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CEILING PANEL WITH PREFABRICATED VALVED PORTS  
FOR CONTROLLED AIR CIRCULATION  
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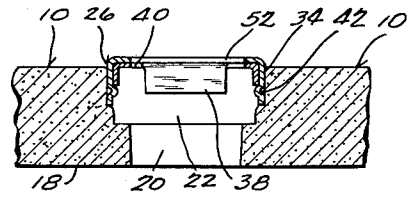
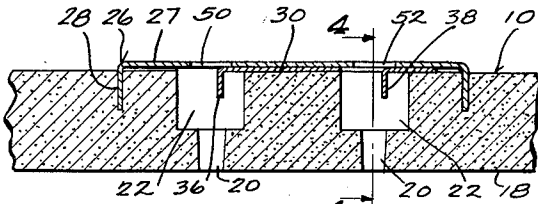
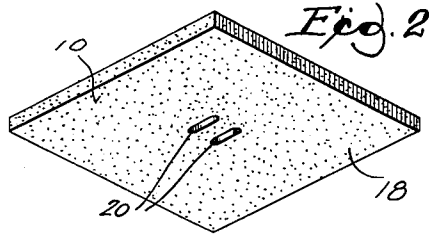
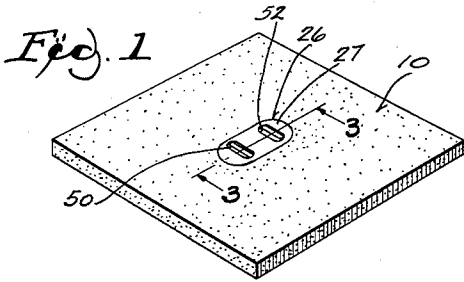


Fig. 3

Fig. 4

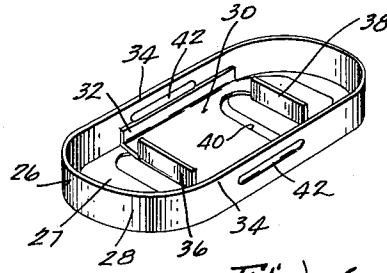
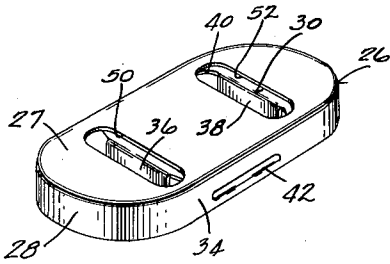


Fig. 5

Fig. 6

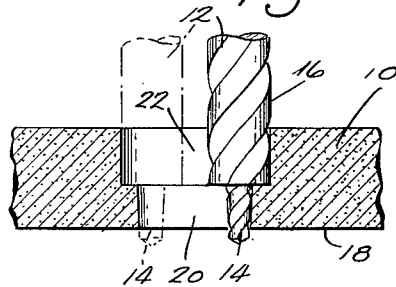
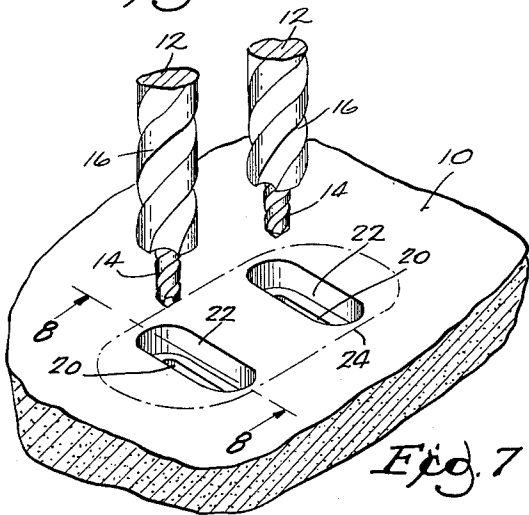


Fig. 7

Fig. 8

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1

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**CEILING PANEL WITH PREFABRICATED VALVED PORTS FOR CONTROLLED AIR CIRCULATION**

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9 Claims. (Cl. 98—40)

This invention relates to a ceiling panel with prefabricated valved ports for controlled air circulation.

A panel or tile embodying the invention is particularly intended for use in air conditioning, ventilating or heating systems in which air is supplied through a plenum chamber. The invention also includes the method of making the valved panel.

As illustrated, the panel comprises a conventional ceiling tile but it is characterized herein as a panel because its form and size are not important.

It has been found desirable in controlled ceiling ventilation systems to have ports paired in close proximity. It is convenient to provide one pair of such ports in an area that happens to be the area of a standard tile, which accounts for the fact that the panel is illustrated in the form of a conventional  $\frac{3}{4}$ " x 12" x 12" tile.

According to preferred practice of the present invention, a single valve controls both of the paired ports concurrently. It comprises a ported valve casing in the form of an elongated shallow inverted cup and having a side wall or marginal flange of less height than the thickness of the panel. A valve slide is assembled within the cup to be reciprocable across the ports therein and one or more operating handles in the form of flanges depending from the slide valve toward the plane of the free margins of the side walls of the inverted cup.

The panel or tile is desirably composed of insulating material which has a relatively loose bond and into which the margins of the cup may be forced by pressure. Portions of the material of the panel which will lie within the inverted cup when the latter is driven into the upper surface of the panel are previously drilled and/or routed away to provide air delivery openings in the form of narrow parallel slots. Preferably, the material is counter-bored to form a shoulder around each such opening. Tools which may conveniently be used for this purpose are illustrated. The organization is completed by simply driving the pre-assembled cup and slide valve into the panel from above.

The panel may be made of a wide variety of materials but preferably includes a fibrous or granular material such as wood fiber or asbestos fiber or rock wool or mixtures of such materials loosely bonded adhesively. Friction between the cup margins and the material of the panel will retain the cup in unitary assembly with the panel. When first inserted, the slide will be clamped under pressure between the base of the cup and the panel but the first operation of the slide will displace enough of the fiber to permit the slide to move freely thereafter. Both the initial operation and any desired subsequent adjustment of the slide can be effected from the exposed or lower face of the panel by reaching through one of the slots of the panel to engage a handle flange of the slide.

In the drawings:

FIG. 1 is a view in perspective showing a panel assembly embodying the invention, the face exposed being the upper face which is normally at the plenum chamber side of the panel and is concealed when the panel is installed.

FIG. 2 is a perspective view of the panel in FIG. 1 as it appears from below, the face illustrated being the face which is normally exposed when the panel is installed.

2

FIG. 3 is an enlarged detail view taken in section on the line 3—3 of FIG. 1.

FIG. 4 is a detail view taken in section on the line 4—4 of FIG. 3.

FIG. 5 is an enlarged detail view in perspective illustrating the valve assembly as viewed from above.

FIG. 6 is a view in perspective showing an inverted valve assembly.

FIG. 7 is an enlarged fragmentary detail view of a panel ported to receive a valve housing cup assembly of the type shown in FIGS. 5 and 6, the ported tools and panel being fragmentarily illustrated.

FIG. 8 is a fragmentary detail view in the plane indicated at 8—8 in FIG. 7 showing the relationship between a routing tool and a panel during the porting of the panel.

As already indicated, a panel 10 embodying the invention preferably comprises a ceiling tile of generally conventional form and size and composition. With reference to composition, the panel is preferably made of a loosely bonded felted material because the cup-shaped valve housing and valve assembly as hereinafter described can be driven into place in such a loosely bonded panel without requiring any previous machining to make a pocket therefor.

In the preferred procedure, a pair of rotating identical tools 12 are driven through panel 10. Each tool comprises differentially diametered drill and router portions 14 and 16. When the relative movement between a tool and the panel is in a direction axially of the tool, the portion 14 of the tool will pass through the lower face 18 of the panel in the position indicated in broken lines in FIG. 8. Thereupon relative movement between the panel and the tools will be effected in a direction normal to the tool axes and to a line drawn between the tools. This relative movement will result in the relationship shown in full lines in FIG. 8, the relative movement having produced a pair of narrow slots 20 opening through the lower face 18 of the panel and wider slots 22 opening upwardly. Thereupon the relative axial movement is reversed in a direction to withdraw the tools from the panel as shown in FIG. 7. FIG. 7 shows in broken lines at 24 the location at which the marginal flange of the cup-shaped valve housing will be driven as hereinafter described.

The valve assembly is separately illustrated in FIGS. 5 and 6. The valve housing 26 comprises a shallow cup with a slotted base 27 and a continuous marginal flange at 28 which may have parallel sides 34 and rounded ends as clearly shown. Portions of the side walls 34 are pressed inwardly at 42, forming ribs which overlie the side flanges 32 of the valve slide 30 to confine the slide for reciprocation longitudinally of the housing. The ribs 42 and the side wall portions 34 of the housing flange 28 form a way for such reciprocation.

Valve 30 comprises a separately fabricated slide having side flanges 32 which are spaced to engage the inner surfaces of the side wall portions 34 of flange 28. There are also manipulating flanges 36 and 38 on the valve slide. As will be shown, these are accessible through the air discharge slots 20 of panel 10. The handle flange 36 is turned up at the end of the slide 30 whereas the handle flange 38 is formed by some of the material of the slide stamped from an opening 40 formed in the slide.

The prefabricated assembly of the valve slide 30 and the housing cup 26 is driven into the panel 10 as shown in FIGS. 3 and 4. The side flange 28 penetrates the panel along the broken line 24 of FIG. 7. There is no deformation of the manipulating flanges 36 and 38 because these are registered with and received into the openings 22 previously cut in the material of the panel as shown in FIGS. 7 and 8. A tool inserted through the

air delivery openings 20 from the lower face 18 of the panel can be used to engage either of the handle flanges 36 or 38 (only one handle flange is necessary) to reciprocate the valve slide. Initially, the frictional engagement of the housing flange 28 with the material of the panel in which it is imbedded will clamp the valve slide rather tightly but this loosens up with the first reciprocation of the slide, the material of the panel being so loosely bound that the slide reciprocation will dislodge any of such material which resists slide reciprocation.

FIG. 3 shows the slide in a position in which air flow from a plenum above panel 10 toward the discharge port 20 through the lower face of the panel will be partially obstructed by the valve. Portions of the valve extend partly across the valve ports 50 and 52 in the housing cup 26. Movement of the valve slide to the left as viewed in FIG. 3 will further obstruct the openings 50 and 52 whereas movement of the valve slide to the right will provide additional opening area.

Thus, in the assembly, the flow of air from a plenum above panel 10 to the ventilated space beneath panel 10 and served by the discharge openings 20 can readily be controlled in a manner which permits the flow to be controlled locally at each individual ceiling tile or panel provided with the valve.

While the flow has been described as being from the plenum above the ceiling downwardly into the ventilated space beneath the ceiling, it will be understood that so far as the present invention is concerned, it is equally applicable to ventilating systems in which the flow is upward rather than downward.

I claim:

1. A valve assembly for use with a member having an apertured surface, said assembly comprising a housing provided with a ported base and a marginal flange extending upwardly from one surface of said base, said housing adapted to be mounted on a member apertured surface whereby a base port is adapted to register with a member surface aperture and said marginal flange is adapted to penetrate a member apertured surface, portions of said flange having inwardly extending projections, said projections forming guideways; a valve slide carried by said housing against the surface of said base from which said flange extends, portions of said slide being disposed within said guideways whereby said slide is selectively movable independently of said housing in the plane of said base ported surface in contact with said slide to effect opening and closing of said base port; and means provided on said housing and projecting into the path of movement of said slide and defining the limits of independent movement of said slide within said guideways.

2. A valve assembly for use with a member having an apertured surface, said assembly comprising a housing provided with a ported base and a marginal flange extending upwardly from one surface of said base, said housing adapted to be mounted on a member apertured surface whereby a base port is adapted to register with a member surface aperture and said marginal flange is adapted to penetrate a member apertured surface, portions of said flange having inwardly extending projections,

said projections forming guideways; and a valve slide in preassembled relation with said housing and overlying the surface of said ported base from which said marginal flange extends, marginal portions of said slide being slidably disposed within said guideways whereby said slide is selectively movable independently of said housing and only in a plane parallel to said housing base surface to effect opening and closing of said base port; said flange having portions thereof extending into the path of movement of said slide and defining the limits of independent movement of said slide within said guideways.

3. The valve assembly recited in claim 2 wherein said marginal flange extends entirely around said ported base.

4. A ventilating panel comprising a first surface, a second surface opposite said first surface, said surfaces being interconnected by a port spaced inwardly from the margin of said panel, and a valve assembly mounted on said first surface adjacent one end of said port; said assembly including a housing having a base provided with an opening in registered relation with said port one end, and a marginal flange spaced from said base opening and penetrating and frictionally engaging the portion of said panel circumjacent said port one end, and a valve slide carried by said housing and being manually slidable independently thereof to effect opening or closing of said base opening.

5. The panel recited in claim 4 wherein the extent to which said flange projects from said housing base is less than the distance between said panel surfaces.

6. The panel recited in claim 4 wherein said valve slide includes a protuberance which projects into the panel port and is accessible from the opposite end of said panel port to effect movement of said slide.

7. The panel recited in claim 4 wherein portions of said flange cooperate with said housing base to form a guideway in which marginal portions of said valve slide are slidably accommodated and restrict said valve slide to movement in a linear direction.

8. A method of making a unitary valved panel for the partial enclosure of a ventilated space, said method comprising prefabricating a sub-assembly of a housing having a ported base and a marginal flange extending transversely therefrom and a valve slide carried by said housing against said base and movable independently thereof to open or close the base port, prefabricating an air circulation port in a panel, aligning the housing base port with one end of said panel port, and driving the sub-assembly into said panel whereby said housing flange penetrates and frictionally engages the portion of said panel circumjacent said port and said valve slide is adjacent said panel surface.

9. The method recited in claim 8 wherein prefabricating of said panel port includes countersinking the panel from the surface from which said sub-assembly is driven.

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