

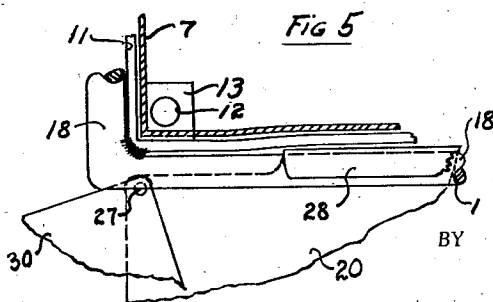
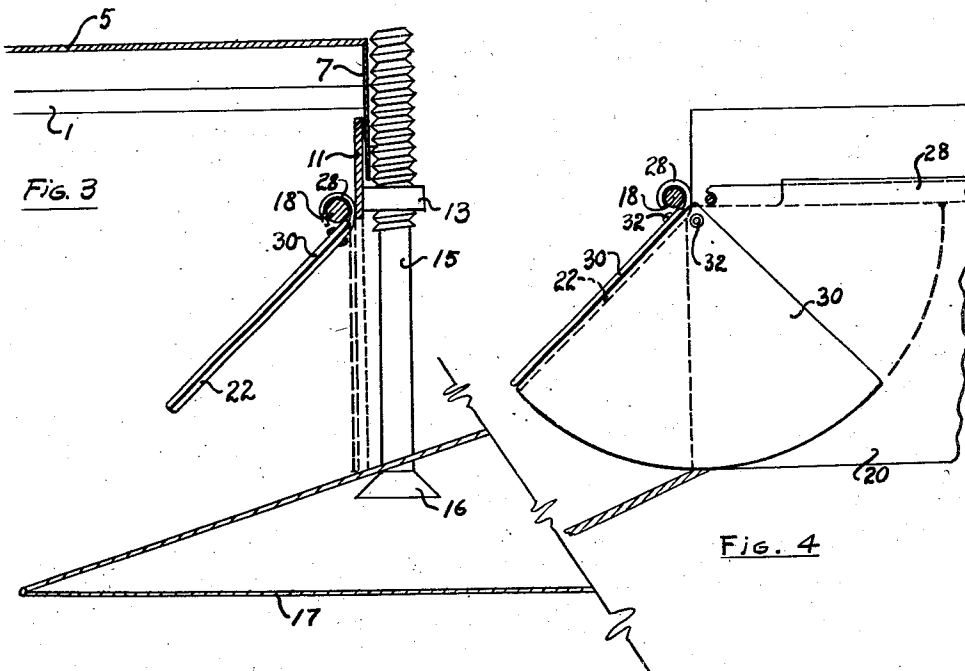
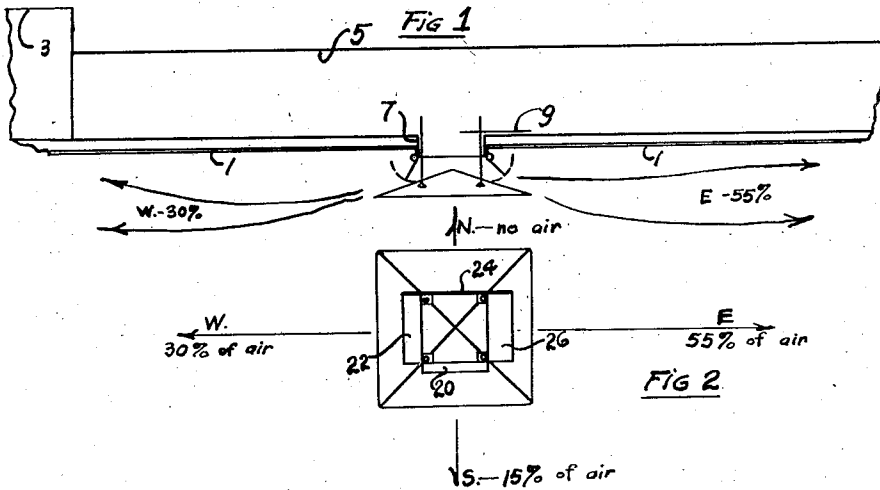
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VENTILATING AIR DISTRIBUTOR

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VENTILATING AIR DISTRIBUTOR

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This invention relates to air discharge fixtures which are used in heating, ventilating and/or air conditioning systems to discharge air from a duct into a room which is to be supplied with air and to distribute it in the room. More specifically, it relates to a device, for which I have coined the descriptive word "placque," which is connected to an air duct outlet neck, and which comprises a deflector which is a metal sheet formed into a very low pyramid and disposed substantially opposed to the direction of the flow of air issuing from the duct neck so that the air is discharged from the deflector substantially parallel thereto at greater velocity than that of the air issuing from the neck. The device includes dampers and deflector adjustment means whereby the flow of air leaving the deflector is completely controlled as to volume, velocity and direction.

In the usual systems used for distributing either warm or cool air from a blower to a room, a series of ducts are connected to the main duct and are disposed above the ceiling of the room. It is the usual practice to connect one or more fixed opening air outlets to the branch ducts and to divert into the branch ducts by means of dampers, also commonly called "splitters" or "scoops" in the main duct, the amount of air required by the outlets attached to the branch ducts.

These dampers create turbulence in the ducts and render the system less efficient. The air impinging on these dampers often causes air noises and rattles which are obnoxious. Further, the dampers cannot be readily adjusted if they are incorrectly set on installation. Another difficulty is that sometimes the necessary dampers are omitted entirely during installation of the system and it is an expensive procedure to install them at a later date. Applicant eliminates the need for such dampers by providing control at the outlet into the room.

Difficulty is also encountered in securing proper blanketing of the walls or other surfaces through which the undesirable heat transfer is occurring. In order to blanket these walls, the air being supplied to the room must just lose perceptible velocity as it reaches the wall, to prevent objectionable down drafts. This requires a fine control of velocity of the air and is almost impossible to attain unless the air velocity can be adjusted after the installation is made. Applicant provides this control by providing complete means for adjusting the volume of flow, the velocity and the direction of flow of the air discharged.

In theory, a jet of air striking a flat plate disposed at right angles to the flow, leaves the plate at double the entering velocity. The velocities actually attained by applicant's device

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in practice are up to 165% of the velocity of the air issuing from the duct neck.

Applicant provides a deflector which may be a flat plate, but which is preferably the above described low pyramid, arranged transversely of the jet of air issuing from the duct neck. Dampers are fitted to the device and close downwardly toward the deflector on each side thereof. The deflector is mounted for movement toward and away from a series of dampers so as to adjust the volume of air issuing between the dampers and the deflector. Adjustment of these dampers controls the volume and velocity of air discharged in each direction and, consequently, the distance which each stream travels. They, with the sloping sides of the deflector, also deflect the streams vertically so as to affect the distance travelled by them and to prevent contact between the air streams and the ceiling. They also cooperate with the pyramidal deflector to direct the air laterally or horizontally toward the walls to be blanketed.

The control of the vertical direction of the stream is especially important because any contact of a high velocity stream with the ceiling of the room will result in streaking of the ceiling.

A damper, which is preferably a slide damper, is placed over each duct neck to regulate the total volume of air which is discharged through a single fixture.

The discharge of air in a relatively thin, wide, high velocity stream having a relatively small cross-sectional or frontal area along the ceiling of a room induces mixture of room air with the incoming air in many times the volume of the incoming air which produces a much more efficient ventilating effect than would be attained by a slow velocity stream having a large cross-sectional or frontal area.

It will be apparent from the above discussion that an object of the invention is to provide an air outlet fixture which has a deflector for increasing the velocity of the air issuing from a duct neck and dampers for forming and for completely controlling the several compass directions, in addition to the required angular directions and velocity of the air stream issuing from the deflector.

Another object of the invention is to provide a deflector, adjustable dampers cooperating therewith, and sector on said dampers which are adjustable parallel to said dampers to form therewith a continuous, circumferential deflector entirely surrounding said deflector.

Another object of the invention is to provide a fixture of the kind described which is readily attachable to the outlet neck of an air duct.

Another object of the invention is to provide a deflector which is securely mounted in adjustable

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spaced relation with respect to the adjustable dampers.

Yet another object of the invention is to provide a deflector which is mounted as described and which is provided with adjustable dampers to aid in regulating the direction and velocity of the air discharged in one or more compass directions.

A further object of the invention is to provide a fixture which is fitted with adjustable dampers, and which has a deflector mounted in adjustable spaced relation with respect to the dampers by means which permit instant levelling, yet use a minimum of material to attain complete stability and security.

Another object of the invention is to provide a substantially flat deflector which is disposed at right angles to the flow of air leaving the duct so that greater velocities of air leaving the deflector may be attained.

A further object of the invention is to provide means for controlling the velocity of the ejected air so as to maintain a blanket of air being discharged over the walls where the heat exchange is taking place.

Another object of the invention is to control the vertical direction of the air so that the ceiling of the room will not be contacted by rapidly moving air and be streaked.

Still another object of the invention is to provide such complete control of the air issuing from the fixture that the neck leading from the main duct may be deliberately oversized and a simple slide placed over the duct neck (or a simple butterfly in case of long duct necks) to control volume, thus eliminating the use of "splitters," "scoops," or other velocity flow-diverters or main trunk dampers which cause turbulence and loss of pressure. Thus, one or more fixtures may later be selected to deliver as much as double the originally designed volume, without requiring excessive fan speed to overcome these turbulence losses characteristic in conventional duct-grille and duct-fixture systems.

Yet another object of the invention is to provide a "placque" which will discharge a thin, wide, high velocity stream of air toward the walls to be blanketed.

Still another object is to provide a deflector which is instantly adjustable with respect to the duct neck so as to vary the volume and velocity of the air issuing from the deflector.

These and other objects will become apparent from a study of the drawings which are attached hereto and made a part hereof and in which:

Figure 1 is a diagrammatic elevation showing the duct and discharge fixture and also the path of the discharged air from the fixture.

Figure 2 is a plan view of the diagram of Figure 1.

Figure 3 is a sectional view of the duct, neck, deflector and one damper.

Figure 4 is an elevation with parts broken away showing the deflector and two dampers, together with the sectors mounted thereon.

Figure 5 is a plan view of one corner of the fixture showing the assembled structure.

Referring now to Figures 1 and 2, the numeral 1 represents the ceiling of the room to be supplied with air, 3 represents the main duct which is connected to a blower or fan, and 5 is the branch duct which is provided with an outlet neck 7. This neck is usually square or round and

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extends about an inch below the surface of the ceiling. The neck shown in the drawings is square.

A damper 9 of any suitable kind, here shown as a slide damper, is supplied above the neck 7 and in the duct 5.

A collar 11 which conforms to the exterior periphery of the neck 7 is suitably secured to the neck and is preferably provided with bosses 13, one in each corner, which are perforated as at 12 and tapped to receive the deflector supporting screws 15.

The upper or air impinging surface of the deflector is preferably formed as a low, regular pyramid having four lateral faces where four directions of flow are required. The number of faces may vary with the requirements. The angle formed between the base and any lateral face should be small because the increase in velocity of the air leaving the deflector is a definite function of this angle. In practice it has been found that angles of from 3 to 30 degrees are suitable. The deflector may be circular in plan if desired. In any case, the deflector extends a substantial distance beyond the farthest extent of the main dampers to straighten the stream of air.

Screws 15 pass through the deflector which is supported on the heads 16 thereof and the distance between the deflector and the air neck may be adjusted by screwing or unscrewing the screws from the bosses 13.

A rod 18 is bent into a square and attached at the corners to the collar 11 adjacent the lower edge thereof.

Four wing dampers 20, 22, 24 and 26, are attached to the rod. As shown in Figures 4 and 5, each damper is provided with a projection 28 centrally of the upper edge which is inserted between the rod 18 and the collar 11 and then bent outwardly around the rod. The friction between the rod and projection 28 and between 28 and the collar 11 serves to hold the damper firmly in any adjusted position.

A sector shaped damper 30, hereinafter called a sector damper, is pivotally attached to each of the upper corners of each damper by means of a rivet 32. Each sector damper is formed as a quadrant with a radius equal to the height or narrow dimension of the wing damper. The sector dampers are preferably mounted on top of the wing dampers and, as shown in Figure 4, may be rotated from any extended position, one of which is shown by full lines, to the fully retracted position shown in dotted lines in which the outer edges of the sector and wing dampers are parallel.

Also, as shown in Figure 4, in any rotated positions of two adjacent wing dampers, the two adjacent sector dampers may be extended until their outer edges contact substantially in a line.

Thus, when viewed from the top, the wing dampers and sector dampers when properly extended form a continuous deflector all around the duct neck and the corners are substantially closed. Also, when viewed from below, the sector dampers meet in a distinct corner which presents a neat appearance. Of course, when adjacent wing dampers are vertical, their adjacent edges meet in a line and the sector dampers may be rotated to the fully inactive position.

Operation

Since no dampers are provided between the

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main and branch ducts, the pressure is substantially the same in both, with the exception of frictional losses.

Accordingly, the first step in adjusting the flow is to set the slide damper 9 to the position which permits the required cubic feet per minute of air to pass through the neck.

The wing dampers 20—22—24—26 are then adjusted to the positions required to secure the discharge of the proper volume of air in each of the general directions of flow and to attain the required velocity of flow. If it is found impossible to secure the required volume of flow in a given direction after installation, the plaque may be lowered and the size of the openings will thus be increased.

After the wing dampers are set, the adjacent sector dampers are then rotated until they close the corner.

It is obvious that various changes may be made in the form, structure and arrangement of parts without departing from the spirit of the invention. Accordingly, applicant does not desire to be limited to the specific embodiment disclosed herein primarily for purposes of illustration; but instead, he desires protection falling fairly within the scope of the appended claims.

What I claim to be new and desire to protect by Letters Patent of the United States is:

1. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a stationary support mounted adjacent to said duct neck and having a lower edge, a distributor in the form of a pyramid having lateral faces, means for adjustably mounting said distributor on said support, transversely and in spaced relation with respect to said duct neck outlet, and a plurality of dampers mounted for pivoting about one edge on the lower edge of said support for movement toward and away from the lateral faces of said distributor, said dampers completely surrounding said duct neck.

2. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent to said duct neck, a distributor, means for mounting said distributor on said support, transversely of and in spaced relation with respect to said duct neck outlet, a plurality of dampers each mounted for pivoting about its upper horizontal edge on said support for movement toward and away from said distributor, said dampers completely surrounding said duct neck, said distributor mounting means being adjustable to vary the distance between the distributor and said outlet.

3. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent to said duct neck, an air distributor, means for mounting said distributor on said support transversely of and in spaced relation with respect to said duct neck outlet, a plurality of wing dampers pivotally mounted on said support for movement toward and away from said distributor, said wing dampers being disposed to completely surround said duct outlet, and sector dampers movably mounted one on each end of a wing damper, each sector damper being adapted for movement into contact with the sector damper on the adjacent wing damper to form a corner therewith.

4. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent said duct neck, an air distributor, means for mount-

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ing said distributor on said support, transversely of and in spaced relation with respect to said duct neck outlet, a plurality of wing dampers pivotally mounted on said support for movement toward and away from said distributor, said wing dampers being disposed to completely surround said duct outlet, quadrant shaped sector dampers disposed one at each end of each wing damper and pivotally mounted at a point adjacent the intersection of the upper and lateral edges of the wing damper.

5. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent said duct neck, an air distributor, means for mounting said distributor on said support, transversely of and in spaced relation with respect to said duct neck outlet, a plurality of wing dampers pivotally mounted on said support for movement toward and away from said distributor, said wing dampers being disposed to completely surround said duct outlet, and substantially quadrant shaped sector dampers disposed one at each end of each wing damper and mounted for motion in a plane parallel to the plane of the wing damper, to serve as an adjustable extension of the wing damper.

6. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent said duct neck, an air distributor, means for mounting said distributor on said support transversely of and in spaced relation with respect to said duct neck outlet, a plurality of wing dampers pivotally mounted on said support for movement toward and away from said plaque, said wing dampers being disposed to surround said duct outlet, and sector dampers pivotally mounted one at each end on each wing damper for movement in a plane parallel to the plane of the wing damper to and from a position beyond the end of the wing damper.

7. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent said duct neck, an air distributor, means for mounting said distributor on said support transversely of and in spaced relation with respect to said duct neck outlet, a plurality of wing dampers mounted on said support for movement toward and away from said distributor, said wing dampers being disposed to completely surround said duct outlet, and quadrant shaped sector dampers mounted on pivots one at each end of each wing damper, said pivot being disposed closely adjacent an upper corner of the wing damper and closely adjacent the vertex of the central angle of the sector damper.

8. In an air outlet fitting adapted to be applied to an air duct neck having an outlet, the combination of a support mounted adjacent said duct neck, an air distributor, means for mounting said distributor on said support, transversely of and in spaced relation with respect to said duct neck outlet, a plurality of wing dampers pivotally mounted on said support for movement toward and away from said distributor, said wing dampers being disposed to completely surround said duct outlet, and adjustable means mounted on and cooperating with said wing dampers for closing the space between adjacent wing dampers.

9. In an air flow system the combination of an air duct having a duct neck and an outlet in said neck, a damper associated with said outlet for regulating the effective area of said outlet, a stationary support disposed adjacent said outlet,

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a pyramidal air distributor having a large apex angle and having a base of greater area than the outlet, adjustable means for suspending said distributor from said support transversely of the axis of said outlet, and a series of dampers each mounted on said support for pivoting about a horizontal axis and disposed to completely surround said outlet, each damper cooperating with said distributor for controlling the size of the opening through which air issues from the distributor in a particular horizontal compass direction, said suspending means being adjustable so that the size of the opening between the distributor and the dampers may be varied by raising and lowering the distributor.

10. In an air flow system the combination of an air duct having a duct neck and an outlet in said neck, a damper associated with said outlet for regulating the effective area of said outlet, a support disposed adjacent said outlet, an air distributor, means for supporting said distributor transversely of the axis of said outlet, a series of dampers each mounted for pivoting on said support about a horizontal axis and disposed to completely surround said outlet, each damper cooperating with said distributor for controlling the size of the opening through which air issues from the distributor in a particular horizontal direction, and sector dampers adjustably mounted on said dampers for closing the space between said dampers after they have been pivotally adjusted.

11. In an air flow system the combination of an air duct having a duct neck and an outlet in said neck, a damper associated with said outlet for regulating the effective area of said outlet, a sup-

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port disposed adjacent said outlet, an air distributor, means for supporting said distributor transversely of the axis of said outlet, a series of dampers each mounted for pivoting about its upper horizontal edge on said support and disposed to completely surround said outlet, each damper cooperating with said distributor for controlling the size of the opening through which air issues from the distributor in a particular horizontal direction, and means for adjusting said distributor toward and from said duct neck.

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