May 20, 1969 R. R. LAMBERT 3,444,801

AIR DIFFUSER ASSEMBLY

Filed Dec. 22, 1967

FIG. 1.

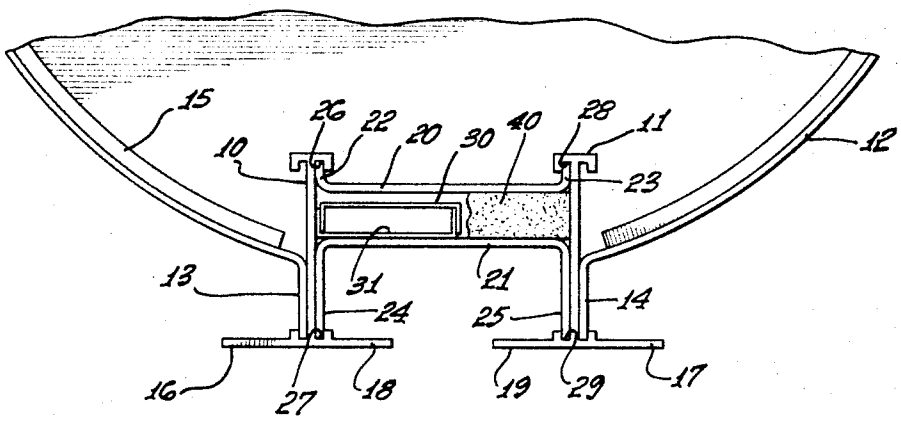


FIG. 2.

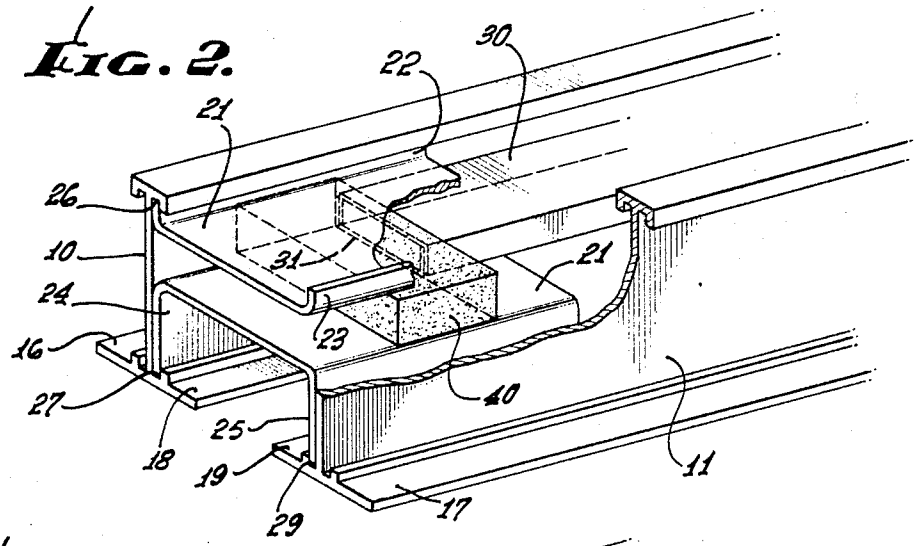
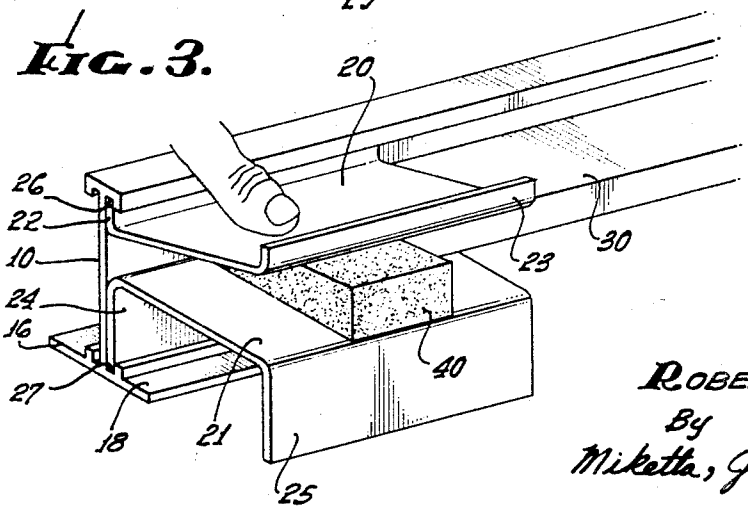


FIG. 3.



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AIR DIFFUSER ASSEMBLY

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ABSTRACT OF THE DISCLOSURE

A pair of suspended ceiling air diffuser T-bar elements are assembled in spaced relation by pairs of oppositely opening channel-like spacer members with edge flanges received in opposed grooves formed adjacent inner wall surfaces of the T-bar members with resilient pad means positioned between the spacer member web portions for normally resiliently holding the spacer members in operative spaced relation assembled to and engaged with the recesses of the ceiling elements and being deformable during assembly or disassembly of the spacer members to the ceiling elements to facilitate assembly or disassembly of the apparatus. A weir member is positioned on the spacer members with end portions thereof in frictional engagement with the resilient pad means positioned at either end thereof on associated spacer means to yieldably retain the weir means in selectable positions of adjustment between the ceiling diffuser T-bars.

Background of the invention

The building construction industry is making increased use of suspended ceiling installations wherein lighting fixtures, ceiling tiles and air-conditioning units are all suspended from the underside of the actual ceiling or soffit of the room. In such commercial, industrial or residential uses of suspended ceilings, the major contractor generally sub-contracts the building of various portions of the ceiling system to different contractors. Further, trade union requirements demand that different union workers perform different tasks in assembling the ceiling installations. It has therefore become a somewhat complicated and involved procedure to schedule all of the various workmen for the assembly and installation of the various components in a ceiling system so that the work of one contractor does not await or interfere with that of another.

Long slot-like air diffuser openings are frequently provided in suspended ceiling installations where the diffuser opening is defined by suspended and spaced ceiling elements which cooperate with the surrounding ceiling gridwork and ceiling tile to form a part of an integrated ceiling installation. While such ceiling elements form a part of the air distribution system, they may be considered within the province of the trade unionist who installs the ceiling gridwork rather than the air-conditioning contractor. It is important for the proper operation of the air-conditioning system that the ceiling elements defining the air diffuser outlet be properly assembled in a predetermined spaced relation, such spacing generally being predetermined by the air-conditioning contractor. It is therefore the primary object of the present invention to disclose and provide an air diffuser assembly which, because of its pre-design, is easily, readily and unerringly assembled at the location of use by relatively unskilled labor without the need for the presence of the air-conditioning contractor or engineering expert who designed the installation.

It is also a primary object of the present invention to disclose and provide a ceiling element spacer and weir means mounting assembly for use in suspended ceiling air diffuser installations wherein the assembly is easily erected manually at the location of use without the need for tools normally required for screwing or bolting conventional prior air diffusers together and which, when assembled, is maintained in a predetermined rattle-free relationship, yet allowing ease of adjustability of the weir means provided therein.

It is another object of the present invention to disclose and provide a ceiling element spacer and weir means mounting assembly as in the foregoing object wherein the ceiling element members are spaced a predetermined distance by spacer means held in assembled relation by a resilient means which readily deforms to allow disassembly of the spacer means from the ceiling elements without the need for additional manually operated tools.

It is a still further object of the present invention to disclose and provide a ceiling element spacer and weir means mounting assembly as in the foregoing objects wherein the weir means employed for controlling air flow between the ceiling element members through the air diffuser outlet formed therebetween is adjustably retained in rattle-free relation to the assembly by a friction engagement with the resilient means employed for retaining the ceiling element spacer means in assembled relation.

Additional objects and various advantages of the air diffuser assembly according to the present invention will become apparent to those skilled in the art from a consideration of the within detailed explanation of a preferred exemplary embodiment thereof.

Summary of the invention

The air diffuser apparatus of the present invention, in general, comprises the spacing of a pair of ceiling elements defining an air diffuser outlet in a suspended ceiling installation by a pair of opposed spacer means extending between and spacing the ceiling elements and the provision of a deformable, resilient means associated with the spacer means for normally holding them in an operable assembled position and being deformable during the assembly and disassembly of the spacer means to and from the ceiling elements to facilitate such assembly or disassembly of the air diffuser apparatus.

More particularly, a pair of spacer members of generally channel-like configuration are mounted in oppositely opening relation between a pair of inverted T-shaped ceiling elements or bars of a suspended ceiling installation. The outer flange portions of the channel-like spacer members are retained in complementary recesses or grooves formed in the ceiling element T-bars by the provision of a resilient means disposed between the web portions of the spacer means. The spacer means may be sprung out from under the groove or recesses formed in the ceiling T-bars by manual depression thereof upon the resilient, deformable means between the web portions of the spacer means.

Where a weir member is movably mounted on the spacer means for relative adjustment between the ceiling element T-bars for controlling the direction and amount of the air flow through the diffuser, the resilient means is positioned in frictional engagement with end portions of the associated weir means to yieldably restrain the weir means in any desired position of adjustment in a rattle-free, secured position.

A more complete understanding of the air diffuser assembly according to the present invention as well as its advantages over prior assemblies will become apparent to those skilled in the art from a consideration of the following detailed explanation of a preferred exemplary embodiment thereof. Reference will be made to the appended sheet of drawings wherein:

FIG. 1 is an end elevational view, partially sectioned, of a preferred exemplary embodiment of ceiling element spacer and weir means mounting assembly, according to the present invention, for use in suspended ceiling air diffuser installations;

FIG. 2 is a perspective view of the assembly of FIG. 1 showing portions of the ceiling element and spacer members in section; and

FIG. 3 is a perspective view of the assembly of FIGS. 1 and 2 showing the manual forceful movement of the spacer members toward one another, to compress and deform a resilient means therebetween, during the assembly of the ceiling element spacer members to the ceiling elements.

A detailed explanation of the ceiling element spacer and weir means mounting assembly, according to the present invention, will now be made with reference to the preferred exemplary embodiment thereof illustrated in FIGS. 1 through 3. Referring first to FIG. 1, a pair of longitudinally extending ceiling elements **10** and **11** are shown with a generally T-shaped cross-sectional configuration. Ceiling elements **10** and **11** may be individually suspended from the soffit by hanger wires or by other conventional means which can be associated with the spacer members **20** and **21**. An air supply conduit or plenum **12** is illustrated with its longitudinally extending flanges **13** and **14** received in complementary slots or grooves provided in the ceiling elements **10** and **11** in conventional manner. The conduit or plenum **12** is provided in known manner with an inner insulation material **15**.

Each of the ceiling elements **10** and **11** is provided with a bottom flange to lie generally in the plane of the ceiling. The outwardly directed flange portions **16** and **17** are adapted for supporting ceiling tiles in known manner while the inwardly directed flange portions **18** and **19** are adapted to provide a longitudinally extending slot or diffuser opening through which air from within the plenum or air supply chamber **12** is diffused into the room area below the level of the ceiling.

Weir means for controlling the direction and amount of air flow through the diffuser outlet provided by the spaced ceiling element flanges **18** and **19** are provided between the ceiling element members **10** and **11**. Such means in the exemplary embodiment includes the provision of the nested and opposed generally channel-like weir members **30** and **31** as seen in FIGS. 1 and 2. The longitudinally extending and relatively laterally adjustable weir members **30** and **31** are mounted between ceiling elements or members **10** and **11** by the provision of spacer elements, as elements **20** and **21**, at opposite ends thereof. It is to be understood that while only one end of the exemplary weir means are shown mounted on a single pair of spacer means **20** and **21**, the opposite end of the weir means is similarly mounted on a second identically constructed pair of spacer means. The construction and operation of the exemplary weir means is more fully explained in my copending application Ser. No. 608,094, filed Jan. 9, 1967, and entitled "Air Diffusion Outlet With Laterally Adjustable Weir Control." For purposes of the present application, it is sufficient if it is understood that the individual weir members **30** and **31** are movable laterally between ceiling elements **10** and **11**, jointly or severally, in order to control the direction and amount of air passing from within the plenum **12**, between ceiling elements **10** and **11** and through the diffuser outlet formed by flanges **18** and **19**.

As particularly contemplated within the present invention, the assembly of the ceiling elements **10** and **11**, the spacer members **20** and **21** and the weir means **30** and **31** is accomplished and maintained in operable working order through the provision of resilient means positioned between each pair of spacer members employed in the diffuser apparatus. In the exemplary embodiment, such resilient means includes the provision of a resilient, deformable pad **40** which may be made from any suitable

material such as foam rubber or other compressible, deformable yet resilient material which tends to retain its original shape between spacer members **20** and **21** while allowing movement of the spacer members toward one another in order to facilitate the assembly or disassembly of the apparatus as hereinafter explained.

As seen in FIGS. 1 and 2, the individual spacer elements **20** and **21** are of channel or U-shaped configuration with side flanges **22** and **23**, and **24** and **25**, respectively. Each ceiling member **10** and **11** is provided with opposed channels, recesses or grooves **26** and **27**, and **28** and **29**, respectively, adjacent an inner surface of the vertical wall or web portion of the ceiling elements. The spacer element flanges **22** through **25** are thus receivable within the associated ceiling elements grooves or channels **26** through **29** when the spacer members are disposed in oppositely opening relation to each other as shown in FIG. 1.

Referring to FIG. 3, the assembly of the spacer elements **20** and **21** to the ceiling elements **10** and **11** may be performed manually at the location of use of the diffuser with the appropriate weir means supported by the spacer members. A pair of ceiling elements **10** and **11** may be positioned on any appropriate working surface and two lower spacer elements **21** may be assembled thereto into the complementary ceiling element grooves **27** and **29** at spaced locations thereon. The desired weir means, as weir members **30** and **31** may then be placed upon the longitudinally spaced lower spacer members, as member **21** in the drawings. Thereafter a deformable or resilient means is preferably placed at each end of the weir means upon the associated lower spacer means. At this stage in the assembly, the resilient means, as pad **40**, at each end of the weir means is preferably positioned snugly against the weir means end surfaces to provide a friction fit engagement between the weir means opposite ends and the respective deformable means positioned thereagainst. As seen in FIG. 3, each upper spacer plate **20** may then be pivoted under one of the ceiling element top T or flange portions to place an edge flange thereof in engagement with the associated ceiling element groove, as flange **22** is received within ceiling element downwardly opening groove **26** formed in the ceiling element head flange. It should be noted that the weir means, including member **30**, is positioned toward the ceiling element under which the first flange of the upper spacer member is pivotally assembled so that it will not interfere with the subsequent depressing of the free end, flange **23** in FIG. 3, of the upper spacer member under the opposite ceiling element head flange. The assembly of the diffuser apparatus is then completed by the depression, which may be done manually, of each upper spacer plate **20** down on the resilient pad **40** to snap the free end thereof under the opposite ceiling element head flange, ceiling element **11** in the exemplary embodiment. During such assembly, and as particularly contemplated within the present invention, the resilient pad **40** deforms to allow the depression of the upper spacer member under the complementary groove or channel **28** provided in the head flange of ceiling element **11**. Further, upon the completion of such assembly, the opposite ends of the weir means **30** and **31** are frictionally engaged by the resilient pads positioned at their ends so that lateral adjustable movement of the weir means between the ceiling elements upon the spacer members is yieldably resisted. The weir members may thereby be held in any selected position of adjustment in a rattle free, automatically secured position of adjustment.

Having thus described a preferred exemplary embodiment of the air diffuser apparatus for use in suspended ceiling installations, according to the present invention, it should be understood by those skilled in the art that various adaptations, modifications and resilient materials for the resilient means may be used within the scope of the present invention which is defined and limited only by the following claims.

I claim:

1. A ceiling element spacer and weir means mounting assembly for use in suspended ceiling air diffuser installations, said assembly comprising:

a pair of spacer members extending between and spacing a pair of ceiling elements, said spacer members being engaged with portions of said ceiling elements when assembled thereto, and

resilient means positioned between said spacer members for normally resiliently holding said spacer members in operative spaced relation assembled to and engaged with said portions of said ceiling elements and for deforming upon forceful movement of said spacer members toward one another to allow manual assembly or disassembly of said spacer members to or from said ceiling elements.

2. An assembly as in claim 1 wherein:

weir means for controlling air flow between said ceiling elements are provided between and mounted by said spacer members.

3. The assembly of claim 2 wherein:

said weir means is selectively movable relative to said ceiling elements and includes longitudinal outer end portions, and

said resilient means positioned between said spacers engages a longitudinal end portion of said weir means to resiliently and frictionally retain said weir means by said end portion in a selected position of adjustment between said ceiling elements.

4. The assembly of claim 1 wherein:

said ceiling elements are each provided with upper and lower opposed recesses adjacent an inner wall surface thereof providing said portions engaged by said spacers,

said pair of spacer members comprise a pair of oppositely opening channel-shaped members, each having a pair of spaced, parallel side walls interconnected by a generally planar web, and

said member side walls are received in said ceiling element opposed recesses and resiliently held therein by said resilient means disposed between said webs.

5. A ceiling element spacer and weir means mounting assembly for use in suspended ceiling air diffuser installations comprising:

a pair of spacer members extending between and spacing a pair of ceiling elements, said spacer members receiving and mounting weir means therebetween for controlling air flow between said ceiling elements and past said spacer members, and

resilient means positioned between said spacer members for resiliently holding said spacer members in operative spaced relation and being deformable upon movement of said spacer members toward one another to allow their assembly to or disassembly from said ceiling elements.

6. The assembly of claim 5 wherein:

said resilient means are positioned between spacer members at longitudinal ends of said weir means mounted by said spacer members for movement relative to said ceiling elements; and

said resilient means engage and yieldably retain said weir means in any selected position of adjustment between said ceiling elements.

7. An air diffuser apparatus for use in suspended ceiling installations comprising:

a pair of ceiling elements, each having a generally vertical wall portion and opposed channels provided adjacent an inner surface of said wall portion,

spacer means extending between and spacing said ceiling elements, portions of said spacer means being received in said opposed channels of each of said ceiling elements, and

a deformable means associated with said spacer means for normally holding said spacer means in operable position spacing said ceiling elements and for deforming during assembly and disassembly of said spacer means to and from said ceiling elements to facilitate said assembly and disassembly.

8. The air diffuser apparatus of claim 7 including:

weir means adjustably mounted between said ceiling elements by said spacer means.

9. The air diffuser apparatus of claim 8 wherein:

said weir means is adjustably mounted between said ceiling elements by two longitudinally spaced spacer means; and

longitudinal end portions of said weir means engage and are yieldably retained in any selected position of adjustment by engagement with deformable means associated with each of said two spacer means.

10. An air diffuser apparatus for use in suspended ceiling installations comprising:

a pair of ceiling elements defining a diffuser outlet in a suspended ceiling installation;

spacer means for spacing said ceiling elements and for mounting an air deflecting means between said ceiling elements; and

resilient means associated with said spacer means for normally holding said spacer means in assembled relation to said ceiling elements and being deformable to allow assembly and disassembly of said spacer means to and from said ceiling elements.

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U.S. Cl. X.R.

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