March 16, 1971 J. V. FELTER 3,570,220

COMBINED ACCESS DOOR AND FILTER HOLDER

Filed April 2, 1969 2 Sheets-Sheet 1

Fig. 1

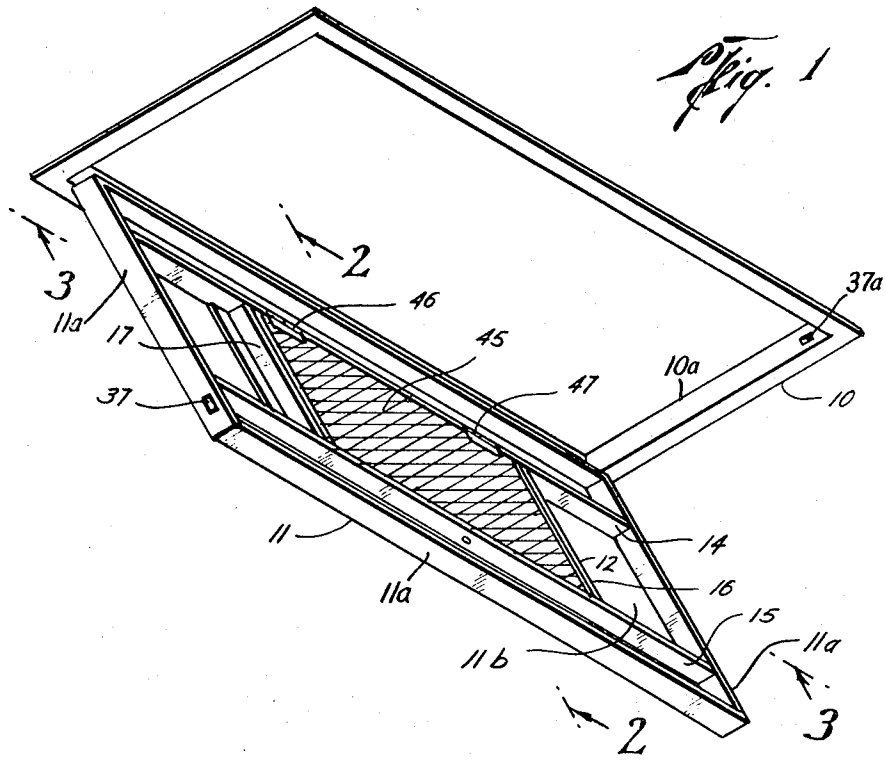


Fig. 2

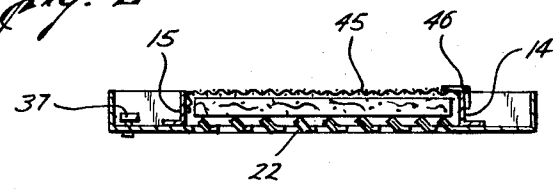
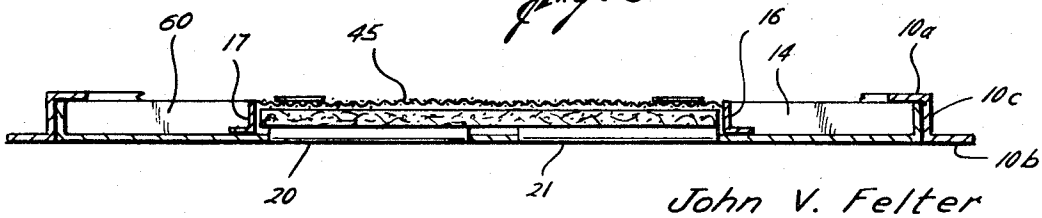


Fig. 3



John V. Felter
INVENTOR.

BY Carl B. Fox, Jr.

ATTORNEY

March 16, 1971 J. V. FELTER 3,570,220

COMBINED ACCESS DOOR AND FILTER HOLDER

Filed April 2, 1969 2 Sheets-Sheet 2

Fig. 4

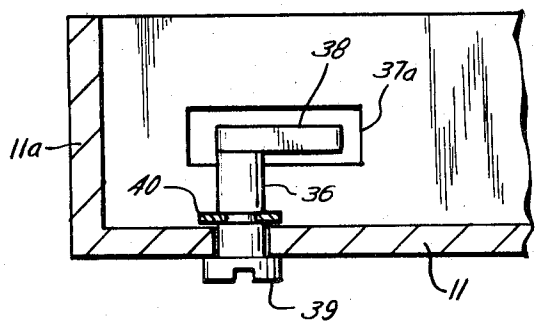


Fig. 5

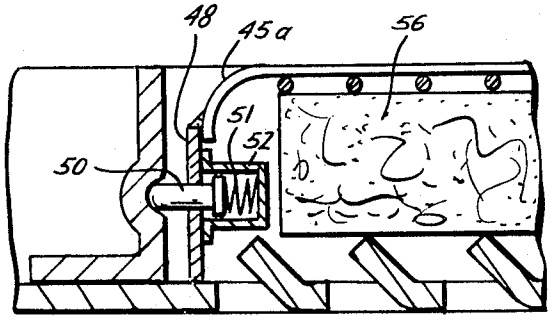


Fig. 6

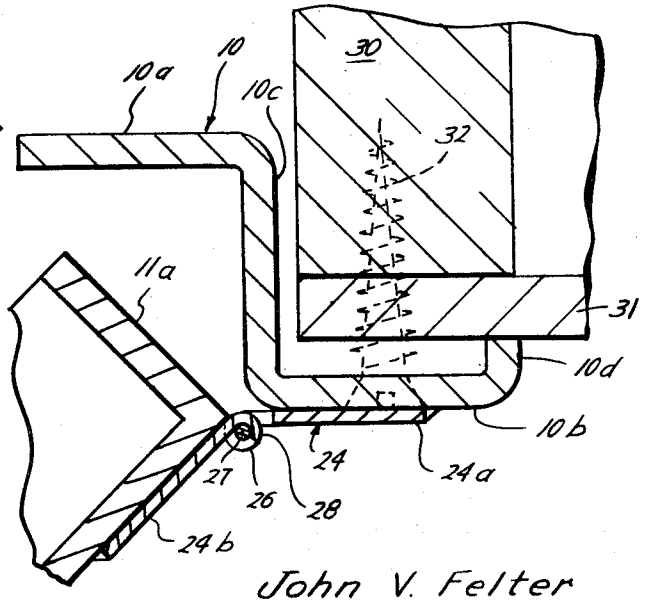
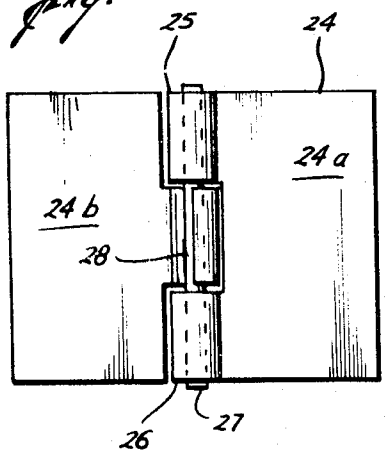


Fig. 7



John V. Felter
INVENTOR.

BY Carl B. Fox, Jr.

ATTORNEY

United States Patent Office 3,570,220 Patented Mar. 16, 1971

3,570,220

COMBINED ACCESS DOOR AND FILTER HOLDER

John V. Felter, P.O. Box 7464, Houston, Tex. 77008

Filed Apr. 2, 1969, Ser. No. 812,655
Int. Cl. B01d 46/00
U.S. Cl. 55—385 5 Claims

ABSTRACT OF THE DISCLOSURE

Combined access door and filter holder wherein the filter holder opens inwardly of the access door, adapted for use of inexpensive filter media supplied in flat sheets or rolls, which is cut to size for placement in the filter holder which holds the filter media in adequately supported condition.

In condenser-blower installations of so-called central air conditioning and heating systems, particularly of the type for installation above the ceiling of a room, considerable ceiling area is required to provide adequate return air intake for recirculation through the system. The return air must pass through a fine-mesh filter for dust removal, so that the intake area is relatively large in order to provide for adequate flow of air, especially since the filter will in most cases not always be maintained in clean condition. Provision of an acess door through the ceiling to the equipment mounted above the ceiling is desirable but frequently not done, since the access door would have to be located to one side of the intake, to be unsightly, would not lead directly to the equipment, and would occupy excessive ceiling area in some cases. In addition, the access door is a separate item in addition to the filter intake, thereby adding to the overall cost.

According to this invention, an access door is provided immediately beneath the overhead equipment, so that ready access thereto is provided. The access door is easily completely removable if desired, to be out of the way during work on the overhead equipment. The access door has combined therewith a return air intake, with a filter receiver disposed on the upper, inner, side of the access door panel. Access for replacement of the filter is accomplished by opening of the access door. The lower, or outer, side of the access door is of smooth, decorative, appearance, having only recessed louvers to show the presence of the return air intake.

A principal object of the invention is to provide a combined access door and a filtered return air intake in an integral unit. Another object of the invention is to provide such apparatus wherein the air intake includes a filter holder at the inner side of the access door, easily accessible by opening of the access door, and adapted for use of roll-type filter media. A further object of the invention is to provide such apparatus which is fully sound-insulated, and wherein the access door may be completely removed for unhampered access therethrough. An additional object of the invention is to provide such apparatus wherein the air-intake access door may be removed and replaced by a solid access door having no air intake therethrough.

Other objects and advantages of the invention will appear from the description of preferred embodiments thereof, and from the accompanying drawings showing the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, taken from beneath an access door of preferred form, positioned as installed in a ceiling.

FIGS. 2 and 3 are perspective views taken along lines 2—2 and 3—3, respectively, of FIG. 1.

FIGS. 4–6 are enlarged partial cross sectional views showing, respectively, an access door lock, the filter holder latch, and the frame and hinge mounting of the access door.

FIG. 7 is a view of the face of a hinge of the type used for mounting the access door.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1 of the drawings, the apparatus shown therein in preferred form includes a rectangular frame **10** from which is hinged a door **11**, provided for access through the frame **10** when open. A filter holder **12** is mounted at the inner side of door **11**. The frame **10** is mounted about an opening through a ceiling, or other horizontal, vertical, or angular wall.

The frame **10** is of angular cross section, as shown in FIGS. 3 and 6, having an inturned inner portion **10***a*, an outturned outer portion **10***b*, and a connecting portion **10***c* perpendicular to the inner and outer portions of the frame. The outer edge of frame portion **10***b* is inturned at its outer end at **10***d*, as is best shown in FIG. 6.

Referring to FIG. 2, a pair of angles **14**, **15** are disposed spacedly and parallelly along the length of door **11**, each spaced inwardly from one of the longer door sides. A pair of angles **16**, **17** extend between angles **14**, **15** as shown. The rectangle defined by angles **14**, **15**, **16**, and **17** forms a receptacle closed at its sides for reception of a filter mat. A surrounding inturned flange **11***a* surrounds the four edges of door **11**, and the angles **14**, **15** are tack welded thereto and to the plate portion **11***b* of the door.

Two rows **20**, **21** of inturned spaced parallel louvers **22** are provided through plate **11***b* within the filter medium receiving area.

Referring to FIGS. 6 and 7, the door is connected by two or more breakaway hinges **24** each having a pair of hinge plates **24***a*, **24***b*. Plate **24***a* has circularly bent portions **25**, **26** bent about a hinge pin **27**. Plate **24***b* has a curved portion **28** bent partway about pin **27**. This arrangement enables portion **28** to be lifted off of pin **27** when the door is moved downwardly to open condition, so that the entire door **11** may be removed from frame **11** whenever desired. Plate **24***a* is tacked welded or otherwise affixed to portions **10***b* of frame **10**, while plate **24***b* is tacked welded or otherwise affixed to the face of door **11** adjacent its edge, as is shown in FIG. 6.

Still referring to FIG. 6, a structural building element **30**, depicted as a member of two-by-four lumber, is covered by a layer of sheetrock or other facing material **31**. A plurality of screws **32** are disposed through suitable spaced perforations about the rectangular length of portion **10***b* of the frame and engaged into the building member **30** to secure the frame in place.

Referring to FIGS. 1 and 4, the door is held in closed condition by a pair of identical twist locks **36**, one being at each side of the door adjacent the lowered door edge when the door is open. Inturned edge **11***a* of the door has a slot perforation **37** at each of these locations, and the frame **10** is provided with a similar perforation in register therewith when the door is closed. A sideways extending bar **38** is affixed at the inner end of the shank of the twist lock, and the twist lock has a slotted head **39**. A snap ring **40** in a suitable groove about the shank of the twist lock holds the lock in place. When the lock is twisted counterclockwise, as shown in FIG. 4, the sideways extending bar **38** extends through the slot **37** and through the corresponding slot **37***a* of frame member **10**, thereby holding the door against opening. To open the door, it is simply necessary to insert the tip of a screw driver into the head slot of each twist lock, turn the twist lock 90°, whereupon the door may be opened. Reverse

movement of the twist locks engages the lock and holds the door in closed condition.

A wire mesh door 45 is connected by hinges 46, 47 to angle 14. The mesh door may be opened and closed by raising its front end. At the front end of the mesh door, the mesh wires 45*a* are tack welded to a cross plate 48 which extends completely across the front of the mesh door. Centrally of the length of plate 48, there is provided a detent latch having an extending detent 50 held outwardly by a helical compression spring 51 mounted within a housing 52 which is secured to plate 48 about a suitable detent opening. The rounded outer end of the detent is engageable within a depression 52 provided in the upstanding portion of angle 15. When the mesh door is closed, the detent 50 engages in depression 52 to hold the mesh door in closed condition. Lifting of the mesh door with sufficient force will depress the detent and enable the door to be opened.

A mat 56 of filter material, usually consisting of metal, vegetable or other fibers closely packed randomly together, is cut to size and placed within the rectangular described by angle elements 14–17. The mesh door is opened during insertion of the filter mat, and closed to hold the filter mat in place within the filter holder. The mat is disposed over the inner sides of the louvers 22, to filter dust and other solid materials from air passing inwardly through the louvers.

The interior of the door, around the filtration area, may be filled with Styrofoam insulation 60.

An auxiliary access door may be provided, omitting the louvers 22 and the wire mesh door 45. This form of door is not shown in the drawings, as it is of the same form and construction as door 11, except for the omissions as indicated. In case the door is to be used, or is to be changed to be used, only for access to the above-ceiling equipment, then the door 11 is removed at breakaway hinges 24, and replaced by the auxiliary door, thereby providing no air passage past the door.

The access and air vent doors hereby provided include a number of advantages not provided by other equipment known in the art. Complete door removal is provided by the breakaway hinges, for maintenance, for changing or cleaning of the filter mat, for interchanging an auxiliary door without air vent louvers for the lowered door, and the like. The access door area is larger than the air filtration area, so that the access door may be large enough for all work-through operations, even for complete removal and/or replacement of the large above-ceiling equipment. The snap-lock, or detent-lock, filter holder is readily accessible and the filter media is easily replaced, cut-to-size, or cleaned, and yet the filter media is adequately held in place during use. The use of bulk, or unfitted, filter media in sheet or roll form is economical yet effective. The provision of insulation of the access door insures quiet operation of the heating-air conditioning system, and reduces loss of heating or cooling effect of the unit. No special tools are required to release or to lock the access door, or to change or clean the air filter. The lowered door presents a smooth, flush, outer surface, with no protruding elements.

While a preferred embodiment of the invention has been shown in the drawings and described, many modifications thereof may be made by a person skilled in the art without departing from the spirit of the invention, and it is intended to protect by Letters Patent all forms of the invention falling within the scope of the following claims.

I claim:

1. Access door and filter apparatus, comprising first frame means defining an aperture for mounting about a wall opening, door means adapted to close said aperture, and including hinge means pivotally connecting one side of said door means to one side of said first frame means, air openings through said door means over a partial area thereof, second frame means fixed to the interior side of said door means surrounding said air opening area, perforate door means hingedly connected to one side of said second frame means and movable to a closed position spacedly covering said air opening area, an air filter mat disposed within said second frame means and between said air opening area and said perforate door means to cover said air openings and filter air passing therethrough, force-openable latch means holding said perforate door means in said closed position, releasable latch means for holding said door means in a closed position surrounded by said first frame means, whereby filtered air passage through said door means is provided, whereby access through said first frame means is provided, and whereby access to said air filter mat is obtained by opening both of said door means and said perforate door means.

2. The combination of claim 1, wherein said force-openable latch means comprises spring-biased detent means projecting from the edge of said perforate door means opposite the hinge mounting of said perforate door means and recess means in said second frame means into which said detent means may be releasably engaged.

3. The combination of claim 2, said door means having surrounding flange means around its edges depending from the interior side of said door means.

4. The combination of claim 3, said releasable latch means comprising exteriorly screw-slotted twist latch means mounted through said door means having arcuately pivotably movable side projection means at the interior side of said door means and slot means through said flange means and first frame means through which said side projection may be pivoted to latch said door means in closed position.

5. The combination of claim 4, said air filtration mat being an unbound mat cut to size to be bounded by said second frame means.

References Cited

UNITED STATES PATENTS

1,862,659	6/1932	Christofferson	55—493
2,144,106	1/1939	Edwards et al.	49—161
2,575,499	11/1957	Manow	55—493
3,222,848	12/1965	Koble, Jr.	55—493
3,252,580	5/1966	Getzin	55—503
3,383,841	5/1968	Olson et al.	55—481
3,427,747	2/1969	Ober, Sr.	49—162

FOREIGN PATENTS

1,185,001	2/1959	France	55—FF

FRANK W. LUTTER, Primary Examiner

B. NOZICK, Assistant Examiner

U.S. Cl. X.R.

55—493, 527