AIR VALVE AND DISTRIBUTION UNIT

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8 Claims

ABSTRACT OF THE DISCLOSURE

An air valve and distributing unit having a valve to control the volume of air flowing into a plenum chamber in the unit and having diffusion means comprising a trough-shaped diffusion member with openings arranged to direct air in different directions and an adjustable deflecting plate connected to the diffusion member to vary the direction of air flow diffused from the unit.

BACKGROUND OF THE INVENTION

Field of the invention

This invention pertains to an air distributing unit that is placed in an opening in a ceiling or a wall of the space to be ventilated and is in communication with a plenum chamber or a source of supply air at increased pressure which is disposed behind the wall or ceiling.

Prior art

Air control valves known in the prior art typified by Leadbetter, 2,351,682 include valves which control the flow of air between a plenum and an air diffuser which is positioned in a second plenum between the first plenum and an air distributing panel in either the wall or ceiling of the space to be ventilated. The purpose of the diffuser which has associated therewith a fixed baffle is to break up the flow of air as it enters the second plenum to ensure an even distribution of air through the distribution panel. The air control valve has a threaded means which will raise and lower the valve plate to control the flow of the air through the opening. This threaded means may be actuated by a tool inserted in the valve means by a person in the space that is being ventilated.

SUMMARY OF THE INVENTION

In certain industrial and domestic ventilating systems, it is desirable to selectively direct the flow of air parallel to the plane of the wall in which a distribution unit is installed. At other times, it is desirable to have a larger volume of the ventilating air directed downwardly from the unit to a space occupied by machines or personnel. The prior art devices which had a fixed baffle attached to a diffusing member could not be readily changed once they were manufactured. It has been found desirable to provide a unit with an air deflector or baffle plate which may be changed in the field or during installation to provide the desired direction of air flow.

Accordingly, it is an object of this invention to provide an air valve and distribution unit which has a means attached to the distribution member that will adjust the direction of the flow of air from the distribution member.

Another object of this invention is to provide an air valve distribution unit which has a distribution member which has a detachable deflector plate which may be removed after installation of the unit in the ventilating system to change the direction of the air flow from the unit.

Yet another object of this invention is to provide a distribution unit having an air control valve and a distribution member which has attached to it a baffle which may be adjusted after installation in a ventilating system to change the flow of air from the unit.

Still another object of this invention is to provide an air valve and distribution unit which comprises the air valve and a distributing member.

These and other objects, features and advantages of the present invention will be understood in greater detail from the following description and the associated drawings wherein reference numerals are utilized in designating an illustrative embodiment.

On the drawings:

FIGURE 1 shows a bottom plan view of the air valve and distribution unit of this invention with portions broken away to illustrate the various portions of the unit;

FIGURE 2 is a side view of the air valve and distribution unit illustrated in FIGURE 1;

FIGURE 3 is an end view of the air distribution unit illustrated in FIGURE 1;

FIGURE 4 is an exploded view of the end view shown in FIGURE 3; and

FIGURE 5 is a fragmentary end view showing a modification of the deflector plate.

As shown on the drawings:

An air valve and distribution unit utilizing the advantages of this invention is generally shown at 10 deployed within an opening 11 in a ceiling or wall 12 and in communication with a plenum chamber 13 on the other side of the wall or ceiling 12 from the space being ventilated. The air valve and distribution unit 10 may also be inserted in an opening in an air duct or plenum, if desired.

The air valve and distribution unit 10 is made up of a rigid panel or top wall 14 which supports a valve means 15 to regulate the air flow through the panel and a distribution or diffusing member 16 attached on the surface of the panel opposite to the plenum 13.

The rigid panel 14, as illustrated best in FIGURE 3, has a pair of openings 17, 17 each of which has a flange 18 extending in the direction towards the diffusion member 16. Between the openings 17, 17, the panel has a portion 19 which supports a thread means 20, that is illustrated in FIGURE 3 to be a threaded bushing inserted in an opening 21 in the portion 19.

The valve means 15 to regulate the air flow comprises a plate 22 which overlies the pair of flanged openings 17, 17 and has flanges 23 and 24 for reinforcement that extend away from the rigid panel 14. In the plate 22 is formed an opening 25 which is in axial alignment with the bushing 20 in the plate 14. Inserted in the opening 25 is a fastener means which, as illustrated in FIGURE 3, may take the form of a threaded screw 26 which engages the threaded bushing 20 mounted in the rigid panel 14. The relative rotation between the bushing 20 and the screw 26 will cause the plate 22 to be moved in a direction perpendicular to the plane of the rigid panel 14. The screw 26 has a means such as a slot 27, best shown in FIGURE 4, which may be engaged by a suitable tool manipulated by a person in the space being ventilated to adjust the position of the plate 22 of the unit 10.

Attached to the plate 22 are resilient means, shown to be four springs 28, that bias the plate 22 away from the openings 17 and have guide means 30 to prevent the rotation of plate 22 when the screw 26 is turned. These guide means 30 are the detents which conflict with the flange 18 of the openings 17 as illustrated in FIGURE 3.

The springs 28 which are leaf springs, as illustrated in FIGURE 2, are secured to the plate 22 by fastening means such as the rivets 32 shown in FIGURES 3 and
4. To prevent the rotation of the spring about the single rivet 32, the plate 22 has an indent or dimple 33 in which the leaf spring fits into at the point of attachment by the rivet 32 to the plate 22.

The diffusion member 16 which distributes the air into the space to be ventilated has a trough-like configuration as shown in FIGURES 3 and 4. Each end of the trough-like member 16 has offset flanges 34 and 35 which reinforce the member. Each end of the member 16 is closed by end portions 36 and 37 which are attached to the reinforcing flanges 34 and 35 in any suitable manner such as by welding. The distribution member 16 is attached to the rigid panel 18 by having side edges 38 and 39 secured to the panel 14 in any suitable manner. As illustrated, the edges 38 and 39 are positioned in a rolled and flattened flanges 40 and 41, respectively.

The end portions 36 and 37 are attached to the rigid member 14 by any suitable means adjacent to the folded end flanges 34 and 35, which are provided with a series of bolt holes 44 for attaching the unit in the opening 11 of the plenum chamber 13, may have attached a sealing material, such as felt strip, to provide the necessary sealing of the unit into the ventilating system.

The distribution or diffusion member 16 preferably has a three-sided trough-like configuration as illustrated in FIGURES 3 and 4. This configuration is made up of slanting side portions 45 and 46 and a flat bottom portion 47 which is substantially parallel to the plane of the rigid panel 14. The side portions 45, 46 and the bottom portion 47 of the member 16 are provided with a series of rectangular slots or slot-like openings 48 (see FIGURE 1) disposed in a uniform pattern with the long axis of each opening extending in the same direction as the length of the unit.

In accordance with this invention, the bottom portion 47 of the member 16 carries a baffle means 49 to adjust and selectively directionize the air flow through the diffusion member 16. The baffle means 49 as shown in FIGURES 3 and 4 comprises a detachable deflector which is secured to the portion 47 by fastening means such as the screw 50. The deflector plate 49 has wings or offset portions 51 and 52 which conform to the sides 45 and 46 respectively. The deflector plate 49 while secured to the member 16 will prevent the flow of air through the group of openings 48a which it covers and therefore cause the air to flow through the openings 48b in the side portions 45 and 46 in a direction substantially parallel to the rigid panel 14.

The deflector 49 is removed selectively by the simple expediency of removing the fastening means 50. The openings 48a are uncovered and a substantial portion of the air passing through the openings 17 in the rigid panel 14 will flow through such uncovered openings generally downwardly. Therefore, the direction of the air flow is changeable.

It should be noted that the deflector has an opening 53 which is in alignment with the slotted screw 26 so that a tool such as a screwdriver may be inserted through the opening 53 to adjust the air valve 15.

The baffle means to adjust the direction of the flow of air through the member 16 may take or be a form such as the embodiment illustrated in FIGURE 5, wherein two deflector plates 54 and 55 are hinged as at 56 and 57, respectively, the hinge means 56 and 57 being attached to the sides 45 and 46 adjacent to the bottom wall 47. Each of the deflector plates 54 and 55 may be moved in the manner of the arrow 58 from an open position to a closed position, and may be locked or secured in a closed position by any suitable fastening means such as metal screws similar to the screw 50.

The use of either a single removable deflector plate 49 shown in FIGURES 3 and 4 or the two-part adjustable device shown in FIGURE 5 allows the person who installs the air valve and distribution unit 10 to selectively adjust the direction of air flow through the member 16 during and after the installation of the unit. In the modification of FIGURES 3 and 4, an on-off adjustment is made by removing the deflector plate 49. The hinged deflectors illustrated in FIGURE 5 provide a continuous adjustment whereby an individual occupying the space being ventilated may vary the direction of air flow through a range of adjustability as desired.

One of the advantages of the above described unit over those units known in the prior art is that the deflector may be removed whereas in the prior art units, the deflectors are fixed and installed inside of the trough-like member 16, thereby increasing the versatility of a single unit.

An additional advantage of the embodiment illustrated in FIGURE 5 over the unit known in the prior art is that the persons occupying the space being ventilated may vary the direction of air flow in addition to varying the volume of air flow from the unit.

A further advantage over the unit known in the prior art for both the embodiments of FIGURES 3 and 5 is that the unit may be manufactured at a reduced cost because of the elimination of the intermediate diffusing member between the air valve and the distribution member.

It will be understood that various modifications may be suggested by the embodiment disclosed, but I desire to claim within the scope of the patent warranted thereon all such modifications as come within the scope of my contribution to the art.

I claim as my invention:

1. An air outlet comprising a trough shaped diffusion member having triangularly shaped end walls and side walls disposed in convergent angular relation and terminating in a generally horizontally disposed bottom wall of reduced width, said side and bottom walls having a plurality of openings formed therein forming air passages through which air is directed respectively transversely and vertically from a source at increased pressure, baffle means for removably overlying said bottom wall and having offset wing portions overlying a portion of each of said side walls, and fastening means for connecting said baffle means to the bottom of said diffuser member, thereby to selectively directionize the flow of air out of said outlet.

2. An air outlet as defined in claim 1 and further characterized by said openings comprising a uniform pattern of spaced slots extending lengthwise in the direction of the longitudinal axis of the diffusion member.

3. An air outlet as defined in claim 1 and further characterized by said baffle means comprising separate hinged parts adjustably connected to said diffuser member.

4. An air outlet comprising a trough shaped diffusion member having triangularly shaped end walls and side walls disposed in convergent angular relation and terminating in a transversely extending bottom wall of reduced width, said side and bottom walls having a plurality of openings formed therein forming air passages through which air is directed in different directions from a source at increased pressure, and baffle means removably overlying said bottom wall and having offset wing portions overlying a portion of each of said side walls, thereby to selectively directionize the flow of air out of said outlet, a panel overlying said trough shaped diffusion member and having valve controlled inlet means for admitting a regulated supply of air into a plenum formed by said panel and said diffusion member from a source at increased pressure,
said baffle means comprising a deflector plate conforming to the shape of said diffuser member to overlie said bottom wall and a portion of each side wall, and fastening means for selectively retaining said deflector plate in baffling position.

5. An air outlet as defined in claim 4, wherein said deflector plate includes hinge means along one side attached to a side wall adjacent said bottom wall so that said deflector plate is selectively movable into and out of a baffling position overlying said bottom wall.

6. In a ventilating system, the combination with a wall or ceiling of a space to be ventilated of a plenum behind said wall or ceiling, an opening in said wall or ceiling in communication with said plenum, and an air valve and distribution unit in said opening comprising,

(a) a rigid panel having a flanged opening,
(b) an adjustable means to regulate the flow of air through said flanged opening, operatively connected to said panel,
(c) a trough-like diffusion member having edges attached to said panel about said flanged opening, having a series of openings forming air passages through the surface of said member for directing air in different directions,
(d) baffle means to selectively adjust the direction of the air flow through the opening in the member to be either parallel or perpendicular to a plane of said panel comprising a baffle plate detachably connected to said diffusion member and having a shape that conforms to the bottom of said diffusion member, and
(e) threaded fasteners securing said deflector plate to the bottom of said diffuser member.

7. A ventilating system according to claim 6, wherein said adjustable means to regulate the air flow through said flanged opening in the panel comprises,