

[54] **DIFFUSERS FOR CONDITIONED AIR**

[76] Inventors: **Mannie Bertin**, 47 Lenon Dr., Danbury, Conn. 06810; **Ira L. Bertin**, Box 25, Limington, Maine 04049

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Related U.S. Application Data

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[52] U.S. Cl. **98/40 VM; 98/108; 98/110; 98/121 A; 49/74**

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[58] Field of Search **98/40 VM, 110, 121 R, 98/121 A, 108; 49/74; 126/285**

[56] **References Cited**

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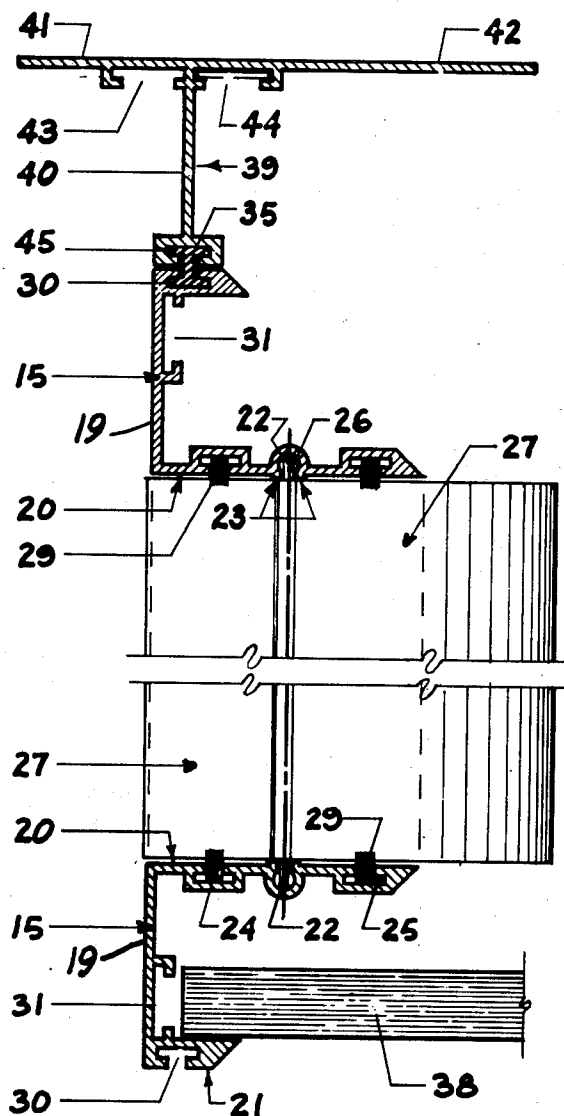
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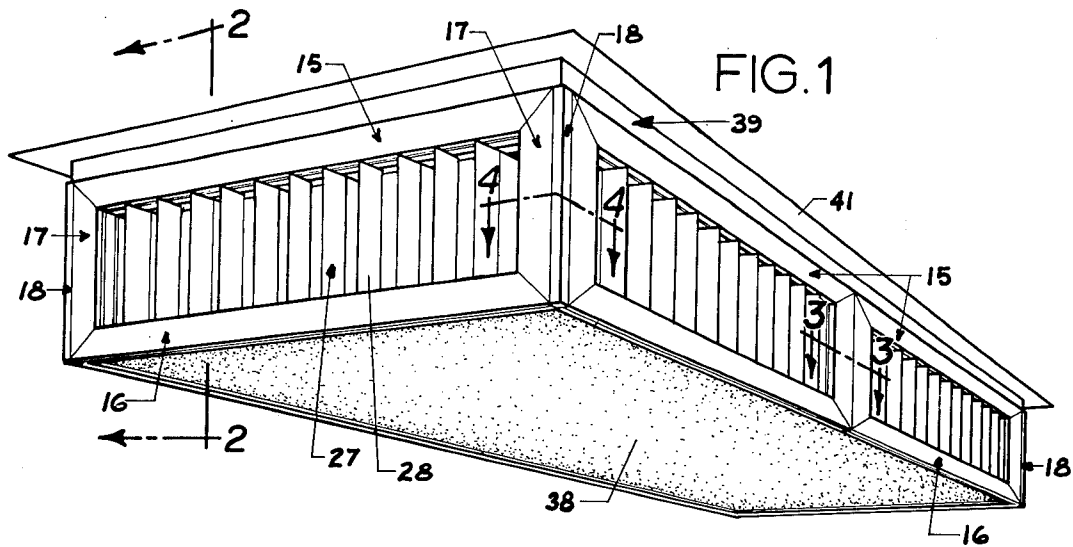
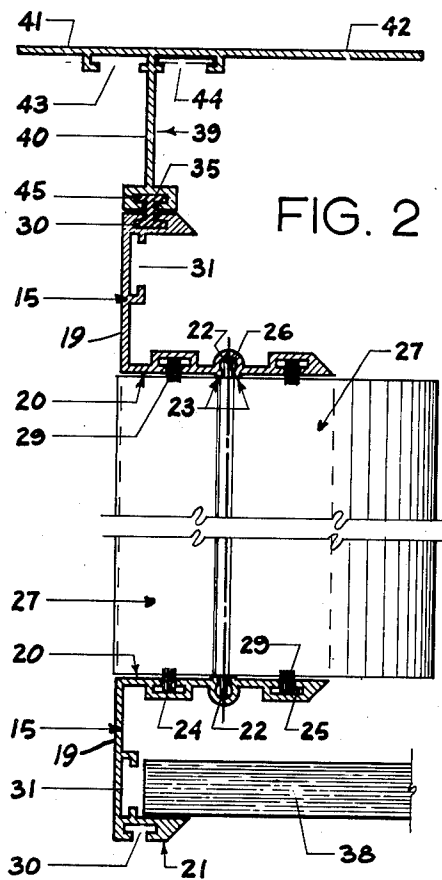
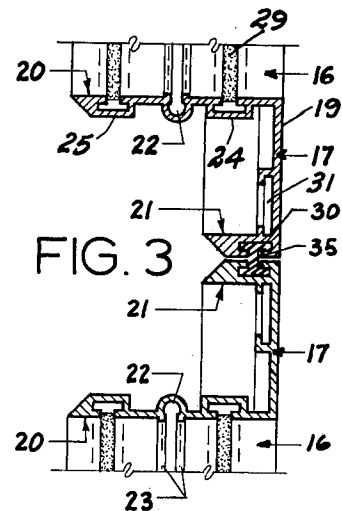
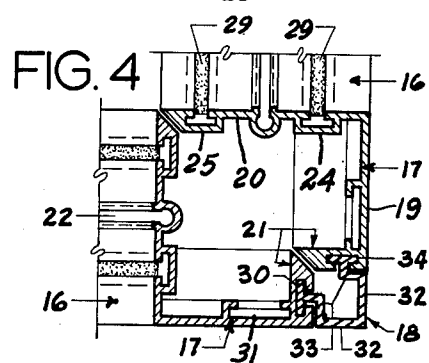
Primary Examiner—Carroll B. Dority, Jr.
Assistant Examiner—Ronald C. Capossela

[57] **ABSTRACT**

A diffuser for conditioned air has interconnected frames, each frame supporting adjustable fin and damper units and separate adjustable fins. Each fin and damper unit has a pair of dampers as one component, a fin as another component, and a pivot. The two components include interfitting portions that enable the dampers and fin to be separately pivoted. One component has pivot-fitting and confining surfaces, at least when the two components are interconnected. The interconnecting portions permit of unit assembly only on relative movement between them in a direction lengthwise of the axis the pivot-confining surfaces define. The frames are formed from mitered lengths of extruded stock having a lengthwise channel with means dividing the channels into spaced, pivot-receiving sockets and with the channels facilitating the interconnection of the mitered ends.

6 Claims, 13 Drawing Figures





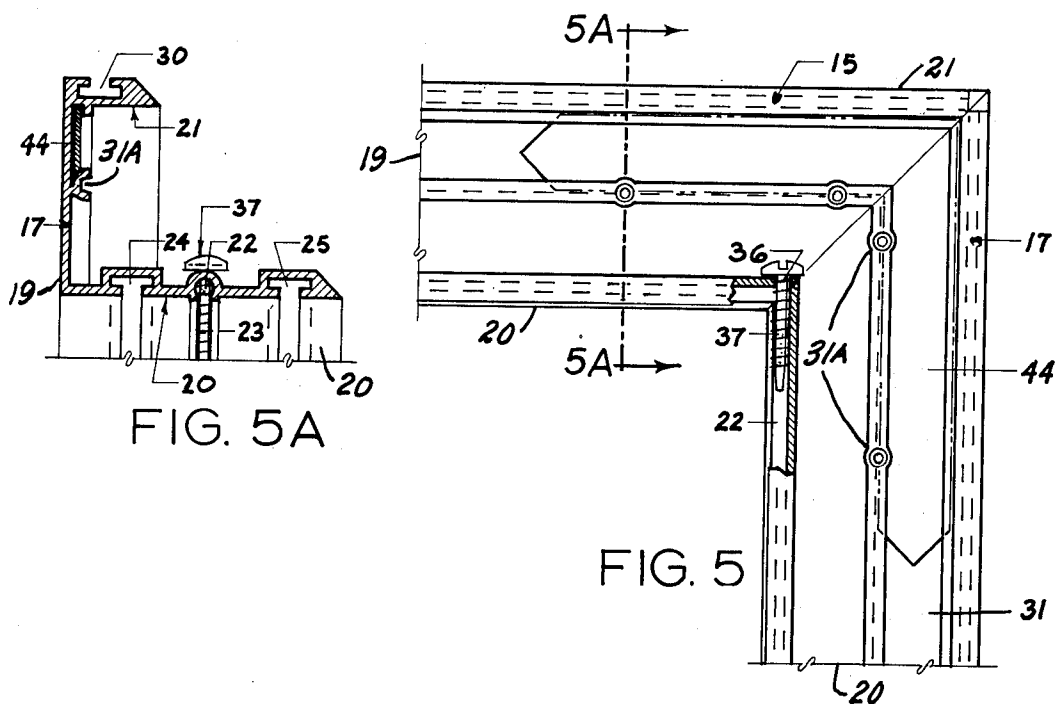
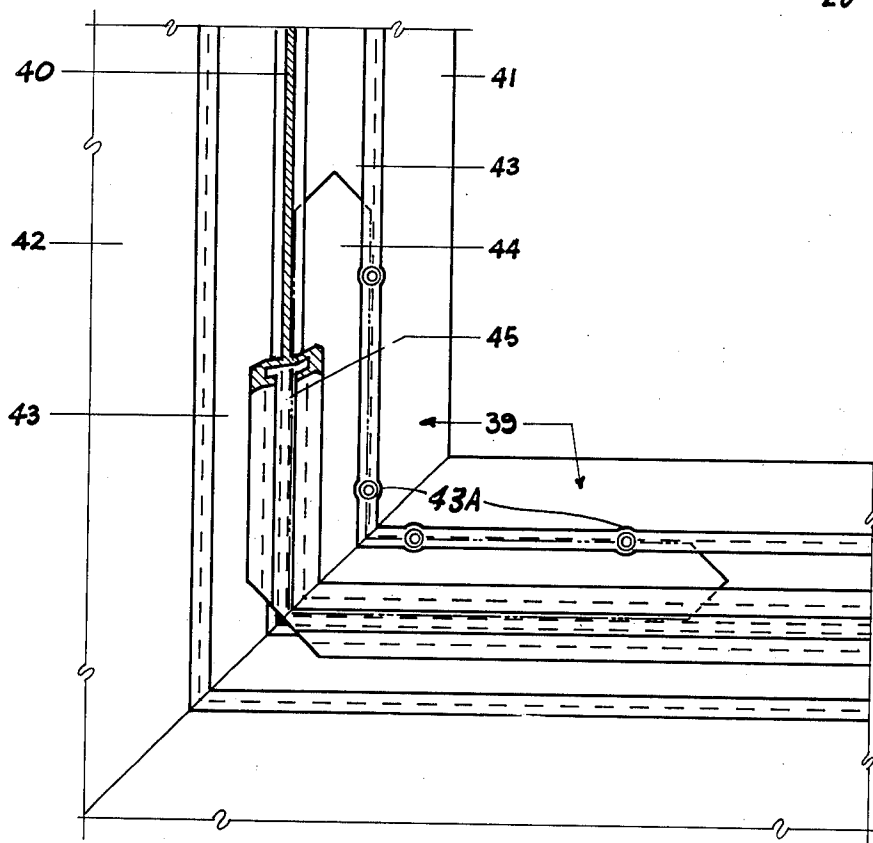
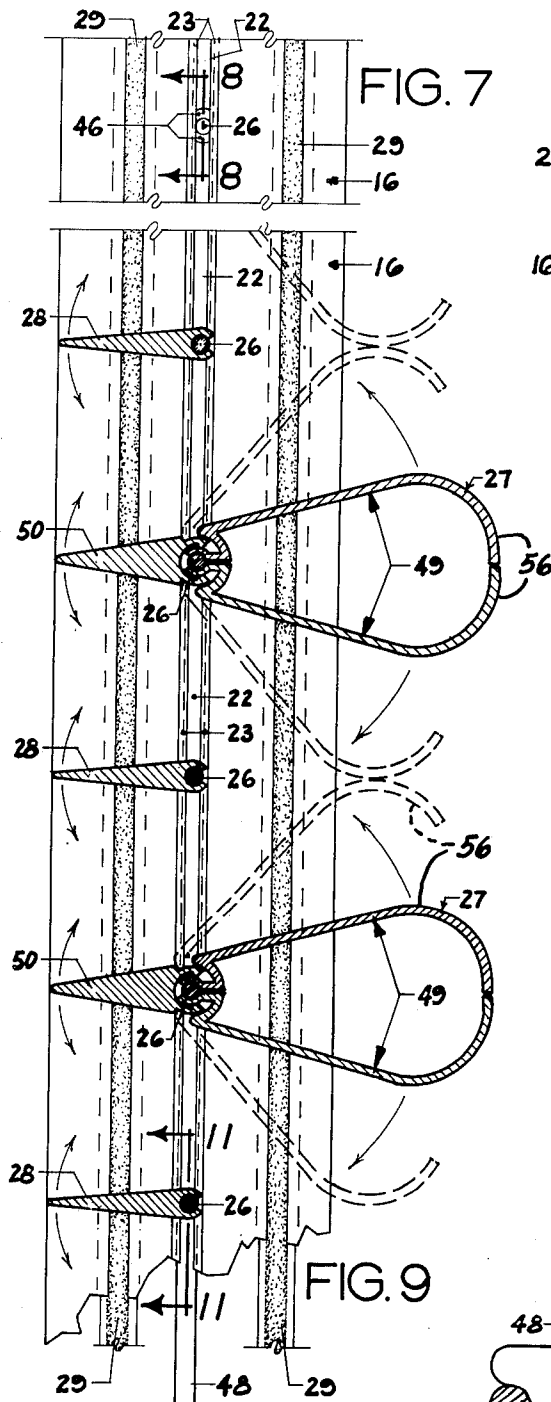
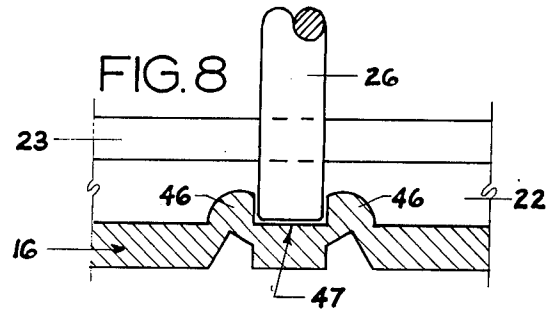
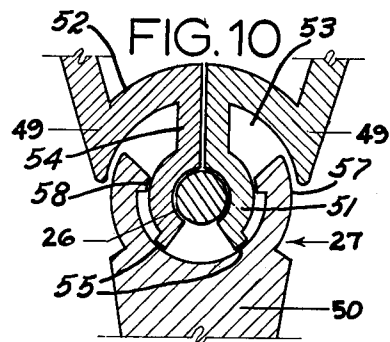
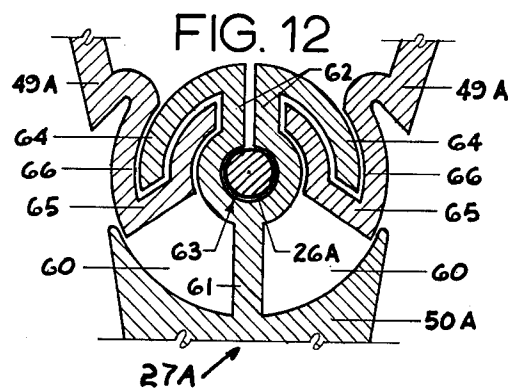
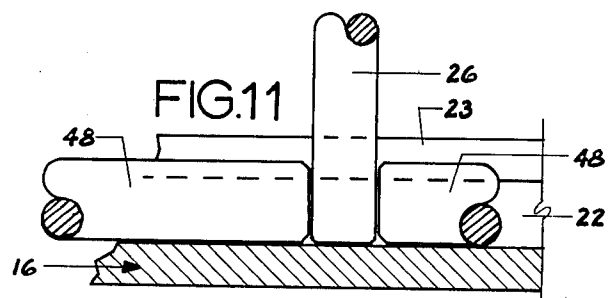


FIG. 6



DIFFUSERS FOR CONDITIONED AIR

The present application is a division of our co-pending application Ser. No. 384,041, filed July 30, 1973 now U.S. Pat. No. 3,841,209.

BACKGROUND OF THE INVENTION

Conditioned air delivered into an enclosed space must be properly distributed therein if the wanted effects of the conditioned air are to be attained.

By way of example, a conditioned air duct extends above a ceiling and has at least one port opening into a ceiling-supported diffuser. Diffusers have side openings provided with dampers and fins that are individually adjustable, after installation of the diffusers, to ensure the most effective distribution of the conditioned air as determined by the particular conditions presented by the enclosed space.

An air diffuser is shown in U.S. Pat. No. 3,654,851 that effectively meets use requirements. Problems exist, however, in the production of such diffusers on an economical basis. Such diffusers are pressure plenums and the damper and fin units must be as capable of blocking the escape of conditioned air as they are of controlling the direction and volume thereof.

THE PRESENT INVENTION

The general objective of the invention is to provide fin, damper and frame-forming members that facilitate the assembly of conditioned air diffusers, particularly those of the type disclosed in said patent.

In accordance with one important feature of the invention, this general objective is attained by providing damper-fin units, each consisting of a pair of dampers constituting a first component, a fin constituting a second component, and a pivot common to the fin and dampers. Each damper, desirably, is the mirror image of the other damper thus enabling the dampers to be lengths of an extrusion. Both components have hinge-establishing portions that are so interfitting as to join the components together and to enable each damper and the fin to be individually pivoted. The portions of one component have arcuate, pivot fitting and confining surfaces and said interfitting portions also including means so limiting the extent of pivoting that the interfitting portions may be interconnected only by their lengthwise movement relative to the axis defined by said surfaces.

In one embodiment of the invention the fins include the surfaces that are of a pivot-fitting and confining radius while in another embodiment of the invention, the dampers have the surfaces that are of a pivot-fitting and confining radius.

In accordance with another important feature of the invention, its general objectives are attained by providing extrusions for use in forming the frames of the diffusers, the extrusions having a central channel dimensioned to receive the ends of the pivots and by providing means confining the pivot ends in predetermined positions spaced lengthwise of the channel. In one embodiment of the invention, the channel is undercut to confine spacers, one between each two pivots. In another embodiment of the invention, the channel is upset at spaced intervals, as by a die, to provide pairs of walls with the walls of each pair dimensioned to define with the indicated side of the channel, pivot-receiving sockets.

With the undercut channel arcuate, frames can be quickly formed from mitered lengths of the extrusion by forming the mitered ends of corresponding frame members with holes located and dimensioned to receive screws of self-tapping dimensions in a position to be threaded into the proximate ends of the channels of the other corresponding frame members.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, preferred embodiments of the invention are shown and

FIG. 1 is a perspective view of ceiling-mounted diffusers as seen from below;

FIG. 2 is a section, on an increase in scale, taken approximately along the indicated line 2—2 of FIG. 1;

FIG. 3 is a section taken approximately along the indicated line 3—3 of FIG. 1;

FIG. 4 is a section taken approximately along the indicated line 4—4 of FIG. 1;

FIG. 5 is a partly sectioned view of the interior of an upper frame corner;

FIG. 5A is a section taken approximately along the indicated line 5A—5A of FIG. 5;

FIG. 6 is a partly sectioned bottom view of a corner portion of the attaching frame;

FIG. 7 is a fragmentary plan view of a frame member having its channel upset to provide sockets for the pivots;

FIG. 8 is a section, on an increase in scale, taken approximately along the indicated line 8—8 of FIG. 7;

FIG. 9 is a fragmentary section of a frame with pivots held in its channel by spacers;

FIG. 10 is a fragmentary section, on an increase in scale of the interfitting portions of one of the fin and damper units shown in FIG. 9 and taken transversely of such portions;

FIG. 11 is a section, on an increase in scale, taken approximately along the indicated line 11—11 of FIG. 9; and

FIG. 12 is a fragmentary view, similar to FIG. 10 illustrating a fin and damper unit in accordance with another embodiment of the invention.

THE PREFERRED EMBODIMENTS OF THE INVENTION

The diffusers shown in FIG. 1 are typically rectangular and have side frames each consisting of top, bottom, and end members generally indicated at 15, 16, and 17, respectively. The end members 17 of the proximate frames are joined by corner members, generally indicated at 18.

Each of the frame members 15, 16, and 17 is shown as an appropriately dimensioned length of an extrusion with its ends mitered at an angle of 45°. The extrusion provides a first or outer wall 19 and supporting and inner walls 20 and 21, respectively, extending in the same direction from its margins and at right angles thereto. The extremities of the walls 20 and 21 are beveled at an angle of 45° relative to the wall 19 and the wall 21 is so much shorter than the wall 20 that a plane inclusive of said beveled extremities bisects the corner members 18, see FIG. 4.

The wall 20 of each frame member has a central channel 22 extending from end-to-end thereof and is preferably arcuate in cross section and more than 180° in extent and is bordered by ribs 23. The channel 22 is between undercut channels 24 and 25. The channels of

the frame members 15 and 16 serve, as will later be more fully disclosed, to support the pivots 26 of fin and damper units generally indicated at 27 and of the fins 28 of which there is one between each two units 27. The ribs 23 space the free ends of the fins and dampers out of the plane of the walls 20 of the frame members 15 and 16 and the channels 24 and 25 thereof receive strips 29 that serve to provide a desired degree of resistance to the movement of the fins and dampers.

The wall 21 has an undercut channel 30 extending from end-to-end of its outer surface while the inner surface of the wall 19 has an undercut channel 31 extending from end-to-end thereof closely adjacent the wall 21.

Each corner member 18 is an appropriately dimensioned length of an extrusion having, see FIG. 4, a pair of corner defining walls 32 disposed at right angles to each other. Each wall 32 has an end wall 33 disposed at right angles thereto and terminating in a T-shaped end 34 for slidable entry into a channel 30 when two frame end members are to be joined together.

As shown in FIG. 3, when two diffusers are to be joined together, common end frames are not needed so that the end members 17 of two frames must be interconnected. In that case, their walls 21 abut and are joined together by a spline 35 that is I-shaped in cross section with its ends entrant of the slots 30.

In order that frame members 15, 16, and 17 may be quickly and easily joined together to provide the frames, the mitered ends of one pair of corresponding members are provided with holes 36, see FIGS. 5 and 5A, extending through the channels 22 and so dimensioned that self-tapping screws 37 may be entered therethrough and be self-tapping in the ends of the channels 22 of the other pair of frame-forming members. The diffusers are completed as a pressure plenum by a ceiling tile 38 supported by the walls 21, see FIG. 2.

The diffusers are shown as ceiling supported utilizing an attaching frame consisting of members generally indicated at 39 for that purpose. Each frame member 39 is a mitered length of an extrusion of a cross section, see FIGS. 2 and 6 providing a wall 40 having at its upper end oppositely disposed flanges 41 and 42, each having undercut channels 43 in its undersurface to receive keepers 44 by which members 39 of the attaching frame are joined together. The keepers 44 are shown as anchored by upsetting a wall of the channel 43 at spaced intervals as at 43A. The lower edge of the wall 40 has an undercut channel 45 enabling the upper frame members 15 to be connected to the attaching frame by splines 35 entrant of the channels 45 and the channels 30 in the walls 21 of the upper frame members 15 of each diffuser. The frame members 15, 16, and 17 may also be similarly interconnected as shown in FIGS. 5 and 5A by the use of keepers 44 in slots 31 with a wall thereof offset at spaced intervals as at 31A.

Each of the fin and damper units 27 and the fins 28 must have its pivots 26 accurately positioned and, as illustrated by FIGS. 7 and 8, accurate spacing of the pivots is effected by deforming the channels 22 of the walls 20 of the top and bottom frame members 15 and 16 as by a die to provide the channels with a series of pairs of transverse walls 46 with the distance between the pairs of walls determining the wanted distance between the pivots 26 and the space between the walls 46 and the included sides of the channels defining accu-

ately spaced, pivot-receiving sockets 47. Desirably, the same die that deforms the channels 22 also forms the holes 36 in the mitered ends of the frame members 15 and 16.

The accurate spacing of the pivots 26 may also be effected by the use of spacers 48 of appropriate length, see FIGS. 9 and 11, the spacers 48 being of a diameter such that they may be slidably entered in the channels 22.

The damper fin units 27 consist of a pair of dampers, generally indicated at 49, as one component, a fin, generally indicated at 50, as a second component and a pivot 26. As may best be seen in FIG. 10, each damper 49 is a section of an appropriate length of an extrusion providing with hinge establishing portions, inner and outer concentric walls 51 and 52 defining an open ended arcuate slot 53 and a wall 54 at the closed end thereof. The inner wall 51 is of a pivot-fitting radius and of an arcuate extent more than 90° but less than 180° so that when the two dampers are positioned with the portions 51 against the pivot 26 and their walls 54 in engagement, the free end of the portions 51 are spaced apart.

Each damper includes a wing 56 that is so curved that when the two dampers 49 of a unit are positioned as above indicated, their open positions, their free edges abut but when swung away from each other until they abut the dampers of adjacent units 27, their closed position shown in dotted lines in FIG. 9, their free edges of each unit are still disposed toward each other.

In order that the dampers 49 may be held against their pivot 26, the fins 50 are each an appropriate length of an extrusion providing hinge establishing portions in the form of arcuate walls 57, shaped and dimensioned so that each is a sliding fit in the appropriate one of the slots 53 and dimensioned to enable the fin 50 and the dampers 49 of a unit to be pivoted relative to one another. As is best seen in FIG. 10, the end of each wall 57 has an inwardly disposed end shoulder 58 and the end of each damper wall portion 51 has an outwardly disposed shoulder 59 with the shoulders 58, 59 so limiting the extent to which the fin and dampers of each unit 27 may be pivoted that the units can be assembled or disassembled only on the movement of their components lengthwise with respect to the pivot axis that the portions 51 define.

Another damper fin unit is generally indicated at 27A in FIG. 12. The unit 27A includes a pair of dampers 49A, as one component, a fin 50A as a second component, and a pivot 26A identical to the fin, dampers and pivot of the units 27 except for the hinge-establishing portions of the dampers 49A and the fin 50A. In the case of the fins 50A, each is an appropriate length of an extrusion and has a pair of open-ended arcuate slots 60 with their closed ends established by a central web 61 divided to provide a pair of walls 62 each including an intermediate arcuate portion 63 whose inner surface is of a pivot-fitting radius and with the two portions 63 dimensioned to receive and confine the pivot 26A. The walls 62 terminate in arcuately disposed ends 64 disposed towards the open ends of the slots 60.

The hinge-establishing portions of each of the dampers 49A has an arcuate wall 65 dimensioned to slidably enter the appropriate one of the slots 60 and enable the dampers 49A and the fin 50A of each unit to be pivoted. Each wall 65 has an arcuate, open-ended slot 66 dimensioned to slidably receive the wall ends 64 which

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limit the extent to which the dampers 49A may be pivoted towards each other while the web 61 limits the extent to which they may be pivoted in the other direction or the fin 50A swung relative thereto. Such limits prevent the dampers and fins from being assembled or disassembled except on relative movement with respect to the pivot axis defined by the pivot-fitting portions 63.

From the foregoing, it will be appreciated that diffusers in accordance with the invention are well adapted to meet production requirements since ease and accuracy of assembly is ensured of the fin and damper units of each frame, and of the interconnection of the frames.

We claim:

1. A damper-fin assembly for an air diffuser, said assembly comprising a frame including top, bottom and side members that are extrusions and means interconnecting said members, said top and bottom members having a channel extending lengthwise thereof with the channels opening towards each other, a series of damper units, fin units and pivots having ends, the ends of the pivots being removably received in said channels, and discontinuous means in said channels providing spaced sockets holding said pivot ends against movement lengthwise of said channels.

2. The damper-fin assembly of claim 1 in which the sockets of the channels of the top and bottom frame members include a plurality of pairs of transverse deformations with the deformations of each pair defining with the included channel sides one of said sockets and

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corresponding sockets of the top and bottom frame members being vertically disposed.

3. The damper-fin assembly of claim 1 in which the channels of the top and bottom frame members are undercut and the sockets comprise a series of spacers slidably confined in each channel, one pivot end confined between two spacers.

4. The damper-fin assembly of claim 1 in which narrow ribs border each channel and are engageable by bottom and top ends of the fin units and damper units.

5. The damper-fin assembly of claim 1 in which the side members of the frame also have said channels, the channels are arcuate and more than 180° in extent and the ends of the frame members are mitered to provide corners, one mitered end at each such corner having a hole in its channel, and a screw extends through each such hole and is dimensioned to be threaded into the end of the channel of the other mitered frame end of that corner.

6. The damper-fin assembly of claim 5 in which the frame members having the holes in their mitered ends are the top and bottom frame members and their channels also include vertically aligned pairs of transverse deformations spaced lengthwise thereof with the deformations of each pair defining with the included channel sides a pivot-receiving socket, corresponding sockets of the top and bottom frame members being vertically aligned.

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