July 9, 1968 C. A. KIRBY 3,391,723

FOLDING DOOR ASSEMBLY AND MOUNTING UNITS THEREFOR

Filed June 21, 1966 2 Sheets-Sheet 1

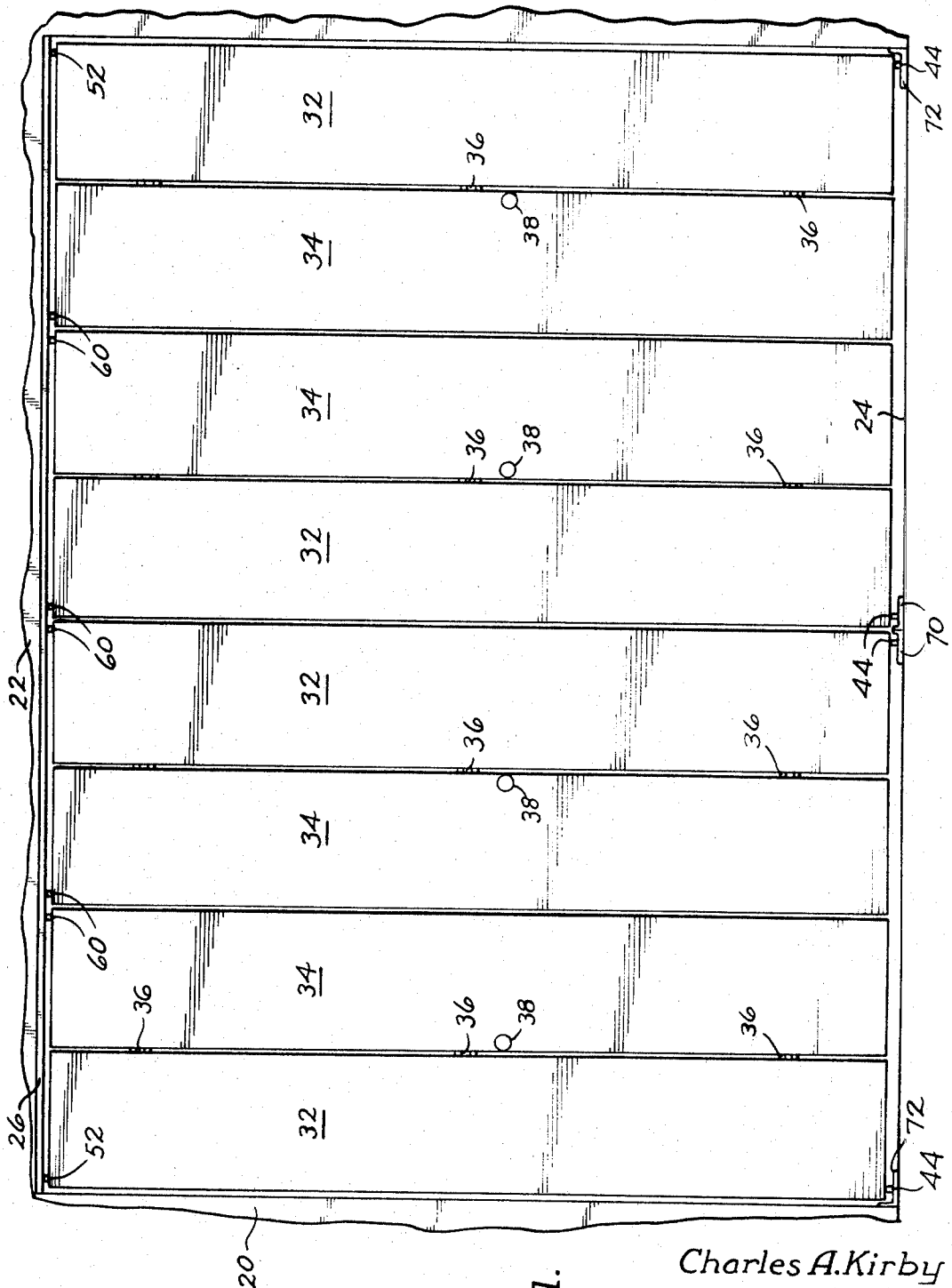


Fig. 1.

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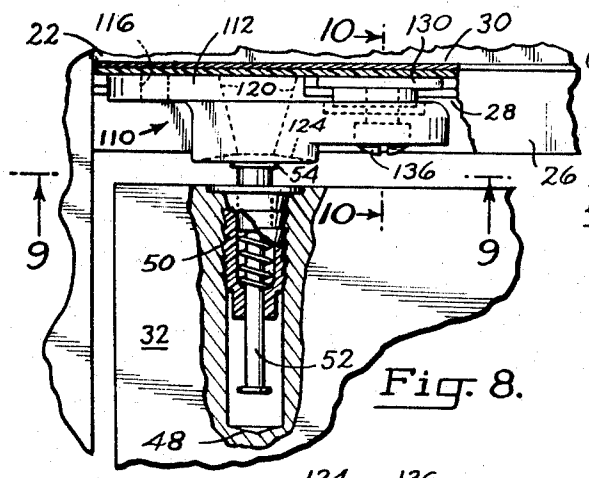


Fig. 8.

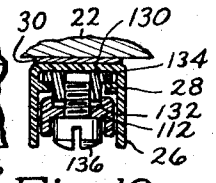


Fig. 10.

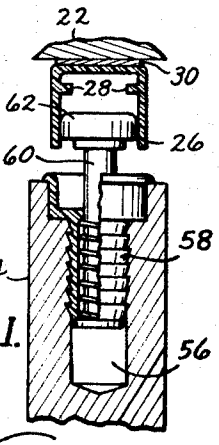


Fig. 11.

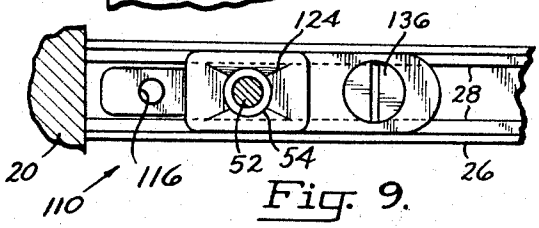


Fig. 9.

Fig. 6.

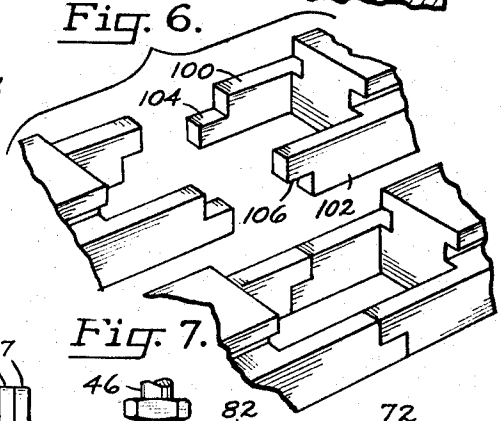


Fig. 7.

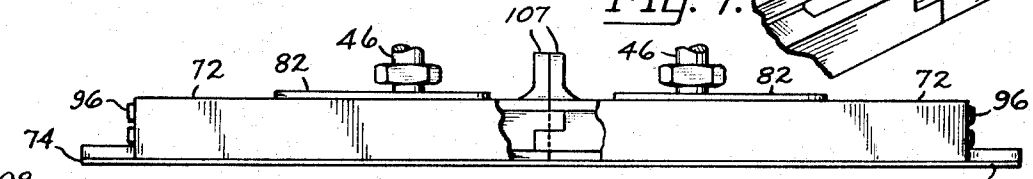


Fig. 5.

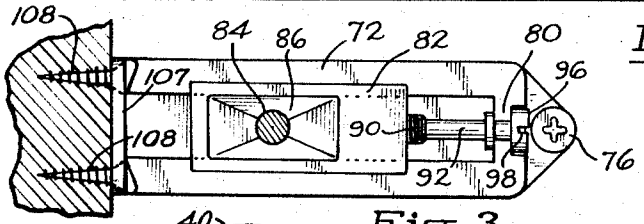


Fig. 3.

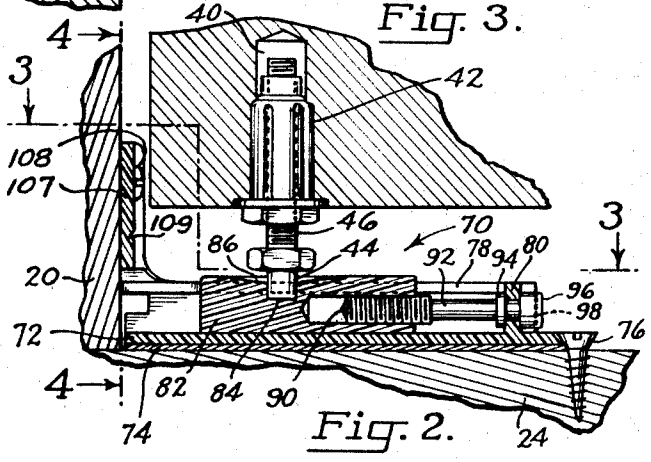


Fig. 2.

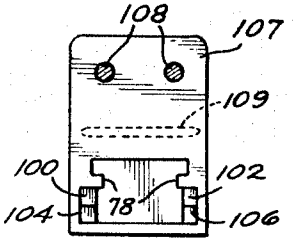


Fig. 4.

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FOLDING DOOR ASSEMBLY AND MOUNTING UNITS THEREFOR

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2 Claims. (Cl. 160—206)

ABSTRACT OF THE DISCLOSURE

A lower mounting unit for supporting the inner panel of a folding door includes a support block adjustable relative to a guideway and having a pair of spaced arms oppositely notched top and bottom. The guideway is open at its inner end to allow extension of the arms so that a pair of said units may be placed back to back with the arm notches overlapping each other.

This invention relates to folding door assemblies of the class comprising two or more vertically arranged panels hinged together and pivotally supported in the doorway, and to mounting units therefor.

Broadly, the present invention provides, for a folding door assembly, an adjustable lower mounting unit which may be employed in pairs, arranged back to back, for pivotally supporting adjacent inner door panels spanning doorways of substantial width.

It is the general object of this invention to provide a folding door assembly which may be spaced easily and accurately from the supporting framework to insure proper operation; which may be installed in edgewise aligned relation with a similar assembly in spanning doorways of large area; which is fast and easy to install; which is adjustable both in horizontal and vertical directions without demounting, initially and during use; which operates smoothly, easily and quietly; which is removable from the doorway at will, either partially or entirely at any time and without disassembly; and which may be installed with a minimum of difficulty by the do-it-yourself home owner.

In the drawings:

FIG. 1 is a view in elevation of a doorway of large area having two of the herein described folding door assemblies mounted therein in edge to edge aligned relation;

FIG. 2 is a vertical, sectional view of the stationary lower pivotal mounting unit for the folding door assembly;

FIGS. 3 and 4 are detail, transverse sectional views taken along lines 3—3 and 4—4, respectively of FIG. 2 and further illustrating the lower mounting unit;

FIG. 5 is a fragmentary detail view in side elevation, partly broken away, showing the manner in which the lower mounting units may be arranged back to back in the installation of dual folding door assemblies in doorways of large area, as in the doorway of FIG. 1;

FIGS. 6 and 7 are detail views in perspective further illustrating the manner of employing the lower mounting units back to back in the manner of FIGS. 1 and 5;

FIG. 8 is a view in elevation, partly in section, of the stationary upper pivotal mounting unit of the herein described folding door assembly, partly in section to show the interior construction;

FIGS. 9 and 10 are detail transverse sectional views taken along lines 9—9 and 10—10, respectively of FIG. 8; and

FIG. 11 is a view in elevation, partly in section, of the upper traveling mounting unit of the herein described folding door assembly.

The folding door assembly

The folding door assembly of my invention is adapted to be mounted in a doorway defined by side jambs **20**, a head piece **22** and a floor **24**. A track **26** is fastened to the head piece longitudinally thereof.

Track **26** comprises a channel-shaped member having parallel, coplanar ribs **28** extending inwardly from its opposite side walls. It is fastened to the head piece by suitable means, as by means of adhesive tape **30**.

Flanges **28** of track **26** do not support the door, but shield the guiding assembly thereof. In addition they provide surfaces to which the upper stationary mounting assemblies of the door may be clamped in a desired location, as will appear hereinafter.

The door itself comprises a plurality of vertically arranged panels there being two such panels in the presently described embodiment, an inner panel **32** and an outer panel **34**. The two panels are hinged together in folding door relation by means of hinges **36**. A knob **38** is provided in the usual manner for opening the door.

Inner panel **32**, i.e. the panel next to jamb **20** is provided with a lower recess **40** opening into its lower inner edge. A lower pivot pin assembly **42** of substantially conventional construction is pressed into the recess. The pivot pin **44** of the assembly is mounted adjustably in a vertical plane by means of a nut-operated threaded section **46**.

The inner door panel **32** also is provided with a recess **48** in its upper inner edge. An upper pivot pin assembly indicated at **50** is pressed into this recess. It is of substantially conventional construction and includes a spring pressed pivot pin **52**, the outer end of which is provided with an annular bearing plate **54**.

The upper outer edge of outer door panel **34** is provided with a recess **56** into which is pressed a traveling mounting unit which also is of known construction. It comprises a stepped case **58** pressed into recess **56** and receiving for slidable longitudinal movement a spring-pressed plunger **60** which is freely rotatable and which mounts a wheel-shaped head **62**. The latter is received in channel-shaped track **26** and slides therein in the manner illustrated in FIG. 11, guiding the door panels as they are opened and closed.

Pivot pins **44**, **52** carried by the inner panel are substantially aligned and extend outwardly in diametrically opposite directions into stationary mounting units having socket means in which they are received. It is these two units which are of primary interest in connection with the present invention, and whose construction and mode of operation is described below.

The stationary lower mounting unit

The stationary lower mounting units is indicated generally at **70**. It is illustrated particularly in FIGS. 2–7 inclusive.

As shown in FIG. 2, the lower stationary mounting unit includes a guideway **72** mounted longitudinally beneath the lower inner corner of inner door panel **32**, in the plane of the panel. It is fastened to floor **24** by suitable means, such as adhesive strip **74** and stop screw **76**. The upper longitudinal edges of the guideway bear inwardly directed flanges **78**. The outer end of the guideway is provided with a slotted partition **80**.

A support block **82** slidably is mounted in guideway **72**. Its upper outside edges are provided with grooves which slidably receive inwardly directed guideway flanges **78**. Its upper surface is provided with a socket **84** dimensioned to receive the end of pivot pin **44**.

It is to be noted that socket **84** is relatively shallow with respect to the pivot pin. This insures that the end face of the pivot pin will bear directly against the socket bottom, a desirable feature since it has been discovered

that such an arrangement decreases wear and makes the pivotal action more positive.

A shallow, inwardly-tapered guiding recess **86** communicates with socket **84**. This guides pivot pin **44** in the direction of the socket and makes easier the location of the pivot pin in the socket during installation of the door.

The position of support block **82**, and hence of the lower inner edge of the door which it mounts, is adjusted by means of an adjustment screw **90** threaded longitudinally into the outer end of the support block.

Screw **90** is provided with a stem **92** terminating in a flange **94** and a spaced head **96**. The space between flange **94** and head **96** forms a bearing recess dimensioned to receive the walls of slotted partition **80** in which the stem of the screw works.

An adjustment slot **98** is provided in the face of head **96**. This is dimensioned to receive a screw driver, by means of which the screw may be adjusted.

The pitch of the threads on screw **90** purposely is shallow, so that the screw will not work in the support block, changing the setting with the passage of time and with operation of the door. This eliminates the necessity of providing a set screw or other means for anchoring the adjustment screw in place.

One or more spacing arms **100**, **102** project inwardly from the inner end of support block **82**. These have for their function spacing the support block a predetermined and proper distance from door jamb **20**, insuring proper clearance of the inner edge of door panel **32** as it pivots about pivot pin **44**.

The arms also serve the function of locating properly two of the stationary lower mounting units **70** back to back in a tandem application across a large doorway, as illustrated in FIG. 1. For such application the arms are provided with opposite top and bottom notches **104**, **106** respectively. The arms thus overlap in the manner illustrated in FIGS. 6 and 7 when the mounting units are placed in tandem relation to each other. Notching the two arms oppositely makes a single mounting unit universal in its application, since it has no left or right.

When the spacing arms are overlapped, support blocks **82** on both are in precisely the optimum position for pivoting of the respective door assemblies. When the doors are closed, the adjacent edges of each pair are properly spaced for good appearance. When the doors are opened, sufficient clearance is afforded to insure that they will not interfere with each other, but will operate smoothly and efficiently.

A flange **107** extends upwardly from guideway **72**. It serves two functions. First it abuts jamb **20** and provides supplemental means for anchoring the mounting unit in place, through the agency of screws **108**. Secondly, it serves as an abutment surface when two of the units are used in tandem, back to back as shown particularly in FIG. 2. In the latter application, the upper ends of the flanges may be parted along line **109** to eliminate a projection which normally would separate the two abutting door panels, causing an unsightly gap.

Stationary upper mounting unit

The stationary unit for mounting the upper end of inner panel **32** is indicated generally at **110** and illustrated particularly in FIGS. 8–10 inclusive.

The stationary upper mounting unit includes a base **112** dimensioned to be received within channel shaped guideway **26**.

Base **112** is provided with a screw hole **116** and with a socket **120** which is dimensioned to receive the outer end of spring-pressed pivot pin **52**. A shallow depression **124** on the outer face of the base communicates with socket **120**. It assists in guiding pivot pin **52** into the socket, with flange **54** on the pin in bearing engagement with the face of the base.

Socket **120** has a pronounced flare in the inward direction. This makes it easier to enter the end of the pivot pin into the socket initially when the door is being installed, since it eliminates the necessity of precise alignment.

Clamp means are provided for clamping the mounting unit on track **26** in any desired position of longitudinal adjustment.

To this end there is provided a clamp member **130** which seats in a recess **132** in the upper face of base **112**. The clamp member is provided with a flange **134** which overlies ribs **28** on the track. A screw **136** penetrates base **112** and is threaded into clamp member **130**.

Accordingly, with screw **136** released, the upper mounting unit may be moved along track **26** to the desired position of adjustment. It then may be clamped in place by tightening down on screw **136**. This accomplishes a releasable locking which permits readjustment of the unit from time to time if required. However, if more permanent locking is desired, a screw may be inserted through opening **116** in the base and into the head piece.

Operation

The manner of installation and operation of the doors are as follows:

First a line is drawn along the head piece to mark the desired track position. The track adhesively is secured along the line. The lower stationary mounting unit is positioned on the floor directly under the track with flange **107** pressed against the jamb. It is secured in place by means of adhesive strip **74** and stop screw **76**.

Next, the door is hung by holding its outside edges, locating the socket in the upper stationary mounting unit, and inserting the pivot pin into it. The door then is pressed upwardly, depressing upper pivot pin **52**. Lower pivot pin **44** is set in socket **84** in the lower mounting unit. All of this is accomplished without the insertion of wheel **62** into the track.

Next the mounting units are adjusted to square the door in the frame. The elevation of the door is adjusted by turning pivot pin **44** using a suitable wrench. The angular position of the lower edge of the door with reference to the jamb is adjusted by turning screw **90** with a screw driver. Arms **100**, **102** abutting against the jamb, normally position the door for proper clearance as it swings.

The upper mounting unit **110** is adjusted by releasing screw **136** and sliding the unit along track **26** to the desired location. Screw **136** then is advanced, clamping clamp member **130** against track flanges **28**.

To complete the operation, wheel **62** of the outer traveling mounting unit is depressed and placed in its FIG. 11 position within track **26**.

Where it is desired to span a large doorway with multiple door units, lower mounting units **70** are installed back to back in the doorway in the manner illustrated in FIGS. 5, 6, and 7, in tandem relation. Notched arms **100**, **102** then space the doors for proper clearance with each other as they swing in the opening.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a folding door assembly for mounting in a doorway defined by a head piece, a side jamb, and a floor, the assembly including a track fastened longitudinally to the head piece, an inner door panel having diametrically opposite upper and lower pivot pins extending outwardly from its upper and lower inner edges, an outer door panel hinged vertically to the outer edge of the inner door panel in folding relation thereto, a stationary lower mounting unit on the floor adjacent the jamb and pivotally receiving the lower pivot pin, a stationary upper mounting unit on

the head piece adjacent the jamb and pivotally receiving the upper pivot pin, and a traveling mounting unit on the upper outer edge of the outer panel, dimensioned for and slidably received in the track, a stationary lower mounting unit comprising:

(a) a guideway extending longitudinally of the unit in the plane of the inner door panel,

(b) a support block mounted for sliding movement in the guideway,

(c) socket means in the upper surface of the block dimensioned to and receiving the lower pivot pin,

(d) screw means rotatably mounted on the guideway and threaded longitudinally into the block for securing longitudinal adjustment thereof, and

(e) two horizontally spaced spacing arms attached to the block and extending inwardly therefrom parallel to each other and oppositely notched top and bottom for overlapped reception in a companion mounting unit when two mounting units used in conjunction with each other, back to back, the spacing arms having a length predetermined when abutting a door jamb or when overlapped with another mounting unit, to locate the socket means in a working position wherein the inner edge of the inner panel properly clears the door jamb or the adjacent inner door panel during pivotal motion of the panel,

(f) the guideway being open at its inner end for passage of the arms therethrough selectively for abutment against a door jamb and for overlapping of the notched ends of the arms of a pair of said units.

2. The stationary lower mounting unit of claim 1 including an upstanding flange on the inner end of the guideway adapted to abut a door jamb, the flange having a transverse parting groove adjacent its lower end for facilitating removal of the upper portion thereof normally extending above the lower edge of a door panel when a pair of the units are to be arranged back to back.

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