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McFERRELL HOLLANSWORTH

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ADJUSTABLE RETAINER FOR FOLDING DOOR PIVOT PIN

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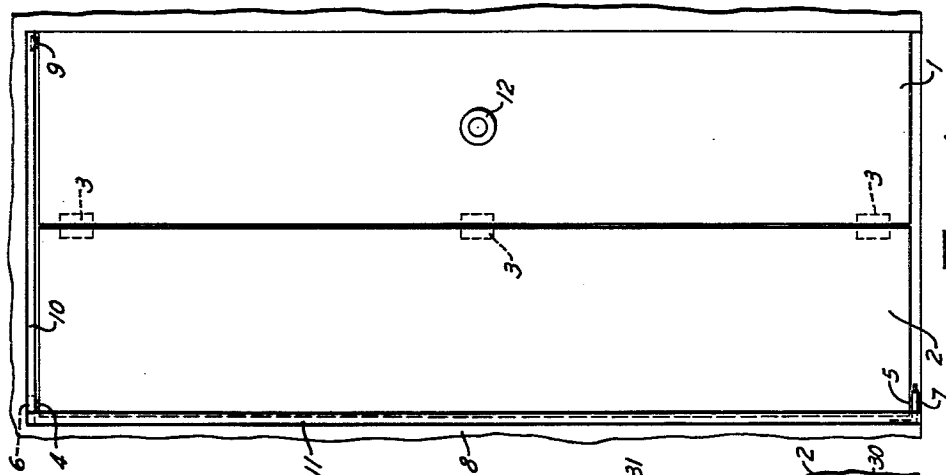


Fig. 1

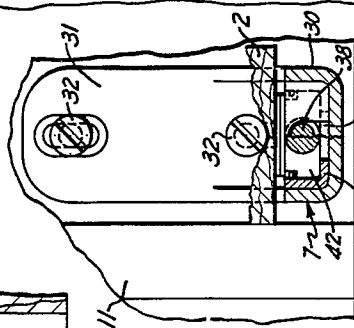


Fig. 4

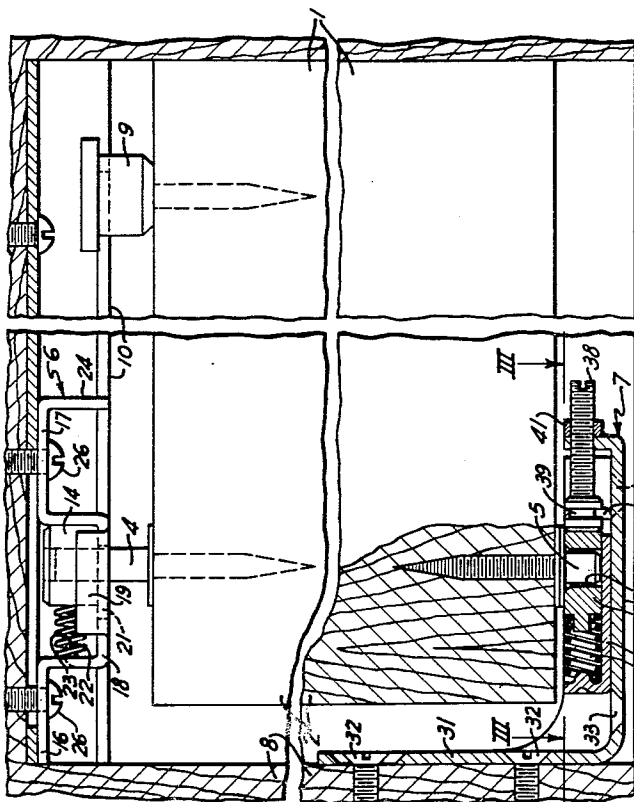


Fig. 2

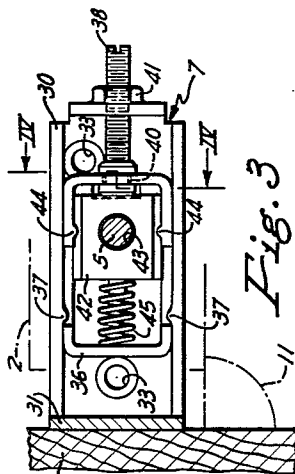


Fig. 3

INVENTOR.

McFERRELL HOLLANSWORTH
BY

Brown, Critchlow, Fitch & Richman
His Attorneys

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ADJUSTABLE RETAINER FOR FOLDING DOOR PIVOT PIN

McFerrell Hollansworth, Pittsburgh, Pa., assignor to McKinney Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

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5 Claims. (Cl. 16—151)

This invention relates to folding doors, and more particularly to the members that receive the pivots of such doors.

In my copending application, Serial No. 696,367, filed November 14, 1957, and now Patent No. 2,882,962, means are disclosed which permit the pivot pins of a folding door to move laterally toward and away from the adjacent door jamb as the door is opened and closed. When a folding door is made from stiff panels that are hinged together on a vertical axis, the width of the door increases slightly when it first starts to open, due to a lining up of the diagonal dimensions of the panels as they are inclined relative to one another. To allow for this momentary increase in width, it has been the practice to leave clearance between the free edge of the closed door and the adjacent door jamb. In my copending application, such clearance is unnecessary because the pivot pins of the door are mounted in bearings that can move toward the adjacent jamb when the door starts to open. Thereafter, coil springs push the bearings back to their original positions. The present invention is an improvement over the one shown in my copending application, because it permits the pivots of a folding door to be vertically aligned, even through one of the pivot retainers is secured to a door jamb that is not plumb.

It is therefore among the objects of this invention to provide a folding door, in which the pivoted edge can be moved toward and away from the adjacent door jamb during opening and closing of the door, in which one of the pivot pin retainers can be attached to the jamb, and in which the bearings in the upper and lower retainers can be vertically aligned even though the jamb is inclined slightly.

In accordance with this invention a bracket is provided with an elongated horizontal body having an outer end adapted to be fastened to a door jamb. The body is provided with a longitudinal recess, in which is slidably mounted a bearing housing that also is provided with a longitudinal recess. The housing is engaged by manually operable means, by which it can be adjusted lengthwise of the bracket. A bearing is slidably mounted in the housing recess and is provided with a vertical hole for receiving a pivot pin of a folding door. The bearing is urged toward the inner end of the housing by means of a spring. Although the bracket can be mounted for retaining either the upper or the lower pin, it will be described herein for convenience as retaining the lower pin. However, neither the specification nor the claims are to be construed as limited to a bottom retainer. The bracket and bearing housing are open above the bearing hole in all of the positions to which the hole can be adjusted. Consequently, the bearing can move back and forth in its housing as the door opens and closes, and the housing can be adjusted in the bracket to compensate for a door jamb that is not strictly vertical.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a front view of a closed folding door;

FIG. 2 is an enlarged fragmentary view, partly in vertical section, of the door construction of FIG. 1;

FIG. 3 is a horizontal section taken on the line III—III of FIG. 2; and

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FIG. 4 is an enlarged cross section taken on the line IV—IV of FIG. 3.

Referring to FIG. 1 of the drawings, a door is shown formed from a plurality, preferably two, rigid panels 1 and 2. The panels are rather thick, in the neighborhood of an inch for example. Their adjacent edges are hinged together by any suitable form of hinges 3 secured to the back of the panels. Screwed into the top and bottom of one panel near its outer edge are upwardly and downwardly extending pivot pins 4 and 5 that project into retainers 6 and 7, respectively, secured to the door frame 8. The opposite or free edge of the door has an upwardly extending guide member 9 that is slidable back and forth in a horizontal track 10 secured to the top of the doorway along the top of the closed door. While the door is closed, its free edge engages or nearly touches the adjoining side or jamb of the doorway. Its opposite or pivoted edge, however, is spaced a short distance from the adjacent door jamb for a purpose that will be explained presently. This space between the door and jamb may be concealed by a molding strip 11 secured to the jamb. When the door is opened by pulling on a knob 12 or the like, or by pushing on its opposite side, the guide member will move along the track and compel the door to fold.

Just as the door starts to fold, it increases in width for a moment, but its pivoted edge can move towards the adjacent side of the doorway to allow this temporary increase in width to take place. For this purpose, the pivot pins 4 and 5 on which the door turns are mounted in bearings that can move toward and away from the adjacent door jamb. Thus, as shown in FIG. 2, the upper pivot pin projects up into a bearing 14 that is slidably mounted in a sheet metal bracket. This bracket may take various forms, the one shown being made of a metal strip that is bent to provide it with two upper horizontal portions 16 and 17 connected by a depending U-shaped portion 18 that forms a recess between them. The opposite sides of the bottom wall of the recess are turned up to provide short ribs 19 that prevent the pin bearing 14, which is disposed in the recess, from sliding out sideways. The bottom wall of the recess also has a slot 21 that extends lengthwise of the bracket. The upper pivot pin 4 projects up through this slot and into the bearing, which is urged away from the adjacent side of the doorway by a coil spring 22 compressed between the bearing and the outer end of the recess, where the spring can encircle a lug 23 bent out of the bracket. From the front end of the horizontal portion 17 of the bracket there is a downturned end portion 24 that serves as a stop for the guide member 9.

The bracket is secured in place by wood screws 26 screwed into the doorway above it, with its outer end engaging the door jamb. The bracket is concealed inside of track 10, which is an inverted channel shape member. The bracket screws extend up through the top of the track and help hold it in place. The lower edges of the side flanges of the track are turned inward toward each other to form horizontal supports for the guide member 9 that is slidable lengthwise of the track.

The door is supported by the retainer 7 for the lower pivot pin. This retainer includes a sheet metal bracket that has a bottom and upwardly extending parallel side flanges forming an elongated horizontal body 30. Extending upward from the outer end of the body is an extension strip 31, through which extend screws 32 that fasten the bracket to the door jamb. The bracket can be mounted high enough on the jamb to permit a carpet or rug to extend beneath the bracket and up against the jamb. On the other hand, if it is desired to fasten the bracket to the floor, that can be done by screws extending down through holes 33 in the bottom of the bracket.

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The space between the flanges of the bracket body forms a longitudinal recess, in which a bearing housing 36 is slidably mounted. This housing is in the general form of an open top rectangular box, which is shorter than the bracket so that it can be moved back and forth therein. As shown in FIG. 3, the housing is prevented from separating from the bracket by inwardly deformed punch marks 37 at the top of the bracket flanges. The bearing housing is adjustable lengthwise of the bracket by manually operable means, preferably a screw 38 having one end rotatably mounted in the inner end of the housing, from which the screw extends out through the inner end wall of the bracket body, in which it is threaded. To connect the screw to the housing, the screw is provided with a circumferential groove 39 and the adjoining end of the housing is provided with a downwardly opening notch 40 that receives the groove. By turning the projecting end of the screw, the housing can be adjusted lengthwise of the bracket. The screw can be locked in any position by a lock nut 41.

Slidably mounted in the recess in bearing housing 36 is a bearing 42 that is provided with a central vertical hole 43 which receives the lower pivot pin 5 of the door. The bearing can be held down in the housing by inwardly punched areas 44 at the top of the side walls of the housing over the bearing. The bearing normally is pressed against the inner end of the housing by a coil spring 45 compressed between the outer ends of the bearing and its housing. Consequently, although the pivot pin and bearing are permitted to move toward the adjacent side of the doorway, when necessary, the spring will push them back toward their original position at the inner end of the bearing housing.

The advantage of this pin retainer is that it permits the upper and lower pivot pins of the door to be located in a common vertical line even though the door jamb is not plumb. Thus, if the jamb inclines downward and inward of the doorway, the bearing housing 36 can be adjusted by screw 38 toward the jamb until the pivot pins are vertical and the door hangs correctly. If the jamb is inclined in the opposite direction, the bearing housing can be adjusted away from it to bring the pivot pins into a vertical line. After such an adjustment has once been made it is permanent, unless there is some settling of the house that shifts the door frame. Regardless of the position of the bearing housing in the bracket however, the bearing 42 can move back and forth in the housing as the door is opened and closed, as will now be described.

When the door starts to open, in response to pulling on its knob 12 or pushing on its opposite side, the pivot pins 4 and 5 will begin to turn in their bearings and the hinges 3 connecting the panels will start to fold. Since the closed door had its free edge substantially engaging one side of the doorway, initial pivoting of the door, which increases its overall width by lining up the diagonal dimensions of the panels, pushes the pivot pins toward the adjacent side of the doorway against the resistance of the coil springs 22 and 45. As the door continues to open, its width will decrease and the coil springs will push the bearings 14 and 42 and pivots back toward the front ends of the slots in retainers 6 and 7. From then on the door will merely pivot in the bearings as if the bearings were rigidly mounted. Of course, while the door is being opened, guide member 9 is moving along the track. While the door is closing, it will operate in the ordinary way until its free edge engages the adjoining side of the doorway. Further closing or straightening of the door will then cause the pivot pins and bearings to compress the springs, after which the springs will be allowed to expand again as the panels swing into a single vertical plane. The use of the springs and sliding pivot bearings not only permits the free edge of the door to engage the side of the doorway, but it also holds the door straight when it is closed, due to the spring pressure against the aligned panels.

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According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An adjustable retainer for the lower pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having an outer end and adapted to be mounted beneath a door, said body being provided with a longitudinal recess, a bearing housing slidably mounted in said recess and provided with a longitudinal recess, manually operable means engaging said housing for adjusting it lengthwise of the bracket, a bearing slidably mounted in said housing recess lengthwise thereof and provided with a vertical pivot pin receiving hole, and a spring urging the sliding bearing toward the inner end of the housing, the bracket and bearing housing being open above said hole in the bearing in all of its operative positions.

2. A pivot pin retainer as defined in claim 1, in which said spring is a coil spring in said housing recess compressed between the outer ends of the bearing and housing.

3. An adjustable retainer for the lower pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having an outer end and adapted to be mounted beneath a door, said body being provided with a longitudinal recess, a bearing housing slidably mounted in said recess and provided with a longitudinal recess, a horizontal screw connecting the inner ends of the bearing housing and bracket and adapted to be turned to adjust the housing lengthwise of the bracket, a bearing slidably mounted in said housing recess lengthwise thereof and provided with a vertical pivot pin receiving hole, and a spring urging the sliding bearing toward the inner end of the housing, the bracket and bearing housing being open above said hole in the bearing in all of its operative positions.

4. An adjustable retainer for the lower pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having an outer end adapted to be fastened to a door jamb, said body being provided with a longitudinal recess, a bearing housing slidably mounted in said recess and provided with a longitudinal recess, the inner end of the bearing housing being provided with an upwardly extending notch, a screw threaded in the inner end of the bracket, one end of the screw being provided with a circumferential groove receiving the wall of said notch to rotatably connect the screw with said housing so that the housing can be adjusted lengthwise of the bracket, a bearing slidably mounted in said housing recess and provided with a vertical pivot pin receiving hole, and a spring urging the bearing toward the inner end of the housing, the bracket and bearing housing being open above said hole in the bearing in all of its operative positions.

5. An adjustable retainer for the lower pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having an outer end adapted to be fastened to a door jamb, said body being provided with an upwardly opening longitudinal recess, a bearing housing slidably mounted in said recess and provided with an upwardly opening longitudinal recess, manually operable means engaging said housing for adjusting it lengthwise of the bracket, the opposite sides of the bracket at their top having inwardly deformed portions overlying the sides of said housing to hold it down in the bracket recess, a bearing slidably mounted in said housing recess and provided with a vertical pivot pin receiving hole, the opposite sides of the bearing housing at their top having inwardly deformed portions overlying the side edges of said bearing to hold it down in the

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housing, and a spring in said housing urging the bearing toward the inner end of the bracket. 2,078,303

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