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UNIT VENTILATOR CONSTRUCTION

Filed March 6, 1968

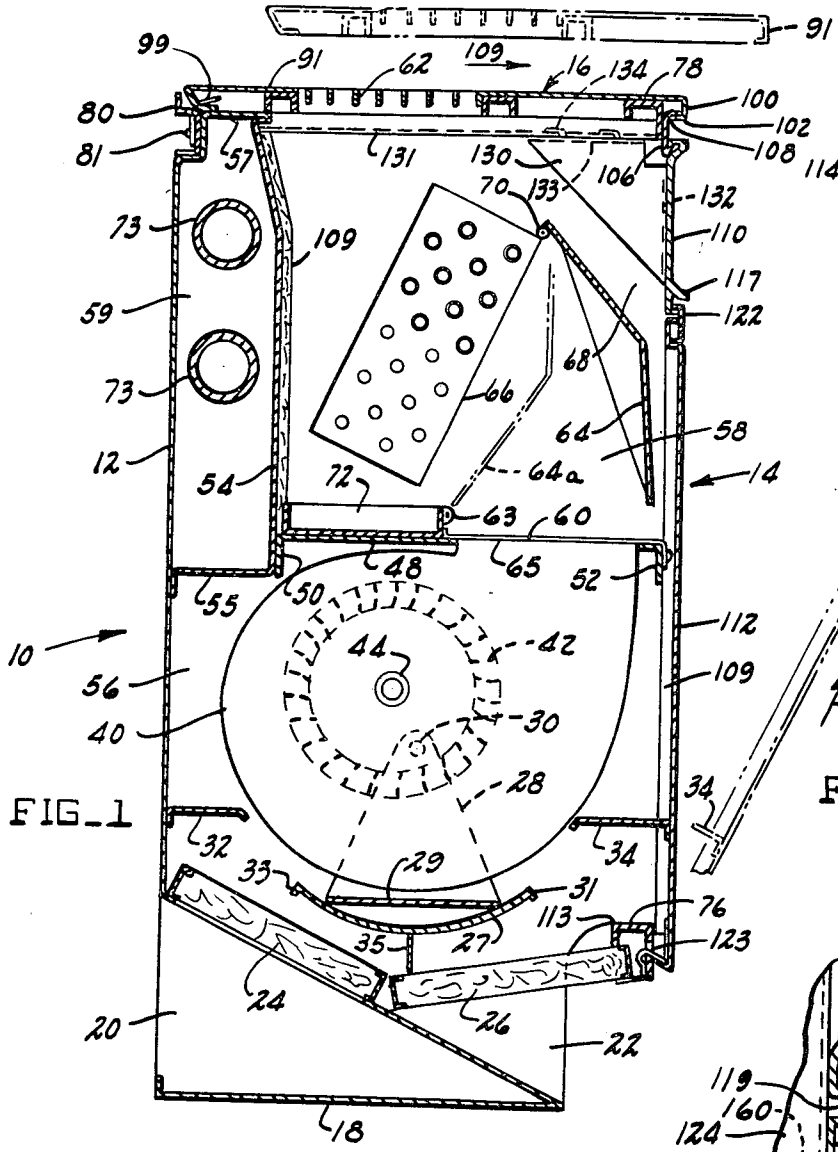

FIG_1

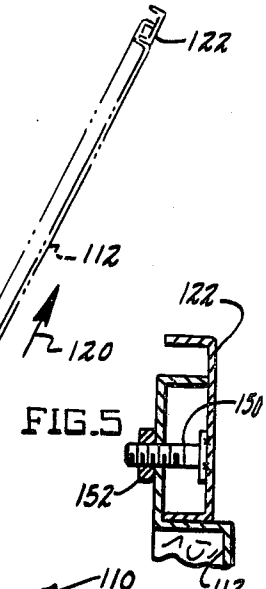

FIG_5

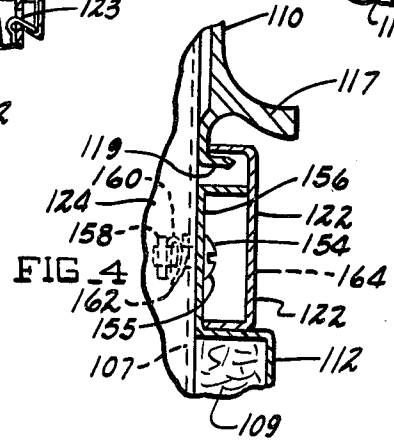

FIG_4

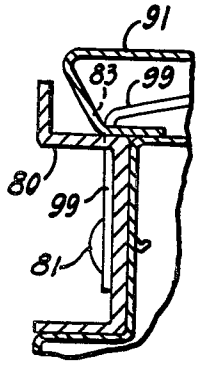

FIG_2

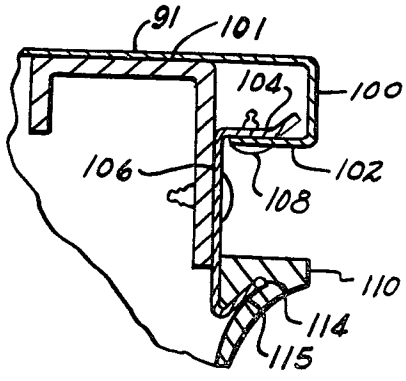

FIG_3

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UNIT VENTILATOR CONSTRUCTION

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U.S. Cl. 98—33 10 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to a unit ventilator comprising an upright housing containing one or more fans for developing an upwardly flowing air stream which exits through a discharge grille in the housing top wall, and a heat exchange coil in the upper portion of the housing arranged to be contacted by the air stream as it flows toward the discharge grille.

Features of the housing structure are the removable nature of certain housing panels for complete access to the housing interior, construction of the front panel assembly as two or more separate panels paintable in contrasting colors for ornamentation purposes, and formation of the front panels with semi-concealed fastener devices for better protection against tampering by children.

THE DRAWINGS

FIG. 1 is a transverse sectional view taken through one embodiment of the invention, certain panels thereof being additionally shown in phantom positions detached from the housing.

FIGS. 2, 3, 4 and 5 are enlarged fragmentary views of different portions of the FIG. 1 embodiment.

GENERAL ARRANGEMENT

There is shown an upright unit ventilator housing **10** having a sheet metal rear wall **12**, removable metallic front wall **14**, and removable sheet metal top wall **16**. Rear wall **12** terminates above the bottom wall **18** to define a fresh air inlet **20**. Front wall **14** terminates above bottom wall **18** to define a return air inlet **22**. Suitable filters **24** and **26** register with respective inlets to filter the separate air streams coming into the bottom portion of the housing. These filters may be connected together to form an integral filter train.

Arranged above the two air filters is a roll type proportioning damper **27** of arcuate configuration carried on two sector-like arms **28**, only one of which is visible in the drawing; a reinforcing plate **29** may be connected between the two sector arms to minimize twist of the damper assembly. Each sector arm is located adjacent an end wall of the defined air passage, and is connected with a stub shaft **30** going through suitable bearings in the passage end wall to mount the damper for arcuate movement about the stuby shaft axis. A damper-actuating motor (electric or pneumatic) located outside the air stream may be thermostatically controlled to move the roll damper **27** to various adjusted positions apportioning the flow through filters **24** and **26**. The arcuate damper is provided with a front edge **31** and a rear edge **33**, said edges cooperating with elongated fixed baffles **32** and **34** to provide flow passages of inversely-varying dimensions. A fixed separator **35** precludes any by-passage of air from one inlet to the other.

Located above damper **27** are one or more centrifugal fan housings **40**, only one of which is visible. Each housing **40** contains a centrifugal fan wheel **42** carried on a

common drive shaft **44** arranged to be rotated by an electric motor located in a non-illustrated end compartment outside the air stream. The various fan housings **40** are individually suspended from a horizontal deck plate **48** having a lull length rear flange **50**, and a full length front flange **52**, said deck plate extending across the entire air passage in the space between front wall **14** and the false rear wall **54**. The space below deck plate **48** forms an inlet chamber **56**, and the space thereabove forms an outlet chamber **58**.

Air discharged through each fan outlet **60** moves toward the discharge grille **62** in the top wall **16**. This air can take either or both of two paths depending on the position of a control damper **64**. In the full line position of the damper all of the air flows through a finned heat exchange coil **66** extending across the air passageway. In the dotted line position **64***a* all of the air flows through a bypass passageway **68** formed between the front face of the damper and the rear face of the housing front wall.

The damper is carried by a horizontal pivot shaft **70** which may be rotated by a thermostatically controlled motor (not shown), the arrangement being such that the damper provides different treated air-bypass air ratios, hence different discharge temperatures. Any condensate formed on the coil fin surfaces will be collected in a removable drain pan **72** extending across the air passageway. A rubber sealing strip **63** may be carried on the front wall of the pan to engage the tip of damper **64** when it assumes its dotted line position. Forward dislocation of the pan may be prevented by suitable front-to-rear strips **65** secured to deck **48** where they will not interfere with upward flow of air through discharge openings **60**.

Hot or cold water may be supplied to and remove from coil **66** via non-illustrated branch pipes coming out of the two horizontal pipes **73** located behind false wall **54**. As shown, the lower edge of wall **54** turns rearwardly to form a false bottom wall **55**, while the upper edge of back wall **12** turns forwardly to form a false top wall **57**, the various walls being welded together along their full lengths to form a pipe raceway designated by numeral **59**. The box cross sectional nature of the raceway enables it to reinforce the ventilator housing for the entire lateral width of the housing (normal to the plane of the paper).

HOUSING SUPPORT FRAMEWORK

The supporting framework comprises a pair of non-illustrated laterally spaced upright bulkheads paralleling the plane of the paper. These bulkheads are spaced inwardly a short distance from each end of the unit ventilator housing to form two relatively narrow end compartments and one relatively wide central compartment, said central compartment forming the illustrated air passageway through the unit ventilator. In an illustrative housing structure each end compartment might be on the order of twelve inches wide and the central compartment (air passageway) might be on the order of seventy-eight inches wide, making a total housing width of one hundred-two inches. This unit ventilator housing would have a height of about thirty inches and a front-to-rear depth of about fifteen inches.

The housing support framework includes a lower front channel-shaped frame element **76**, an upper front channel-shaped frame element **78**, and an upper rear channel-shaped frame element **80**. Each of elements **76**, **78** and **80** extends the full lateral width of the housing, e.g. one hundred two inches, for adequate support of the housing top wall **16** and front wall **14**. The forementioned bulkheads interconnect the three frame elements to form a rigid framework on which to hang the housing panels and interior components.

HOUSING PANEL CONSTRUCTION

The housing top wall **16** comprises a peripherally flanged sheet metal panel **91** having a front portion resting on surface **101** of frame element **78** and a rear portion resting on frame element **80**. The rear portion of the panel is formed with two or more slot openings **83** for accommodating the upwardly projecting retainer elements **99** affixed to frame element **80**, as by screws **81**.

The front edge portion of panel **91** comprises a downwardly turned flange portion **100** and a rearwardly turned lip portion **102**. This configuration reinforces the forward edge of the panel and also causes the raw edge of the panel to be concealed, thus preventing small children from cutting their fingers on the raw edge surface. Extending above lip **102** is a forwardly projecting flange **104** formed on an elongated channel-shaped hanger element **106**. Suitable screws **108** may be extended upwardly through openings in lip **102** and flange **104** to secure panel **91** in its illustrated position. The top panel may be removed by first loosening or removing screws **108** and then drawing the panel forwardly in the arrow **109** direction (FIG. 1). During this movement the surface of each slot **83** rides along the upper surface of the forwardly extending portion of bracket **99**. Panel **91** can be completely removed from the ventilator housing, or alternately the panel can be tilted back to an upright position generally paralleling the room wall or window area; in this event retainer elements **99** serve as hinges.

As previously noted, the front of the housing is closed by a removable front panel structure **14**. This structure comprises an upper wall panel **110**, a lower wall panel **112**, and an interconnecting molding strip **122**. Strip **122** is rigidly connected with panel **112** so that it and the panel are removable from the housing as a unit.

As shown in FIG. 5, molding strip **122** has a plurality of studs **150** welded to its rear face, said studs going through openings in the upper edge of panel **112** and having nuts **152** threaded thereon for semi-permanent securement of the molding strip to the panel. The molding strip is formed separately from the panel to permit the two members to be painted different contrasting colors without expensive masking procedures. The molding strip may also give some longitudinal stiffness to the panel upper edge when formed separately; i.e. it produces a miniature box section as viewed in FIG. 5.

Each of members **110**, **112** and **122** extends the full width of the housing so as to constitute the visible frontal area exposed to the room. Panel **110** may be formed as an aluminum extrusion of constant cross section throughout its length. Its upper portion defines a rearwardly facing groove **114** which fits over an upwardly-outwardly extending flange **115** on hanger element **106**; element **106** preferably extends the full width of the housing for proper support and alignment of panel **110**. The lower portion of panel **110** includes a forwardly projecting rib **117** and a concealed flange **119** therebelow. As shown in FIG. 4, flange **119** seats within or behind the molding strip **122** to preclude removal of panel **110** except after first removing the molding strip—lower panel assembly.

In the event that panel **110** is formed with a relatively thin cross section it may tend to bend or buckle in the areas midway of its ends. To prevent this there is provided a removable brace plate **130** of generally triangular outline. Said plate extends in a front-to-rear plane below a channel frame element **131** which is welded at its ends to frame **78** and wall **57**. The front edge of brace plate **130** is turned laterally to form a flange **132** abutting but not secured to panel **110**. The upper edge of plate **130** is turned laterally to form a flange **133**, suitable fingers **134** then being struck out of the flange to key into openings in the light portion of channel **131**. Installation of the brace plate is accomplished by removing same up against channel **131** and then sliding same rearwardly so that fingers **134** key over the channel surface.

Lower front panel **112** is peripherally flanged (all four edges), and has welded thereto at its lower edge two or three laterally spaced hinge brackets **123**, only one of which is visible in the drawings. Each bracket **123** projects through a slot opening **113** in channel **76** whereby to support the panel **112** weight. It will be seen that the panel can be tilted about the bracket support axis and then removed by an upward motion in the arrow **120** direction. The panel is preferably provided with mat-type sound absorption material **109** on its rear face.

Retention of panel **112** can be accomplished by two fasteners **154** extending through or adjacent flanges **107** formed at the front edges of the aformentioned bulkheads. In FIG. 4 one of these bulkheads (or side walls) is designated by numeral **124**. As previously mentioned, these bulkheads are spaced laterally of one another to define the end walls of the air passage. Each fastener **154** may comprise a bolt **155** extending through wall portion **156** of panel **112**, a nut **158** threaded onto the bolt, a torsion spring **160** having its rear convolution going through a transverse hole in the bolt, and a cam disc **162** disposed on the bolt and being connected with the front convolution of the spring. The general arrangement is such that by inserting a screw driver through an opening **164** in strip **122** it is possible to turn the bolt and thereby rotate the cam disc so that a portion of the disc lies behind the stationary bulkhead flange **107**. Reverse rotation of the bolt unlocks the fastener to allow hinge-like removal of panel **112** for access to the fan motor, and other controls.

Top panel **91** can be removed after first loosening screws **108**; the openings in wall portion **102** are preferably slots extending from the wall rear edge so that when the screws are merely loosened it is possible to slide panel **91** forwardly in the arrow **109** direction. Preferably the spacing and orientation of screws **108** with reference to the upper edge of panel **110** are such that screws **108** cannot be readily disconnected or loosened until panel **110** is first removed. This is to lessen the likelihood of tampering by small children, as by requiring a specific sequence of operations to effect the panel removal process.

It will be noted that after removal of panels **112**, **110** and **91** the entire housing interior is exposed for adjusting damper **64**, cleaning the coil fins, removal of fan deck **48** and other maintenance operations.

CONTEMPLATED ENVIRONMENT

It is contemplated that this unit ventilator will be used primarily in school rooms, preferably along the exterior room wall beneath the glass areas. In such installations one or more fan coil units will be interpersed with book shelf units, and drawer-cabinet combination units. These auxiliary units will be the same height and depth as the unit ventilators so that the top and front surfaces of all units will align with one another as substantially continuous unbroken surfaces.

Frontal edge portion **100** is intended to align with the upper front edge on the companion shelf and drawer-cabinet units. Panel **110** is intended to simulate a modernistic drawer front; for this reason rib **117** is contoured as a modernistic simulated drawer pull or handle. When the unit ventilator is positioned alongside a suitably dimensioned drawer-cabinet unit panel **110** will form a continuation of the horizontal profile of the drawer, thereby giving a modernistic ornamental styling effect.

Molding strip **122** is intended to line up with the front edge of an adjacent shelf or horizontal partition forming part of a suitably dimensioned shelf or drawer-cabinet unit. Panels **110** and **112** are preferably finished in different colors, with panel **110** being lighter in tone than panel **112**. Thus, panel **110** can be white, yellow or aluminum finish, white panel **112** can be a darper color such as blue, red, green, etc. Molding strip **122** and hanger strip **106** are preferably black to provide heightened con-

trast between the other two panels when their own colors are not sufficient, for that purpose.

It would be possible to form panel **110**, strip **122**, and panel **112** os a single panel element, as under conventional practice. However it would then be difficult to achieve the curvatures at the upper and lower edges of panel **110**, or the visual separateness of the different panel areas. It would also be difficult to paint the different panel areas with the different required colors, since masking procedures would then be necessary. Sectioning or dividing the panels into separate panel members as discussed above tends to overcome these problems in that it provides contrasting finishes and contour detail not achievable using a single front panel concept.

It is claimed:

1. An upright unit ventilator comprising a concealed supporting framework comprised of a transverse upper rear frame element, a transverse upper front frame element, and a transverse lower front frame element; a horizontal top panel spanning the space between the upper frame elements; means forming an air discharge grille in said top panel; fan means within the unit ventilator for developing an upwardly flowing air stream exiting through the discharge grille; the front edge portion of said top panel including a flange portion extending downwardly in front of the upper front frame element and a lip portion extending rearwardly from the flange portion to define a smooth non-jagged frontal edge surface for the top panel; a semi-concealed panel hanger means carried by the upper front frame element; an upper front panel suspended from the hanger means below the aforementioned front edge portion of the top panel; a lower front panel having its lower edge portion supported by the lower front frame element; and fastener means arranged to releasably retain the front panels against the concealed framework; said front panels being displaceable from their mounted positions to provide free access to the space therebehind.

2. The unit ventilator of claim **1** wherein the supporting framework includes two upright bulkheads extending rearwardly from the front frame elements adjacent their opposite ends, the space between said bulkheads constituting the air flow passageway through the ventilator; the aforementioned fastener means including separate fastener devices engageable with respective ones of the bulkheads adjacent their front edges.

3. The unit ventilator of claim **1** wherein the upper front frame element provides an upwardly facing flat surface engageable with the underface of the top panel, and a forwardly facing flat surface operable to mount the hanger means.

4. The unit ventilator of claim **3** wherein the hanger means comprises a vertical mounting portion secured flatwise against the forwardly facing surface of the upper front frame element, a forwardly extending flange portion overlying the lip portion of the top panel, and an upwardly-forwardly inclined hook portion operable to suspendably support the upper front panel.

5. The unit ventilator of claim **1** wherein the upper rear frame element provides an upwardly facing flat surface; said top panel having its rear edge portion extending downwardly and then forwardly to define a lip; said top panel having longitudinally spaced slots formed in said lip; said upper rear frame element having upwardly and forwardly extending retainer elements going through respective ones of the slots to preclude direct upward displacement of the top panel.

6. The unit ventilator of claim **5** wherein the slots extend into the downwardly extending portions of the top panel to define slot edges which ride along the upper faces of the retainer elements when the top panel is drawn forwardly from its installed position.

7. The unit ventilator of claim **1** and further comprising a horizontal molding strip carried on the upper edge portion of the lower front panel, said molding strip overlying and spanning the joint formed between the adjacent edges of the upper front panel and lower front panel, whereby the molding strip retains the upper front panel in position on the framework.

8. The unit ventilator of claim **7** wherein the supporting framework includes two upright bulkheads extending rearwardly from the front frame elements inwardly of their opposite ends, the space between said bulkheads constituting the air flow passageway through the ventilator; the aforementioned fastener means further comprising separate fastener devices connected between the lower front panel and respective ones of the upright bulkheads; said fastener devices being located in the space behind the molding strip.

9. The unit ventilator of claim **7** wherein the molding strip is of channel cross section, said strip having its upper and lower edges turned rearwardly to engage the upper and lower front panels; the upper edge portion of the lower front panel being recessed to accommodate the molding strip.

10. The unit ventilator of claim **1** wherein the concealed framework comprises a horizontal reinforcement bar extending rearwardly from an intermediate point on the upper front frame element, the combination further comprising a brace depending from said reinforcement bar in releasable abutting engagement with the upper front panel to oppose inward deflection thereof; said brace having a releasable connection with the reinforcement bar.

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MEYER PERLIN, Primary Examiner

U.S. Cl. X.R.

62—426; 98—94; 165—122