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AIRFLOW AND NOISE CONTROLLING PLENUM DIFFUSER ASSEMBLY

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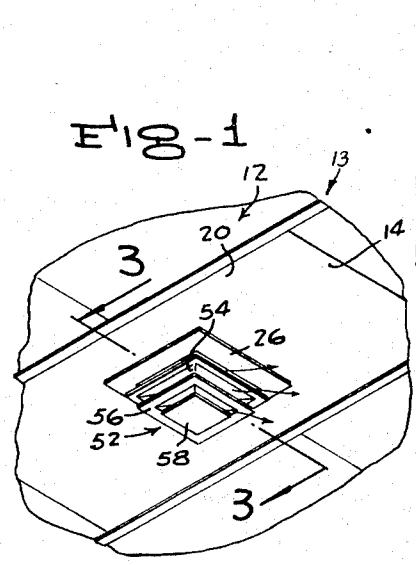


FIG-1

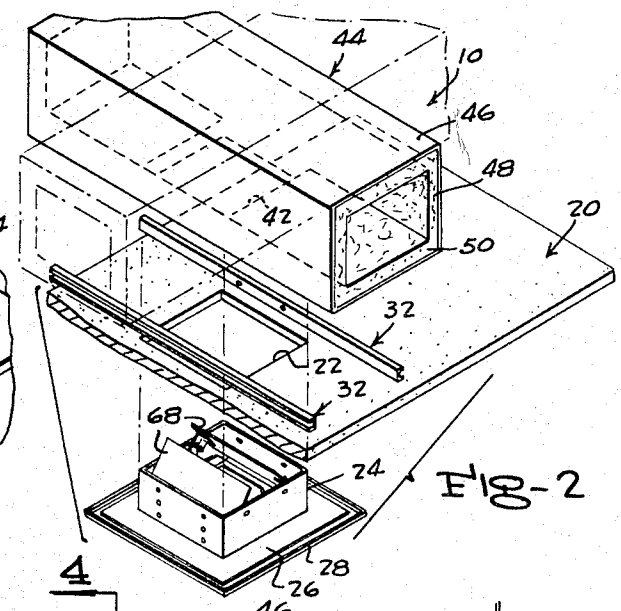


FIG-2

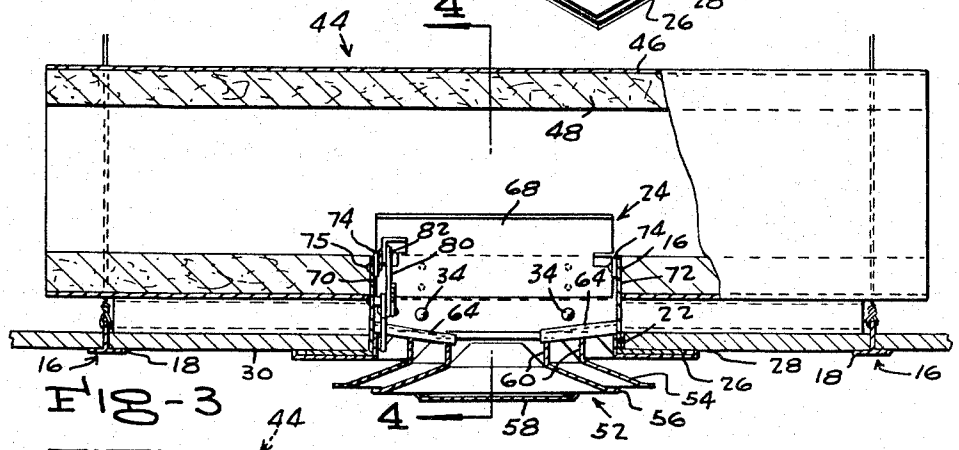


FIG-3

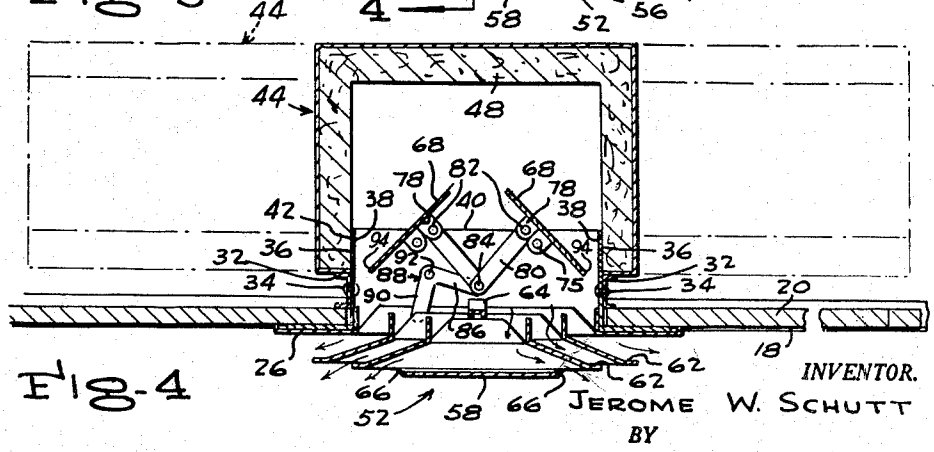


FIG-4

INVENTOR.
JEROME W. SCHUTT
BY

McMorrow, Berman & Davidson
ATTORNEYS

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AIRFLOW AND NOISE CONTROLLING PLENUM DIFFUSER ASSEMBLY

Jerome W. Schutt, Sacramento, Calif., assignor to Aircoustic Co., Inc., San Francisco, Calif., a corporation of California

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1 Claim. (Cl. 98—40)

This invention relates to a novel airflow and noise controlling diffuser assembly for plenum air conditioning systems, and the like.

The primary object of the invention is the provision of efficient and practical assembly of the kind indicated, which is easily installed, and has damper means which is readily adjustable to determine the rate of flow out of a room or other building area.

Another object of the invention is the provision of an assembly of the character indicated above having a novel multiple baffle air diffuser which produces even spread or distribution of air into a room.

A further object of the invention is the provision of an assembly of the character indicated above which includes a non-breathing panel adapted to be installed in an opening in the wall of a plenum, the panel having an opening in which the diffuser housing is engaged, the diffuser housing being secured to and in direct communication with a fibrous material open-ended conduit, located within the plenum, the housing being supported by elongated strut means, secured to the housing behind the panel, which bears throughout the length thereof on the panel, with opposite ends of the panel resting upon supporting means, such as T-bars, whereby the weight of the assembly is widely distributed.

Other important objects and advantageous features of the invention will be apparent from the following description and the accompanying drawings, wherein, for purposes of illustration only, a specific form of the invention is set forth in detail.

In the drawings:

FIGURE 1 is a perspective view of an assembly of the present invention installed in a ceiling, the conduit being shown in longitudinal position in full lines and in transverse position in phantom lines:

FIGURE 2 is an exploded perspective view of the assembly;

FIGURE 3 is a vertical section taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a vertical section taken on the line 4—4 of FIGURE 3.

Referring in detail to the drawings, wherein like numerals designate like parts throughout the several views, the illustrated assembly, generally designated **10**, is shown installed in a ceiling wall **12** of a plenum **13**, having an opening **14**, along opposite ends of which supported T-bars **16** extend, which have lateral flanges **18**.

The assembly **10** comprises a panel **20**, of non-breathing construction, which fits the opening **14**, and rests, at its ends, upon the T-bar flanges **18**. The panel **20** has a central rectangular opening **22** in which a hollow rectangular, open-ended housing **24** fits. The housing **24** has a surrounding lateral flange **26**, around its outer end, which has a peripheral rib **28**, on its inward side, which bears against the outer surface **30** of the panel **20**.

Channel struts **32**, which are as long as the panel **20**, are bolted, as indicated at **34**, to opposed walls **36** of the housing **24**, and bear against the upper or inner side of the panel **20**, so as to widely distribute the weight of the housing **24** and elements mounted thereon. The opposed walls **36** of the housing are provided with vertical rows of bolt holes **38**, for selectively receiving the bolts **34**, so as to accommodate the struts **32** to panels **20** of different thicknesses.

The inner end **40** of the housing **24** is engaged in a rectangular opening **42**, provided in the lower part of a rectangular horizontal air conduit **44**, the conduit **44** being adapted to be positioned crosswise of the housing **24**, in either direction, as indicated in FIGURE 3. The air conduit **44** comprises an outer shell **46** of metal foil or other impermeable sheet material, to which is suitably secured a relatively thick liner **48** of fibrous sound-absorbing material. The conduit **44** rests upon the top of struts **32**. As shown, the conduit **44** can be only slightly longer than the panel **20** or shorter than the panel **20**, or substantially longer than the panel **20**, as indicated by the situation, and has open ends **50**, which communicate with the plenum **13**.

The housing **24** has a diffuser assembly **52** positioned within and extending outwardly or downwardly from the outer or lower end of the housing **24**. The diffuser assembly **52** comprises a plurality of nested, concentric frusto-pyramidical baffles, such as the inner baffle **54** and the outer baffle **56**, with a flat rectangular center baffle plate **58** centered across the outer end of the outer baffle **56**. It will be understood that the present invention contemplates also a circular housing **24** and circular, frusto-conical baffles.

The baffles **54** and **56** have concentrically spaced tubular necks **60**, on their inner or upper ends, and have horizontal, parallel spaced peripheral flanges **62** around their outer or lower ends. The baffles **54** and **56** are supported on arms **64** which extend inwardly from the opposed walls **36** of the housing **24**, at slight downward or outward angles, relative to the horizontal, the upper or inner edges of the necks **60** being suitably fixed to the arms **64**. The center baffle plate **58** is smaller in area than the outer or lower end of the lower baffle **56**, and is secured, as indicated at **66**, to the outer baffle **56**, at the outer or lower end thereof. It will be understood that the peripheral channel provided between the inner or upper baffle **54** and the housing flange **26**, and the peripheral channels between the inner baffle **54**, the outer baffle **56**, and the center baffle plate **58**, produces initially hollow and initially conical airstreams which spread out throughout a room, so that air discharged from the housing **24** is more uniformly and evenly distributed throughout the room.

For controlling the amount and rate of flow of air into a room, through the housing **24**, and the diffuser assembly **52**, adjustable damper means is mounted within the housing **24**, inwardly or upwardly from the diffuser assembly **52**. The damper means comprises a pair of similar elongated flat rectangular damper plates **68**, which extend longthwise between the opposed walls **70** and **72** of the housing **24**, and are in side-by-side relationship. As shown in FIGURES 3 and 4, centered lateral ears **74** are fixed on the ends of the damper plates and extend downwardly or outwardly therefrom, and are pivoted to the housing walls **70** and **72**, as indicated at **75** at points which are spaced at equal distances from the housing walls **36** and close to the upper or inner end **40** of the housing **24**. At their ends adjacent to the housing wall **70**, the damper plates **68** have off-center lateral ears **78**, located at the inner or upper sides of the centered ears **74**, and links **80** are pivoted, as indicated at **82**, at their upper or inner ends to the ears **78**. The links **80** converge outwardly or downwardly and their overlapped lower or outer ends are traversed by a pivot pin **84**, which extends through the free ends of an arm **86** of a bellcrank lever **88**, which has another arm **90**, which extends downwardly or outwardly, in the space between the necks **60** of the diffuser baffles **54** and **56**, so as to be reachable for rotating the bellcrank lever, in opposite directions, on the axis of a mounting pivot **92** which is

fixed to and extends laterally inwardly from the housing wall. Rotating the bellcrank lever 88 clockwise, as seen in FIGURE 4, moves the damper plates 68 toward each other, and toward a horizontal plane, wherein the flow of air from the conduit 44 and through the housing 24 is substantially blocked. Rotating the bellcrank lever 88 in a counterclockwise direction moves the damper plates 68 away from each other and angle the laterally outward edges 94 of the damper plates 68 laterally inwardly and downwardly or outwardly away from the housing walls 36, so as to provide air passages between the damper plates and between the damper plates and the housing walls 36.

It will be understood from the foregoing that air back pressures and pulsations produced by the intervention of the diffuser assembly 52 and the damper plates 68 in the air present in the conduit and in the housing 24, which would otherwise produce vibration of the walls of the conduit and the housing 24, and accompanying noise, are cancelled by the sound absorbing liner 48 of the conduit 44.

Although there has been shown and described a preferred form of the invention, it is to be understood that the invention is not necessarily confined thereto, and that any change or changes in the structure of and in the relative arrangements of components thereof are contemplated as being within the scope of the invention as defined by the claim appended hereto.

What is claimed is:

A noise and airflow controlling essembly comprising, in combination with a false ceiling having a plurality of panels, one of said panels having an opening extending transversely therethrough, and spaced elongated panel support means for supporting said panels, said assembly including a tubular housing having a pair of opposed open upper and lower ends and pairs of opposed walls, said housing having the said lower end thereof fitted within said opening with its upper end projecting above said one panel, arms projecting inwardly from a pair of said opposed walls and being fixedly secured to said walls, a plurality of vertically-spaced concentric frustopyramidal baffles each having upwardly-extending concentrically-spaced tubular necks, said necks being connected to said arms to suspend said baffles below said lower end of said housing, a pair of elongated flat damper plates extending lengthwise between another pair of said walls of said housing, said damper plates being positioned in side-by-side relationship, means pivotally connecting said damper plates to said other pair of opposed walls, a pair of elongated substantially rectangular links having one of their ends pivotally connected respectively, to one of said damper plates, means pivtolly connecting the other ends of said links, a bell-crank lever having one of its ends pivotally connected to said last-named means, means pivotally connecting the central end of said bellcrank lever to one of said first pair of walls, and the other end of said bell-crank lever being manually-operable to effect the pivotal movement of said damper plates toward and away from one another, an elongated air-conducting conduit having an opening formed therein, a sound-absorbing liner disposed within said conduit and secured thereto, said upper end of said housing being fitted within said opening formed in said conduit, and elongated means disposed between said conduit and said one panel supporting said conduit in vertically-spaced relation relative to said one panel, said means comprising an elongated member secured to the opposite pair of walls of said housing and extending above said panels between and to a pair of adjacent panel support means and being supported thereon.

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ROBERT A. O'LEARY, *Primary Examiner.*

CARL W. ROBINSON, *Examiner.*