March 9, 1965 L. R. DICKINSON ETAL 3,172,146

FOLDING DOOR PIVOT PIN RETAINERS

Filed Dec. 26, 1962 2 Sheets-Sheet 1

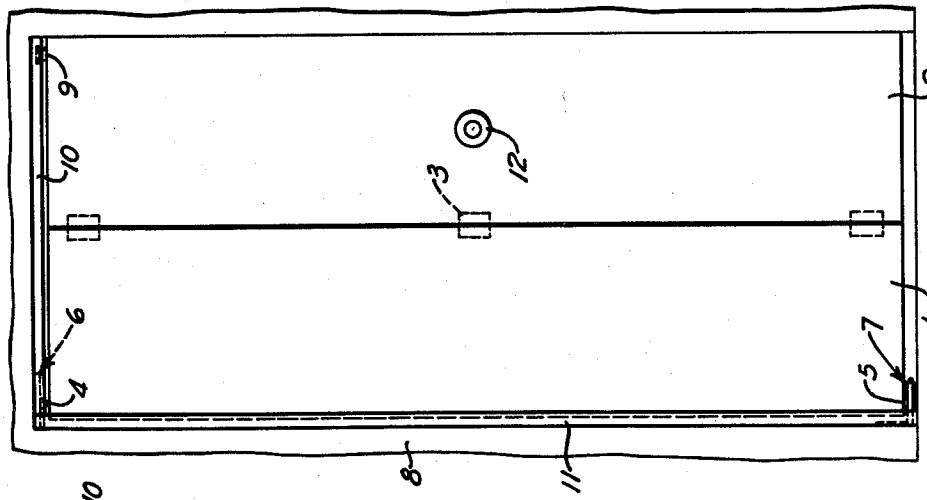


Fig. 1

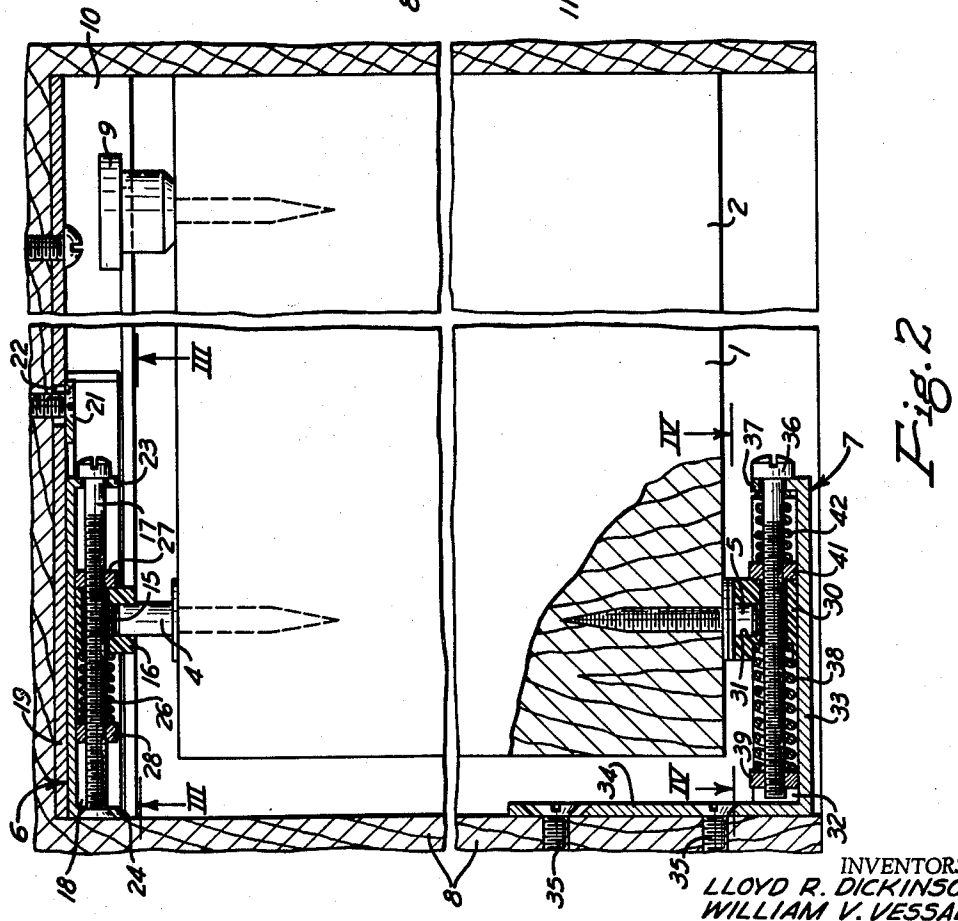


Fig. 2

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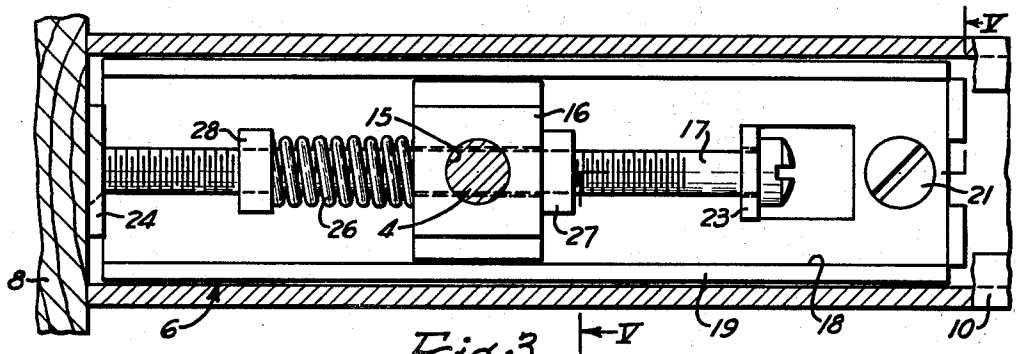


Fig. 3

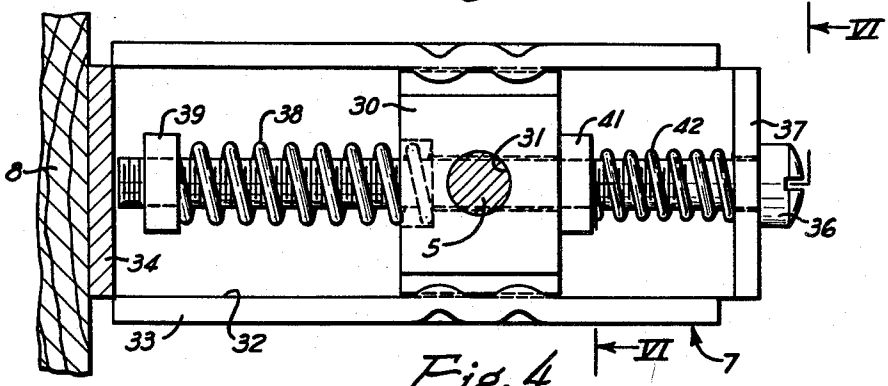


Fig. 4

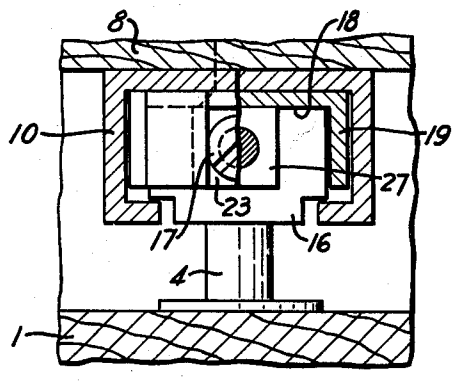


Fig. 5

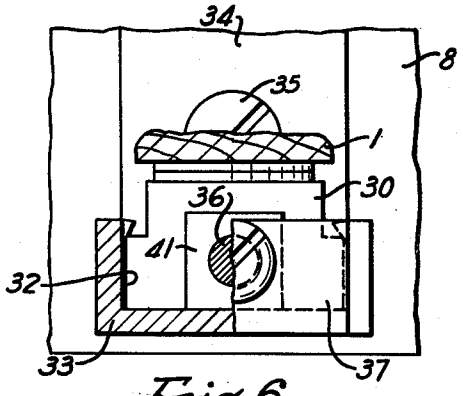


Fig. 6

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FOLDING DOOR PIVOT PIN RETAINERS

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6 Claims. (Cl. 16—129)

This invention relates to folding doors, and more particularly to the socket members in which the pivots of such doors are retained.

In Patent Number 2,987,756 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. This is desired because when a folding door is made from 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 each other. To allow for this momentary increase in width in cases where the free edge of the closed door engages the door frame, the bearings that house the pivot pins of the door are slidably mounted so that they can move toward the adjacent jamb when the door starts to open. Thereafter, springs push the bearings back to their original positions. This is shown in the patent just referred to, which also discloses means for adjusting one of the pivot bearings in order to line it up with the other pivot bearing. A folding door mounted in this manner is very satisfactory, but occasionally something becomes caught between the pivoted edge of the door and the door frame and this may cause trouble by damaging the pivot bearings, bending the pivot pins or even cracking the door.

It is among the objects of this invention to provide a folding door mounted in the general manner shown in Patent 2,987,756, in which at least one of the pivot bearings can be forced away from the adjacent door jamb if something becomes caught between the latter and the edge of the door.

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 an enlarged bottom view of the upper pivot retainer taken on the line III—III of FIG. 2;

FIG. 4 is an enlarged plan view of the lower pivot retainer, taken on the line IV—IV of FIG. 2;

FIG. 5 is a combined end view and cross section, right side up, of the upper pivot retainer taken on the line V—V of FIG. 3; and

FIG. 6 is a combined end view and cross section of the lower pivot retainer taken on the line VI—VI of FIG. 4.

Referring to FIG. 1 of the drawings, a door is shown formed from a plurality, preferably two, of 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 backs 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 become clear 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 9 will move along the track and compel the door to fold.

Just as the door starts to fold, ti increases in width for a moment as mentioned above, 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 FIGS. 2, 3 and 5, the upper pivot pin projects up into a vertical hole 15 in a bearing 16 that is slidably mounted on a horizontal screw 17. The bearing and screw are disposed in a downwardly opening recess 18 formed in the elongated horizontal body of a metal bracket 19. This bracket may take various forms, the one shown being formed from sheet metal having downturned side walls and end walls. The bracket is mounted in the outer end of track 10 and is held in place by a screw 21 extending up through a hole in the top of the bracket near its inner end and through a slot 22 in the top of the track and into the door frame above.

Between the screw and the inner end of the bracket body the latter is provided with a downturned lug 23 provided with a hole in which the inner end of the screw is rotatably mounted. The head of the screw engages the lug. The opposite end of the screw is rotatably mounted in the outer end wall 24 of the bracket, where it is enlarged to restrain the screw from moving toward the opposite end of the bracket. The bearing is urged away from the outer end of the bracket recess by a spring, preferably a coil spring 26 encircling the screw. The opposite side of the bearing engages an inner nut 27 mounted on the screw and having its upper edge in sliding engagement to prevent the nut from turning with the screw. By turning the screw, this nut therefore can be moved along it in order to move bearing 16 toward the outer end of the bracket recess or to permit the spring to move the bearing toward the inner end of the recess. Since it is desirable that the pressure of the spring remain constant, an outer nut 28 may be mounted on the screw in engagement with the outer end of the spring and the bracket body above it. When the screw is turned, both nuts will travel along it together and therefore the length of the spring will not be changed. By being able to adjust the bearing along the screw, the bearing can be located in the position that will give the desired space between the upper corner of the door and the adjacent side of the door frame.

The door is supported by the lower bearing 30 for the lower pivot pin, as shown in FIGS. 2, 4 and 6. This bearing has a vertical hole 31 into which the pin projects. The bearing is disposed in the recess 32 of an elongated horizontal body of a sheet metal bracket 33. The bracket body has a bottom wall, upwardly extending side walls and inner and outer end walls. The outer end wall may be provided with an upward extension 34, through which extends screws 35 that fasten the bracket to the door jamb. In some cases however, the bracket may be fastened to the floor.

Like the upper bearing, the lower bearing is slidably mounted on a horizontal screw 36 extending lengthwise of the bracket recess. The inner end of the screw is rotatably and slidably mounted in a hole in the inner end wall 37 of the bracket. The bearing is urged toward the inner end of the recess by a spring, which most suitably is a coil spring 38 encircling the outer end portion of the screw. To keep the pressure on the screw constant, its outer end may engage a nut 39 mounted on the screw

and having a lower edge slidable along the bottom of the recess to keep the nut from turning when the screw is turned. The bearing can be adjusted toward the adjacent door jamb by means of an inner non-rotatable nut 41, likewise mounted on the screw and engaging the side of the bearing opposite to the spring. When the screw is turned counterclockwise, the two nuts will be moved toward the inner end of the recess to move the bearing in that direction also. Adjustment of the bearing permits it to be aligned with the upper bearing for proper operation of the door.

A further feature of this invention is that if sufficient force is exerted against the pivoted edge of the door in a direction away from the jamb, such as by something caught between them, the lower bearing can move toward the inner end of the bracket because the screw can slide lengthwise in the bracket hole in which it is mounted. However, to normally restrain such movement of the screw so that the bearing will remain in correct operating position, a spring is compressed between the inner nut 41 and the inner end of the bracket. Such a spring preferably is a coil spring 42 encircling the screw. This arrangement prevents damage to the door and its mounting in case an article is pinched between the pivoted edge of the door and the door frame.

It will be understood that the top and bottom pivot retainers could change places without affecting the operation of the door. Likewise, the upper retainer could be made the same as the lower one, as far as longitudinal movement of the adjusting screw is concerned, but to secure the advantages of this invention it is believed to be unnecessary for both screws to be movable lengthwise in their brackets.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we 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.

We claim:

1. An adjustable retainer for a vertical pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having inner and outer ends and adapted to be mounted in a doorway with its outer end adjacent a side of the doorway, said body being provided with a vertically opening longitudinal recess, a horizontal screw rotatably mounted in said recess and extending lengthwise thereof and having a head end adjacent the inner end of said body, means restraining longitudinal movement of the screw, a bearing in said recess slidably mounted on said screw and provided with a vertical hole for receiving a door pivot pin, a spring in said recess between its outer end and said bearing urging the bearing toward the inner end of the recess, a nut mounted on the screw in engagement with the side of the bearing opposite said spring, an edge of the nut engaging the bracket body to hold the nut from rotating when the screw is turned by its head end, whereby the bearing can be adjusted lengthwise of said recess.

2. An adjustable retainer for a vertical pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having inner and outer ends and adapted to be mounted in a doorway with its outer end adjacent a side of the doorway, said body being provided with a vertically opening longitudinal recess, a horizontal screw in said recess extending lengthwise thereof and having a head end adjacent the inner end of said

body, said body being provided with portions rotatably supporting the opposite ends of the screw, a bearing in said recess slidably mounted on said screw and provided with a vertical hole for receiving a door pivot pin, an outer nut in the recess mounted on the outer end portion of the screw, a coil spring on the screw compressed between said nut and bearing, and an inner nut mounted on the screw in engagement with the side of the bearing opposite said spring, edges of said nuts engaging the bracket body to hold the nuts from rotating when the screw is turned by its head end, whereby the bearing can be adjusted lengthwise of said recess.

3. An adjustable retainer for a vertical pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having inner and outer ends and adapted to be mounted in a doorway with its outer end adjacent a side of the doorway, said body being provided with a vertically opening longitudinal recess, a horizontal screw in said recess extending lengthwise thereof and having a head end slidably and rotatably mounted in the inner end of said body, a bearing in said recess mounted on the screw and provided with a vertical hole for receiving a door pivot pin, a spring in said recess between its outer end and said bearing urging the bearing toward the inner end of the recess, a nut mounted on the screw in engagement with the side of the bearing opposite said spring, and a spring in said recess between its inner end and said nut urging the nut toward the outer end of the recess, an edge of the nut engaging the bracket body to hold the nut from rotating when the screw is turned by its head end, whereby the bearing can be adjusted lengthwise of said recess.

4. An adjustable retainer in accordance with claim 3, in which said last-mentioned spring is a coil spring encircling said screw.

5. An adjustable retainer in accordance with claim 3, in which both of said springs are coil springs encircling said screw.

6. An adjustable retainer for a vertical pivot pin of a folding door, comprising a bracket provided with an elongated horizontal body having inner and outer ends and adapted to be mounted in a doorway, said body being provided with a vertically opening longitudinal recess, a horizontal screw in said recess extending lengthwise thereof and having a head and slidably and rotatably mounted in the inner end of said body, an outer nut in the recess mounted on the opposite end of the screw, a bearing in said recess slidably mounted on said screw and provided with a vertical hole for receiving a door pivot pin, a coil spring on the screw compressed between said nut and bearing, an inner nut mounted on the screw in engagement with the side of the bearing opposite said spring, and a spring in said recess between its inner end and said inner nut urging that nut toward the outer end of the recess, edges of said nuts engaging the bracket body to hold the nuts from rotating when the screw is turned by its head end, whereby the bearing can be adjusted lengthwise of said recess.

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