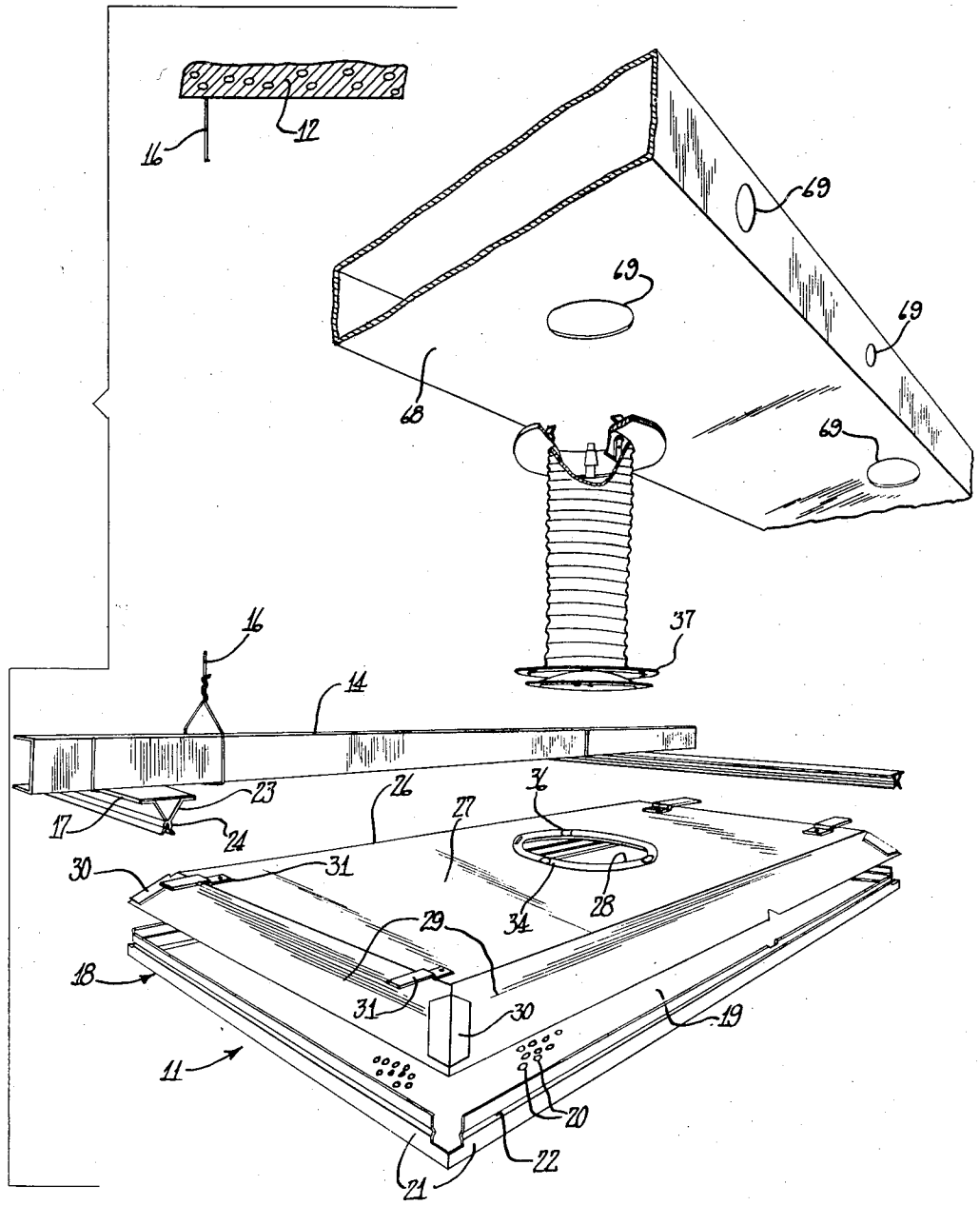
Nov. 25, 1958 W. A. WULLE 2,861,510

VENTILATING APPARATUS

Original Filed April 23, 1953 4 Sheets-Sheet 1

Fig. 1




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Fig. 2

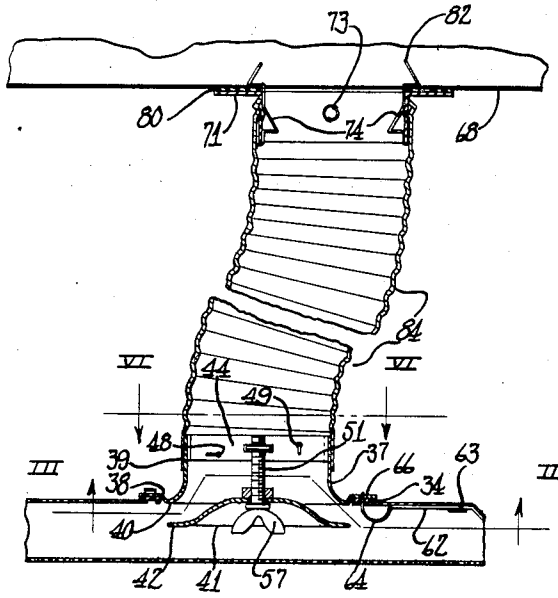



Fig. 3

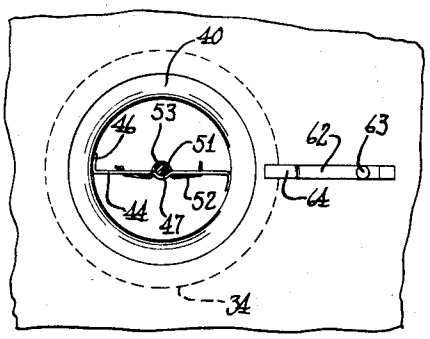
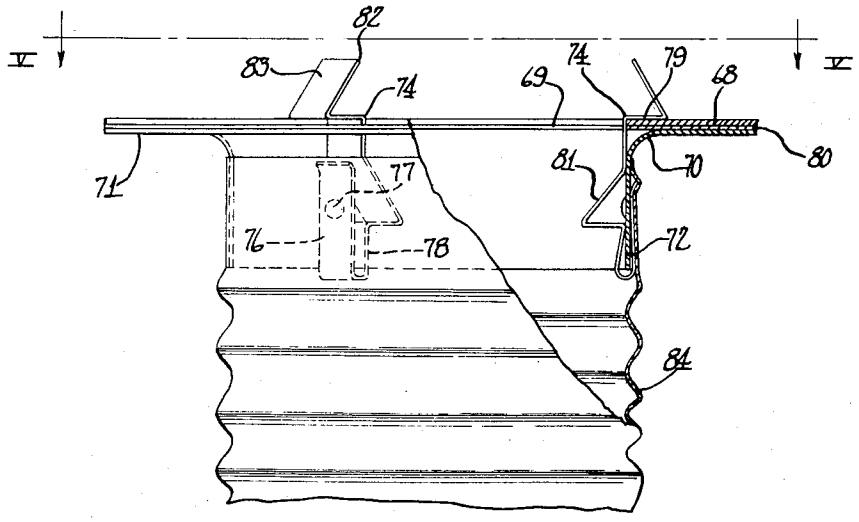



Fig. 4




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VENTILATING APPARATUS

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Fig. 5

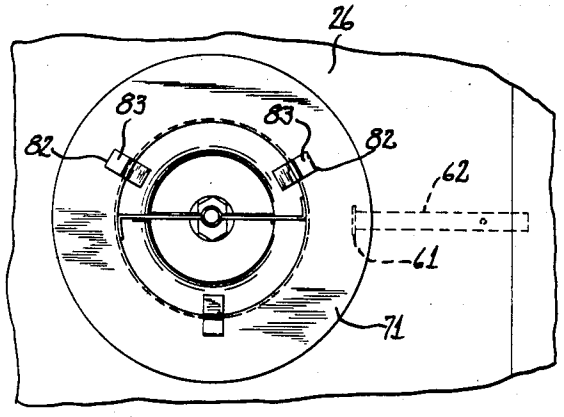
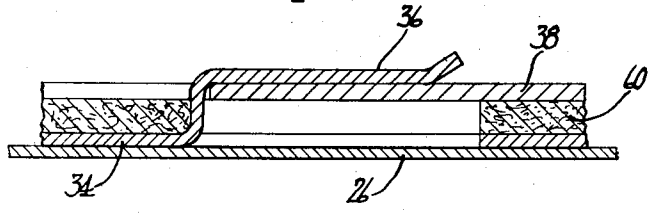



Fig. 7



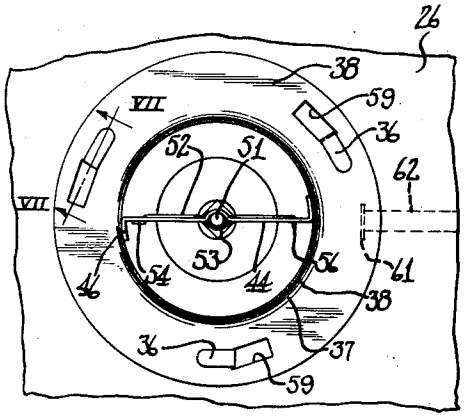




Fig. 6

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Nov. 25, 1958 W. A. WULLE 2,861,510

VENTILATING APPARATUS

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Fig. 8

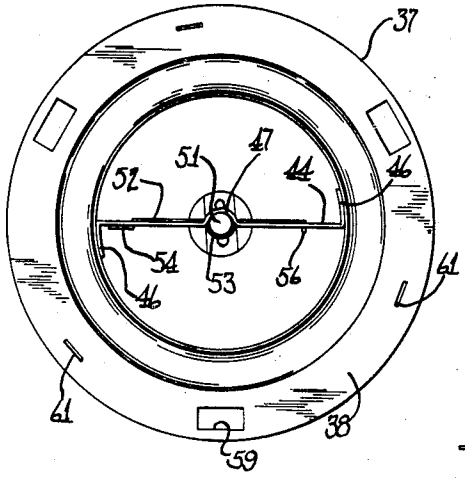



Fig. 9

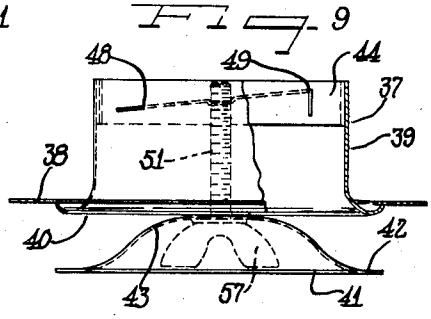
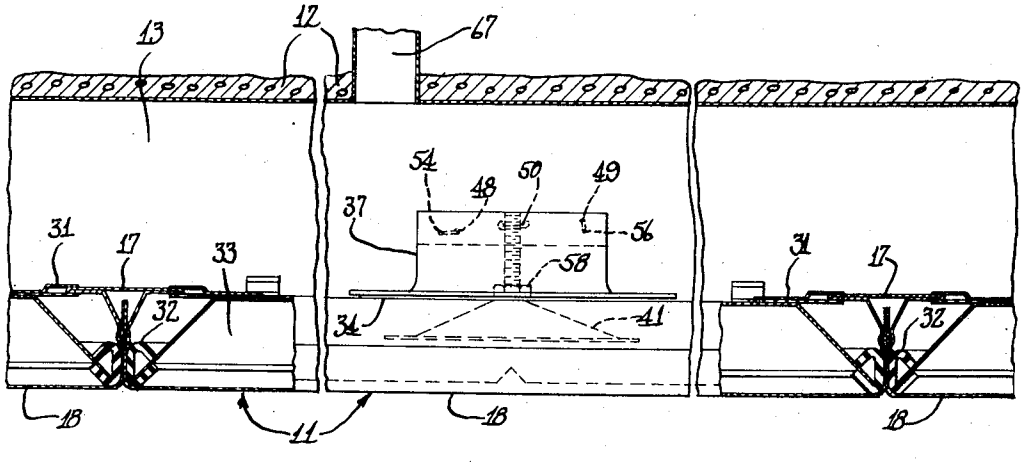



Fig. 10




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United States Patent Office 2,861,510
Patented Nov. 25, 1958



2,861,510

# VENTILATING APPARATUS

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Original application April 23, 1953, Serial No. 350,607, now Patent No. 2,775,927, dated January 1, 1957. Divided and this application July 5, 1956, Serial No. 599,285

9 Claims. (Cl. 98—40)

This application is a division of my application Serial No. 350,607, filed April 23, 1953, now Patent No. 2,775,927.

This invention relates generally to ventilating apparatus and more particularly to a ventilating apparatus for a compartment wherein a plurality of modular panel units are spaced from one wall of the compartment to provide an air space between the wall and the panel units and selected ones of the panel units are constructed to provide plenum chambers having a diffusion plate outlet for supplying diffused air at a low velocity to the compartment, each of the panel units having a collar member providing a valve for admitting a controlled supply of air to the plenum chamber from a source at higher pressure.

It is an object of the present invention to provide a modular type ventilating apparatus employing a plurality of modular panel units or diffusion units for the controlled distribution of ventilating air.

Another object of the present invention is to provide an improved ventilating apparatus wherein modular panel units are employed providing in part a smooth wall surface to the interior of a compartment being ventilated.

Another object of the present invention is to provide a pressure-displacement type ventilating apparatus wherein a primary plenum chamber may be remotely spaced from a secondary plenum chamber and wherein the spaced apart plenum chambers may be selectively communicated by a serpentine flexible sleeve-like conduit.

Yet another object of the present invention is to provide an improved flexible sleeve conduit means for a ventilating apparatus which will effect flow communication between mis-aligned inlet and outlet apertures provided by spaced apart duct means.

Another object of the present invention is to provide a flexible sleeve duct for a ventilating apparatus and improved mounting means at opposite ends thereof.

Another object of the present invention is to provide a standardized form of ventilating apparatus which may be conveniently fabricated from stock-piled components but which will be adaptable for installations of different supply requirements.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example only.

Figure 1 is an exploded view showing in perspective the various components of a ventilating apparatus incorporating the principles of the present invention;

Figure 2 is a reduced cross-sectional view showing additional details of construction of the apparatus of Figure 1;

Figure 3 is a fragmentary cross-sectional view with parts shown in elevation taken substantially on line III—III of Figure 2;

Figure 4 is an enlarged fragmentary view with parts



broken away showing additional details of construction of one of the collar units provided in accordance with the principles of the present invention;

Figure 5 is a fragmentary plan view in the direction of the arrows shown on line V—V of Figure 4;

Figure 6 is a cross-sectional view taken substantially on line VI—VI of Figure 2;

Figure 7 is a fragmentary cross-sectional view taken substantially on line VII—VII of Figure 6;

Figure 8 is a bottom plan view of one of the collar members provided in accordance with the principles of the present invention;

Figure 9 is an elevational view with parts broken away of the collar unit of Figure 8; and

Figure 10 is a fragmentary cross-sectional view with parts shown in elevation of a so-called plenum installation provided in accordance with the principles of the present invention.

As shown on the drawings: Ventilating apparatus of the present invention comprises a plurality of modular panel units indicated in Figures 1 and 10 generally by the reference numeral **11** which are spaced from one wall **12** of a compartment to be ventilated to provide an air space **13** between the wall **12** and the panel units **11**.

For example, as shown in Figure 1, one wall of the compartment being ventilated may conveniently comprise an overhead wall, or ceiling, from which a subceiling support structure **14** may be suspended by means of hangers indicated at **16**. The support structure conveniently takes the form of channel members to which are firmly connected a plurality of clip runners **17** spaced and aligned to receive in clip-in assembly a plurality of pan members **18** forming one component of each of the panel units **11**.

As is indicated in Figure 10, a plurality of pan members **18** may be provided in side by side relationship and each of the pan members **18** presents a smooth wall surface to the interior of the compartment, each of the pan members **18** lying in adjacent co-planar relationship.

Selected ones of the panel units **11** are constructed and arranged to operate as a diffusion means for distributing air to the compartment.

As is shown most clearly in Figure 1, the pan member **18** includes a diffuser plate **19** presenting a smooth wall surface to the interior of the compartment which surface is intersected by a large number of small air flow passages or openings indicated at **20**. The openings **20** are provided over the entire wall surface.

At opposite margins of the plate **19** are provided upstanding flanges **21** forming side walls. The side walls or flanges **21** are beaded as at **22**, thereby to provide clip means for placing the pan member **18** in firm assembly with spaced clip runners **17**.

As is shown, in Figures 1 and 10, each of the clip runners **17** has a pair of depending leg portions **23** recessed as at **24** to intermatingly receive the beaded flanges **21** in clip-in assembly.

A cover member indicated generally at **26** is provided for each pan member **18**. Each cover member **26** is made from a flat sheet of metal including a plate portion **27** having an opening **28** formed in a central portion thereof and bounded on its margins by offset flanges **29** which are bent downwardly at an acute angle to the plate portion **27**. Each of the corners of the cover member **26** are notched to facilitate abutment of the longitudinal and transverse flanges **29** and a retainer member **30** is spot welded or otherwise attached to each of the corners after the cover member is formed into proper shape so as to retain the flanges **29** in locked assembly.

Clip members **31** are provided on the plate portion **27** of each of the cover members **26** and engage with the clip runners **17** as shown in Figure 10.

The flanges 29 form side walls for the cover member 26 and as shown in Figure 10 a peripheral gasket 32 made of a resilient material such as rubber or a rubber substitute may be provided on the flanges 29. Since each cover member 26 forms together with the pan member 18 a plenum chamber 33 which communicates with the air space 13 through the opening 28, the perimeter or peripheral gasket 32 finds particular utility in a ventilating installation as shown in Figure 10 since the gasket 32 will prevent the diffusion of air from the air space 13 into the compartment through any flow path other than the flow path established through the opening 28, the plenum chamber 33, and the diffusion openings 20 provided in the plate 19 of the pan member 18.

As is shown in Figure 1, a flat ring member 34 secured to the plate portion 27 of the cover 26 surrounds the opening 28 and provides a plurality of circumferentially spaced tongues 36 which are struck out so as to extend upwardly above the plane prescribed by the surface of the plate 27 and the ring member 34.

A first collar member indicated generally by the reference numeral 37 is provided to form an upstanding flange at the locale of the opening 28. The details of construction of the first collar member 37 are clearly disclosed in Figures 8 and 9. The member 37 comprises a radially extending flange 38 and the upstanding flange for the opening 28 is provided by a generally cylindrical wall portion or flange indicated at 39. An annular curved portion 40 extends between the flange 39 and the radial flange 38 so as to provide an annular valve seat for engaging a valve head member indicated generally at 41. The valve head member 41 conveniently comprises a sheet form member stamped into a dish-shaped configuration to provide an annular rim 42 of substantially complementary shape to the seat 40 and a cup-shaped body portion 43 which is adapted to be selectively received within the flange 39 so as to selectively restrict the size of the opening through the collar member 37.

A bracket member 44 spans the flange 39, lying substantially on a diameter thereof and having offset leg portions 46 which can be conveniently attached to the flange 39 by means of spot welding or the like. The bracket member 44 takes the form of a sheet-form band medially offset as at 47 to provide a curved boss.

Adjacent the ends of the bracket member 44 are provided apertures which are indicated by the reference numerals 48 and 49 respectively. An elongated slot 50 is also provided at the boss portion 47. The openings 48 and 49 and the elongated slot 50 are aligned on a bias, in other words, the enumerated openings are acutely inclined with respect to the normal axis of the bracket member 44 and it may be noted that the angle of inclination is preferably correlated to the pitch angle of a threaded bolt indicated at 51.

A rod form spring member 52 abuts against one face of the bracket member 44 and is provided with a medially offset boss portion indicated at 53 shaped in a curved configuration complementary to the curved boss portion 47.

One end portion of the spring member 52 is offset as at 54 and passes through the opening 48 to engage the opposite face of the bracket member 44, the offset portion 54 lying on an axis generally parallel to the main axis of the spring member 52.

The opposite end of the spring member 52 is offset as at 56 and extends through the opening 49, the offset portion 56 being bent generally transversely of the main length axis of the spring member 52 and also engaging the opposite face of the bracket member 44. It will be evident that the particular bending arrangement of the offset portions 54 and 56 facilitates assembly of the spring member 52 through the openings 48 and 49 with the offset boss portion 53 extending through the elongated slot 50 thereby to form together with the offset boss portion 47 an adjustment nut means for threadedly mating with the bolt 51.



As is indicated in the drawings, the bolt 51 is threadedly adjusted in the nut means afforded by the boss portions 47 and 53 and forms the threaded valve stem for the valve head 41.

A wing nut 57 is attached to one end of the bolt 51 and facilitates threadedly adjusting the bolt 51 for adjusting the valve head 41 relative to the seat 40, thereby to selectively control the flow of air through the collar member 37. A lock nut 58 retains the valve head 41 in firm assembly with the bolt 51, serving to clamp the valve head 41 against the wing nut 57.

As is shown in Figure 8, a plurality of circumferentially spaced openings 59 are provided in the radial flange 38 of the collar member 37. The openings 59 take the form of elongated slots adapted to receive the lugs 36 provided on the ring member 34, thereby to effect a bayonet coupling action. A felt pad 60 may be provided between the ring member 37 and the flange 38.

It will be noted that the flange 38 is further provided with a plurality of circumferentially spaced recesses indicated by the reference numeral 61 (Figure 8). On the inside surface of the cover member 26 is provided a locator spring indicated at 62 and attached to the cover member 26 by a fastener 63. A curved portion 64 terminates in a locator pin 66 and selectively seats in one of the recesses or openings 61 thereby to preclude relative movement which might inadvertently disconnect the collar member 37 from the cover member 26.

In the embodiment of Figure 10, an air supply conduit 67 furnishes a supply of pressurized air to the air space 13 so that the air space 13 functions as a primary plenum chamber. Each of the respective collar members 37 on the various selected panel units will admit a controlled supply of pressurized air from the air space 13 into each of the respective plenum chambers 33 for diffused distribution outwardly through the plate 19 of the pan member 18.

It will be evident that the apparatus described above may be installed in a sequence of installation which permits the pan members 18 to be snapped in place after all of the other components are already assembled on the support structure 14. By virtue of such arrangement, each of the individual valving units in the respective collar members 37 may be selectively adjusted to effect an air balance for the particular compartment being ventilated. In other words, all of the valving units in the respective collar members 37 may be selectively adjusted for varying load conditions before ceiling erection. Furthermore, with the arrangement of the present invention, all adjustments may be effected without requiring the use of tools since the various valving units may be manually adjusted through turning of the wing nuts 57 and thereafter all of the pan members 18 may be manually snapped in place.

In the embodiment of Figure 1, a separate duct 68 is provided in the air space 13 and is adapted to carry a supply of pressurized ventilating air. The duct 68 preferably takes the form of a thin wall structure having a plurality of openings 69 comprising outlet openings for supplying ventilating air to selected panel units 11 in the sub-ceiling suspended from the support structure 14 or otherwise spaced from the wall 12 of the compartment.

For each outlet opening 69 a second collar member 70 is provided, the detailed structure of which is shown in Figures 2, 4 and 5. Each coller member 70 comprises a radially extending flange 71 and an axially extending flange 72. The axially extending flange 72 is generally cylindrical in configuration and the diameter thereof corresponds generally to the size of the opening 69.

In the flange 72 is provided a plurality of circumferentially spaced openings indicated generally at 73. A plurality of spring clip members 74 corresponding in number to the opening 73 are also provided. Each clip member

74 includes a first leg 76 overlying one side of the flange 72 and including a lug 77 received in the recess or opening 73.

Each clip member 74 further includes a second leg member 78 which overlies the opposite side of the flange 72 and which projects beyond the radial flange 71.

A radially outwardly offset lug 79 is provided on the second leg 78 and is preferably spaced from the radial flange 71 so as to clamp the edge portions of the duct 68 surrounding the opening 69 therebetween. A gasket 80 may be interposed between the radial flange 71 and the duct 68. The second leg 78 may also be offset as at 81 to improve the resilience of the spring clip member 74.

The second leg 78 of each spring clip member 74 is provided with an acutely inclined portion indicated at 82 which provides a sliding surface 83. When the clip members 74 are mounted on the flange 72, all of the sliding surfaces 83 will incline inwardly so that the collar may be attached to the duct merely by inserting the inclined portions 82 through the opening 69 whereupon the sliding portions 83 will engage the edges of the duct 68 around the opening 69 and will permit snap-in engagement of the collar member 70 with the duct 68.

A flexible sleeve 84 is attached to the flange 72 at one end, for example, as by cementing and to the flange 39 at the other end so as to provide a flexible conduit between the duct 68 and the panel unit 11. It will be noted from the drawings that the flexible sleeve 84 preferably takes the form of a serpentine tube having corrugated side walls capable of being flexed in both lateral and longitudinal direction. This is an advantageous provision as will be noted in referring to Figure 2, the opening 69 in the duct 68 of Figure 2 being shown as considerably mis-aligned with respect to the opening 28 in the cover member 26. The flexible sleeve 84 provides an air flow passage between the openings, thereby affording considerable tolerance in installation procedures.

Although minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A ventilating apparatus, comprising, a duct carrying pressurized air and having an outlet aperture in one wall thereof, a first collar having a flange around said outlet aperture, said flange having a plurality of circumferentially spaced openings, a spring clip for each opening having a first leg overlying one side of said flange and a lug formed in said first leg and received in a corresponding opening, said clip having a second leg overlying the other side of said flange and extending beyond said flange, said second leg forming a radially outwardly retainer portion for clip-on engagement with the edges of said opening in said one wall, an air distributor unit having an inlet aperture formed therein, a second collar forming a flange around said inlet aperture, said second collar and said air distributor unit having a plurality of circumferentially spaced openings and a corresponding plurality of struck-out lugs formed therein and operatively disposed therebetween for effecting turn-on engagement of said second collar with said air distributor unit at said edges of said inlet aperture, a flexible tubular sleeve receiving said collars at opposite ends thereof and in firm assembly therewith, bracket means bridging one of said collars and having adjustment nut means mounted thereon, a bolt threaded into said adjustment nut means and advanced axially with respect to the corresponding flange, and a valve plate on the end of said bolt to selectively adjust the effective size of the opening through the collar upon threadedly positioning the bolt and the nut means to admit controlled quantities of air from the duct into the air distributor unit.

2. In a room ventilating apparatus, an air distributing unit having an inlet opening therein, a collar for said opening having a valve therein, and a sleeve of flexible material having one end connected to said collar to carry air for diffused distribution through said air distributor unit, said sleeve having means at its other end to connect said sleeve to a source of ventilating air at higher pressure, said connecting means on said other end of said sleeve comprising a collar having a radial flange for abutting the adjoining edges of an opening from said source and an axial flange received in said sleeve, said axial flange having a plurality of circumferentially spaced openings, a spring clip for each opening having a first leg overlying one side of said axial flange and providing a lug received in a corresponding opening and a second leg overlying the other side of said axial flange and projecting beyond said radial flange, said second leg having a radially extending lug spaced from said radial flange to clamp the edges around a duct opening therebetween.



3. In a ventilating apparatus, a duct having a thin wall with an opening formed therein, and a collar on said wall having an upstanding flange for said wall at said opening, said collar having a radial flange connected to said wall at the edges of said opening, said upstanding flange having circumferentially spaced openings, and a clip for each opening having a first leg overlying one side of said flange and providing a lug seated in a corresponding opening, and having a second leg overlying the opposite side of said flange and projecting beyond said radial flange, said second leg having a lug spaced from said radial flange and clamping said wall edges therebetween.

4. In a ventilating apparatus as defined in claim 3, a serpentine flexible sleeve having one end connected to said collar and an air diffuser unit on the opposite end of said sleeve to diffuse air outwardly from said duct.

5. In a ventilating apparatus, duct means having a thin wall providing an opening, a collar on said wall providing an upstanding flange at said opening, a bracket member spanning said flange and comprising a band medially offset to provide a curved boss on one face of said band, said band having spaced apart openings adjacent the respective ends thereof on opposite sides of said curved boss and an elongated slot at said curved boss, a rod-form spring member abutting said one face of said bracket member and having offset end portions received in said openings and an offset medial portion received in said elongated slot, said offset medial portion being curved complementally to said boss portion and being inclined with respect thereto to form together therewith the thread of a nut means for receiving a threaded valve stem to selectively restrict the opening through the collar upon adjusting the stem in the collar.

6. In a ventilating apparatus, duct means having a thin wall providing an opening, a collar on said wall providing an upstanding flange at said opening, a bracket member spanning said flange and comprising a band medially offset to provide a curved boss on one face of said band, said band having spaced apart openings adjacent the respective ends thereof on opposite sides of said curved boss and an elongated slot at said curved boss, a rod-form spring member abutting said one face of said bracket member and having offset end portions received in said openings and an offset medial portion received in said elongated slot, said offset medial portion being curved complementally to said boss portion and being inclined with respect thereto to form together therewith the thread of a nut means, and a threaded valve stem in said nut means having a valve head thereon to selectively restrict the opening through the collar upon adjusting the stem in said nut means.

7. In a ventilating apparatus, a diffuser unit to distribute ventilating air having a thin wall providing an opening, and a collar to provide an upstanding flange for said wall at said opening, a bracket member bridging said upstanding flange of said collar, and a rod form spring member carried by said bracket member, both of said

members having medial portions bent outwardly and said rod form spring member being inclined to together form the thread of a nut, a bolt threaded into said thread and a valve on said bolt to selectively restrict the opening through said collar upon threadedly positioning said bolt in said members.

8. In combination with a wall or a ceiling of a space to be ventilated having an inner wall spaced interiorly of the wall or ceiling, a ventilating system comprising, a supply duct having an inlet adapted to receive a supply of ventilating air at increased pressure, said supply duct extending into the space behind said inner wall and having a plurality of separate spaced apart outlet apertures formed therein, a corresponding plurality of outlet units, a collar for each respective outlet aperture connected to said supply duct and having a flange around the corresponding outlet aperture, said flange having a plurality of circumferentially spaced openings formed therein, a spring clip for each opening having a first leg overlying one side of said flange and providing a lug received in a corresponding opening, said clip having a second leg overlying the other side of said flange and extending beyond said flange to provide a radially outwardly retainer portion for clip-on engagement with the edges of said outlet aperture, a flexible conduit connected at one end to said collar, a terminal air distributor at the free end of each said conduit having an outlet formed therein through which air is discharged, and mounting means connecting said air distributor to said inner wall, said air distributor together with said inner wall forming a finished surface for the interior of the space being ventilated.

9. In combination with a wall or a ceiling of a space to be ventilated having an inner wall spaced interiorly of the wall or ceiling, a ventilating system comprising, a supply duct having an inlet adapted to receive a supply of ventilating air at increased pressure, said supply duct extending into the space behind said inner wall and having a plurality of separate spaced apart outlet apertures formed therein, a corresponding plurality of outlet units, a first collar for each outlet aperture mounted on said supply duct and having a flange around each corresponding outlet aperture, said flange having a plurality of circumferentially spaced openings formed therein, a spring clip for each opening having a first leg overlying one side of said flange, said first leg forming a lug received in a corresponding opening, said clip having a second leg overlying the other side of said flange and extending beyond said flange, said second leg forming a radially outwardly extending retainer portion for clip-on engagement with the edges of said outlet aperture, a flexible conduit connected at one end to said collar, a terminal air distributor at the free end of said conduit providing an outlet through which air is discharged, a second collar having a plurality of circumferentially spaced openings formed therein, said air distributor having a corresponding plurality of struck-out lugs received in said openings for effecting turn-on engagement of said collar with said air distributor at the edges of said inlet aperture, the other end of said flexible conduit being connected to said second collar, and mounting means connecting said air distributor to said inner wall, said air distributor together with said inner wall forming a finished surface for the interior of the space being ventilated.

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