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FOLDING DOOR MOUNTING

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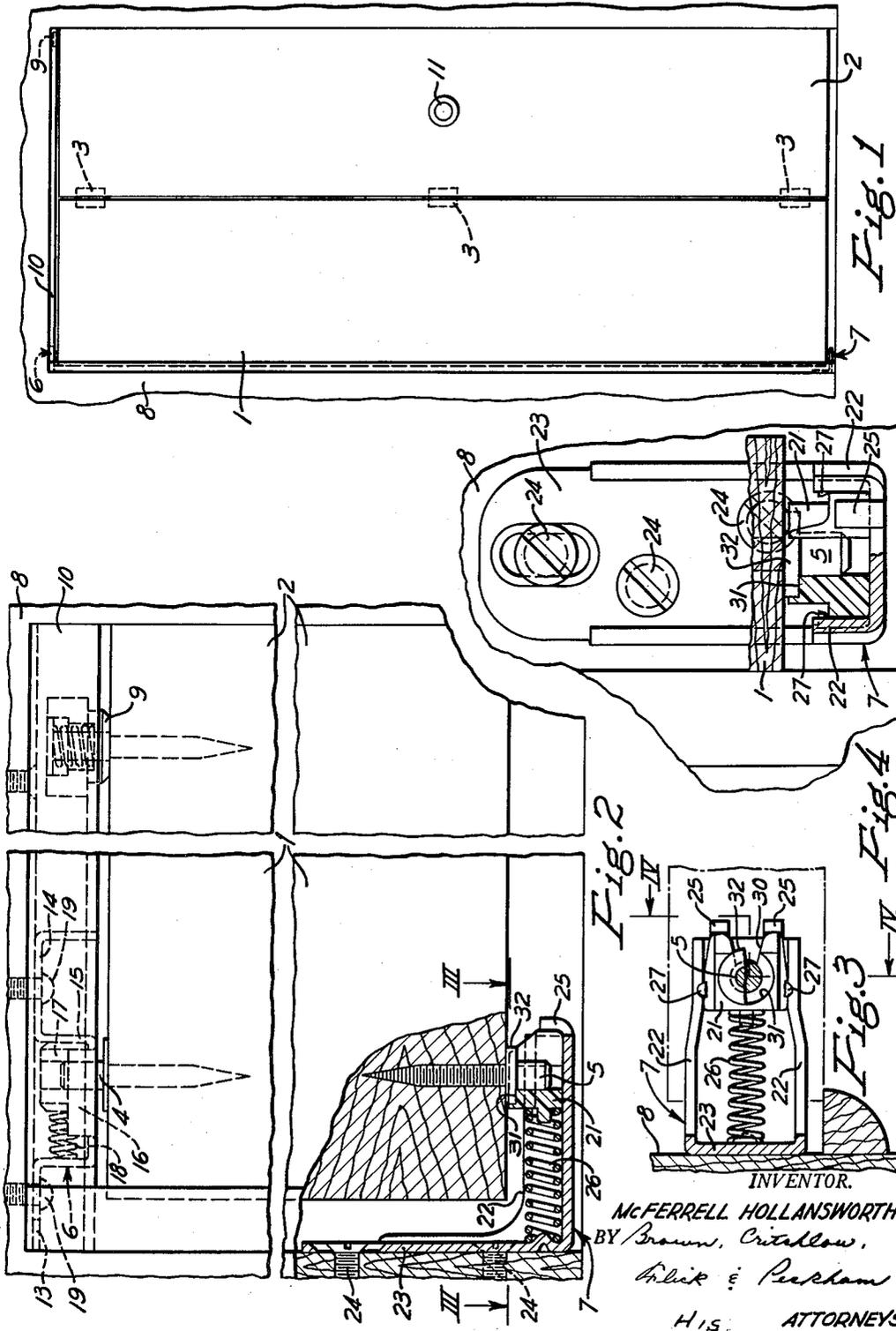


Fig. 2

Fig. 3

Fig. 4

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FOLDING DOOR MOUNTING

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This invention relates to doors, and more particularly to those having pivot pins projecting from their tops and bottoms.

Door mountings of the type forming the subject matter of this invention are shown in Patent 2,882,962. By reference to FIG. 3 of that patent, it will be seen that the outer edge portion of one of the panels of a folding door is pivotally mounted in a doorway by means of pivot pins, which project from the top and bottom of the door into bearings mounted in the doorway above and below the door. In order to insert the pivot pins in the bearings, the door is moved into the doorway in a slightly tilted position so that the upper pin can be inserted in the upper bearing. The door then is raised far enough for the lower pivot pin to clear the lower bearing and its support to permit the bottom of the door to be swung into a position where the lower pin will be directly above the lower bearing. The door is then lowered to insert the lower pin in its bearing. Of course, the upper pin is long enough to remain in the upper bearing. The only objection to such an arrangement is that a relatively large space necessarily is formed between the top of the door and the guide track above it, this space being necessary in order to permit the door to be raised far enough for the bottom pivot pin to clear the lower bearing. Such a space is rather unsightly and therefore undesirable.

It is among the objects of this invention to provide a door mounting, in which only a very narrow space remains between the top of the door and the overlying fixed door frame member above it after the door has been put in place, and in which the lower pivot pin is securely held in the lower bearing until it is desired to remove the pin therefrom.

In accordance with this invention, a door has pivot pins projecting from its top and bottom near one edge. These pins project into bearings mounted in the doorway above and below the door so that the door can swing. The bottom bearing has a circular recess in its top, which receives a thrust collar that encircles the bottom pin and takes the weight of the door. To permit the bottom pin to be moved laterally into and out of the lower bearing, rather than vertically as heretofore, the side wall of that bearing farthest from the adjacent side of the doorway is provided with a slot through it, through which the pin can pass. To mount the door in its bearings, its pivot pin is inserted in the upper bearing and then the door is raised just enough to allow the thrust collar to slide over the top of the bottom bearing as the bottom pin is pushed laterally through the slot in that bearing. Then the door is lowered to seat the thrust collar in the bearing recess. This positively prevents the bottom pin from accidentally slipping out through the slot in the bearing. It also is desirable to make the inner end of the slot slightly narrower than the pin and to make the bottom bearing

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resilient enough to permit the pin to be forced through the narrow inner end of the slot when desired.

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 front view of the door construction, but with a lower corner broken away to show parts in sections;

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

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

Referring to FIGS. 1 and 2 of the drawings, a folding door is shown that is formed from two rigid panels 1 and 2, although the invention also is applicable to ordinary swinging doors of the non-folding type. 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 panel 1 near its outer edge are upwardly and downwardly extending pivot pins 4 and 5 that project into horizontal hinge brackets 6 and 7, respectively, secured to the door frame 8. Since a folding door is illustrated, its opposite or free edge has an upwardly extending hanger or 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. When the door is opened by pulling on a knob 11 or the like, or by pushing on its opposite side, the guide member will move along the track and compel the door to fold in a well-known manner.

The upper hinge bracket 6 may be the same as that shown in Patent 2,882,962. The bracket is made of a strip of sheet metal that has two upper horizontal portions 13 and 14 connected by a depending U-shaped portion 15 that forms a recess between them. The opposite sides of the bottom wall of the recess are turned up to provide short ribs 16 that prevent the pin bearing 17, which is disposed on the recess, from sliding out sideways. Also, the bottom wall of the recess is slotted lengthwise so that the upper pivot pin 4 can extend up through it and into the bearing, which is urged away from the adjacent side of the doorway by a coil spring 18 compressed between the bearing and the outer end of the recess. The bracket is secured in place by wood screws 19 screwed into the doorway above it. The bracket is concealed inside of track 10, which is an inverted channel shaped 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 head of guide member 9, which is slidable length-wise of the track.

The lower pivot pin 5 projects down into a bearing 21 that may be slidably mounted in the sheet metal bracket 7. This bracket has a bottom with upwardly extending side flanges 22, as shown in FIGS. 2, 3, and 4. Extending upward from the outer end of the bracket is an extension strip 23, through which extend screws 24 that fasten the bracket to the door jamb. The bearing is prevented from sliding out of the inner end of the bracket by upwardly projecting lugs 25 that are spaced apart a distance greater than the diameter of the pivot pin. The bearing normally is held against these

lugs by means of a coil spring 26 compressed between the bearing and extension strip 23. To hold the bearing in the bracket before installation, small portions 27 of the upper edges of the side flanges 22 are peened inward over the adjoining edges of the bearing.

As explained in the patent mentioned above, the coil springs in the hinge brackets hold the free edge of the door against one side of the doorway when the door is closed, but permit the pin bearings and therefore the door to move away from that side of the doorway sufficiently for the door to be opened. This is necessary because during initial pivoting of the door, its overall width will increase due to alignment of the diagonal dimensions of the panels, and therefore something has to give if the free edge of the door was in engagement with the door jamb when the door was closed. Of course, if a crack exists between the free edge of the closed door and the adjacent side of the door frame, or if the door is not a folding door, the springs are unnecessary.

It is a feature of this invention, as shown in FIGS. 1 and 2, that there is only a small space between the top of the door and the bottom of guide track 19. Such a small space is possible because the lower pivot pin 5 can be moved laterally into the bottom bearing instead of having to be inserted from above as heretofore. Accordingly, the side wall of bottom bearing 21, adjacent the inner end of its supporting bracket 7, is provided with a slot 30 through which the pin can be moved sideways into the open center of the bearing. Preferably, the outer end of the slot is wide to facilitate entrance of the pin from between lugs 25, and the slot then tapers inwardly and has an open inner end that is slightly narrower than the diameter of the pin. By making the bearing of slightly resilient material, such as nylon, it is possible to force the pin through the narrow inner end of the slot and snap it into the center of the bearing. Although that will normally hold the pin in the bearing, it is desirable to provide a more positive lock by providing the top of the bearing with a recess 31 concentric with its central pin-receiving opening for receiving a thrust collar 32 that encircles the pivot pin in engagement with the bottom of the door. The collar generally is joined to the pin and limits the distance it can be screwed into the door. The thrust collar also usually takes the weight of the door and rotates against the bottom of the bearing recess when the door is pivoted.

Since the collar is quite thin, the door has to be raised only a very short distance in order to permit the collar to slide across the top of the bearing when the pivot pin is being swung into or out of the bearing. Therefore, the space or crack at the top of the door can be very narrow. When the pin is in place in its bearing, with the thrust collar fitting in the bearing recess, the pin cannot come out of the bearing unless the door is lifted far enough to remove the collar from the recess.

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. The combination with a door having a pivot pin projecting from its top and another pivot pin projecting from its bottom near one edge, of bearings mounted above and at the bottom of the door slidably and rotatably receiving said pins, the bottom bearing having a circular recess in its top, and a thrust collar encircling the bottom pin and carried thereby below the door, said collar fitting in said recess in engagement with the bottom thereof to support the door, the top of the door being

spaced from the top bearing a distance greater than the depth of said recess but less than the length of the bottom pin below the collar, whereby the collar can be lifted out of the recess, and the side wall of the bottom bearing farthest from said door edge being provided with a slot therethrough to permit the bottom pin to be moved laterally out of the bearing when the door raises the bottom pin in its bearings far enough to remove said collar from said recess.

2. The combination with a doorway containing a door, of a pair of vertically aligned pivot pins projecting from the top and bottom of the door near one edge, bearings mounted in the doorway above and at the bottom of the door slidably and rotatably receiving said pins, the bottom bearing having a circular recess in its top, and a thrust collar encircling the bottom pin and carried thereby below the door, said collar fitting in said recess in engagement with the bottom thereof to support the door, the top of the door being spaced from the top bearing a distance greater than the depth of said recess but less than the length of the bottom pin below the collar, whereby the collar can be lifted out of the recess, a metal bracket at the bottom of the doorway provided with a channel extending inwardly toward the opposite side of the doorway and having an inner end wall, the bottom bearing being slidably mounted in said channel, and a coil spring in the channel compressed between the bottom bearing and the adjacent side of the doorway normally holding the bearing against said inner end wall of the channel, the side wall of the bottom bearing farthest from the adjacent side of the doorway being provided with a slot therethrough to permit the bottom pin to be moved laterally out of the bearing when the door is raised in its bearings far enough to remove said collar from said recess, and said channel end wall being provided with an opening therethrough permitting the bottom pin to pass through it.

3. A hinge bracket adapted to be mounted below one edge of a door that is provided with a downwardly projecting pivot pin encircled by a circular thrust collar, the bracket comprising a metal support, and a bearing carried by said support and provided with a vertical opening for snugly receiving said pin, the top of the bearing having a circular recess therein around said opening for receiving said collar, and the side wall of the bearing being provided with a slot therethrough to permit the pin to be moved laterally into and out of the bearing while said collar is above the level of the bearing.

4. A hinge bracket adapted to be mounted below one edge of a door that is provided with a downwardly projecting pivot pin encircled by a circular thrust collar, the bracket comprising a metal support, and a bearing carried by said support and provided with a vertical opening for snugly receiving said pin, the top of the bearing having a circular recess therein around said opening for receiving said collar, and the side wall of the bearing being provided with a slot therethrough to permit the pin to be moved laterally into and out of the bearing while said collar is above the level of the bearing, said slot tapering inward and having an open inner end slightly narrower than said opening, and the bearing being resilient enough to permit said pin to be forced laterally through the inner end of said slot and into said opening.

5. A hinge bracket adapted to be mounted below one edge of a door that is provided with a downwardly projecting pivot pin encircled by a circular thrust collar, the bracket comprising a metal channel having an outer end formed for attachment to the side of a doorway, the channel also having an inner end wall, a bearing slidably mounted in said channel and provided with a vertical opening for snugly receiving said pin, the top of the bearing around said opening having a circular

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recess therein for receiving said collar, and a coil spring in the channel compressed between its outer end and said bearing normally holding the bearing against said inner end wall of the channel, the side wall of the bearing adjacent said inner end wall being provided with a slot therethrough to permit the pin to be moved laterally into and out of the bearing while said collar is above the level of the bearing, said slot tapering inward and having an open inner end slightly narrower than said opening, and the bearing being resilient enough to

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permit said pin to be forced laterally through the inner end of said slot and into said opening.

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