discharge outlet therebetween, each of said devices further including an elongated flow splitting member, means for mounting said member below said outlet and between said troffer side frame members, said flow splitting member having a lower portion which is of inverted T-shape in cross section, said T-shaped lower portion having a lowermost head portion which is rectangular in horizontal planform and is of constant thickness throughout its lateral width to define flat horizontal upper surfaces, an upper portion of said flow splitting member having a plurality of vanes each of which is integrally connected along one edge to a stem portion of said lower portion, each of said vanes being inclined upwardly and laterally outwardly in a direction opposite the inclination of an adjacent vane so that successive air flow segments are diverted in successively opposite directions, each of said vanes having an opposite edge which lies in closely spaced relation to the lower edge portion of one of said side walls so that air flow emanating from said elongated outlet is split into a plurality of longitudinally limited segments and is deflected laterally outwardly off said upper horizontal surfaces.

2. The combination of claim 1 wherein said lower edge portions of said side walls define inwardly turned lips which abut said troffer side frame defined flanges, and wherein said mounting means for said flow splitting member comprises leaf springs attached to at least some of said vanes and extending upwardly thereabove to engage the innermost edge portions of said lips, each of said leaf springs being so shaped as to hold said vanes against the underside of said troffer side frame.

3. The combination of claim 2 wherein said air diffusing device is further characterized by flow straightening means between said side walls and upstream of discharge

5

outlet for restricting the air inside said device to vertical movement only.

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6

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5

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