

Aug. 25, 1964

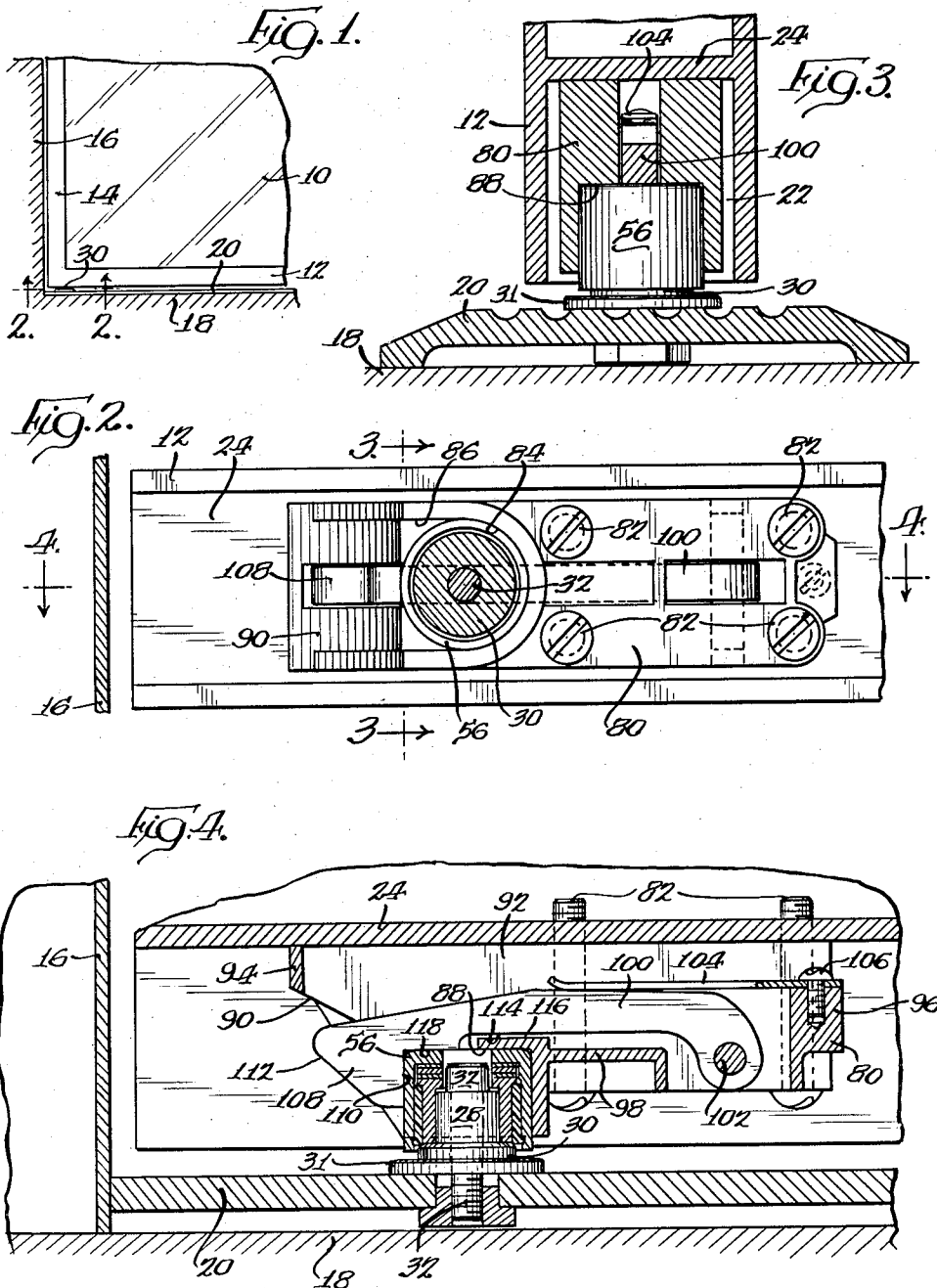
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3,145,414

LOWER PIVOT ASSEMBLY FOR SWINGING DOORS

Filed Oct. 27, 1961

2 Sheets-Sheet 1



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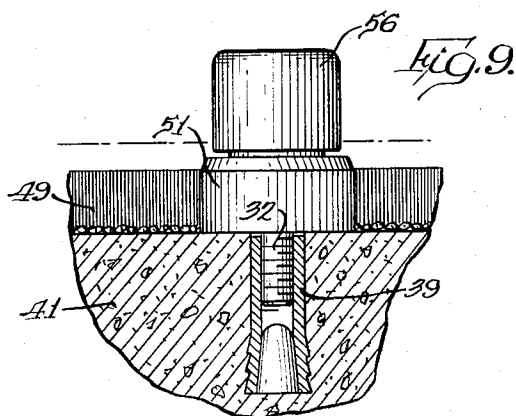
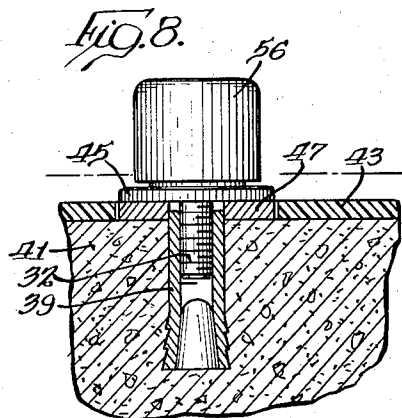
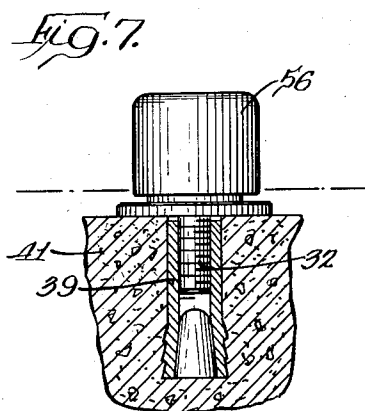
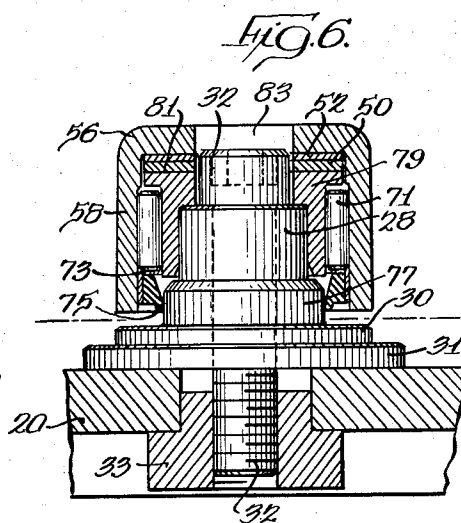
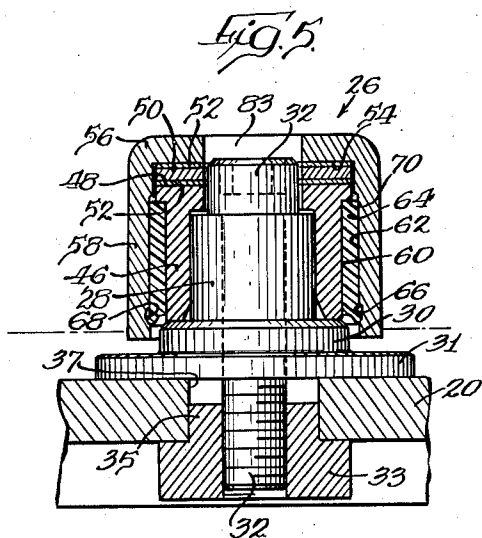
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LOWER PIVOT ASSEMBLY FOR SWINGING DOORS

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2 Sheets-Sheet 2



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3,145,414

LOWER PIVOT ASSEMBLY FOR SWINGING DOORS

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Filed Oct. 27, 1961, Ser. No. 148,250
5 Claims. (Cl. 16—151)

This invention relates to an improved lower pivot or hinge assembly for swinging doors, and more especially to a pivot of this type which greatly facilitates the installation and removal of swinging doors.

One of the objects of the present invention is to provide an improved bottom pivot for swinging doors, such that a portion of the mechanism can be attached to a door, whereas another portion can be secured in any of several fashions in position within a doorway, thereafter it being necessary merely to snap the door into place to complete the installation.

It is also an object of my invention to accomplish the above with novel structure which is easily separable to permit removal of an installed door.

In my copending United States patent application Serial No. 63,350, filed October 18, 1960, for "Concealed Overhead Door Closer," I have illustrated and described a door closer mechanism which is especially adapted to be housed within the door frame in a position above the door. My copending United States application Serial No. 56,981, filed September 19, 1960, now Patent No. 3,089,183, issued May 14, 1963, entitled "Overhead Door Control Arm," relates to a door control arm especially adapted to be housed in a slot in the door top edge and to be used with such an overhead concealed door closer. A valuable characteristic of this arm is that it permits the upper end of the door to be snapped in place when installing the door. The pivot of the present invention, therefore, effectively complements the structures of the referred to copending patent applications in that, by using all three of the structures, or reasonable alternatives, for certain of them, it is possible to attach certain of the elements to the door, either on the job or at the factory where the door is made, and to attach others of the elements to the door frame structure or in the doorway, and then to install the door simply by pushing it into place, the top and bottom connections being made automatically. This approach to door hanging, it will be appreciated, greatly simplifies the operation and thus reduces its cost.

It is therefore an additional object of this invention to provide novel bottom pivot structure which is compatible with the structures of the previously recited copending patent applications, or devices of a generally similar character.

Other objects and advantages will become apparent from the following description of a preferred embodiment of my invention which is illustrated in the accompanying drawings.

In the drawings, in which like characters of reference refer to similar parts throughout the several views:

FIG. 1 is a fractional front view of a swinging door showing the lower door corner at the hinged side and illustrating the installed position of the pivot of this invention;

FIG. 2 is a horizontal sectional view taken essentially along the line 2—2 of FIG. 1 looking upwardly as indicated by the arrows;

FIG. 3 is a vertical transverse sectional view which may be considered as taken in the direction of the arrows essentially along the line 3—3 of FIG. 2;

FIG. 4 is a vertical longitudinal sectional view taken in the direction of the arrows along the line 4—4 of FIG. 2;

FIG. 5 is a vertical transverse sectional view of the

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major portion of the pivot assembly which is secured in the doorway;

FIG. 6 is similar to FIG. 5, but illustrates a modified or alternative form of the pivot;

FIG. 7 is a view partly in elevation and partly in section showing an installation which is an alternative to that of FIGS. 5 and 6;

FIG. 8 is similar to FIG. 7, but illustrates another type of installation; and

FIG. 9 is similar to FIGS. 7 and 8, but illustrates yet another type of installation of the basic pivot mechanism.

As seen in FIG. 1, the illustrated portion of a swinging door 10 has a bottom rail 12 and a vertical hinged edge rail 14. This door fits within a doorway having a vertical casement member 16 and a floor 18. Usually a threshold strip 20, formed of heavy extruded aluminum, is fastened to the floor beneath the closed position of the door.

The door bottom rail 12 has a slot 22 running its full length. This slot is open at the door bottom and is closed at its upper side by a web 24. Rail sections of this type are customary, since the arrangement lends itself well to manufacture by extrusion and the slot is of value in providing the space for housing the control arm used with the spindle of a conventional floor mounted door check. The present invention makes use of this slot, as will appear presently.

When arranging for hanging doors according to this invention, a pivot post is preliminarily mounted within the doorway near the hinged edge. Such a pivot post is illustrated in FIG. 5, and is indicated generally by the numeral 26. It is made up of a cylindrical fixed post 28 which rests upon a somewhat larger collar 30 and washer 31, together with an appropriate mounting means. In FIG. 5 the post 28 and collar 30 may be separate elements through which a screw 32 is passed, this screw extending through the washer 31 and threshold strip 20 and into a shouldered nut 33 which has a small diameter knurled portion 35 which is pressed upwardly into an opening 37 in the threshold strip. The threshold strip is secured to the floor in any conventional manner.

In FIGS. 7, 8, and 9 the mounting means differs because of a difference in the floor character. In FIG. 7, the screw 32 is threaded into an anchor 39 driven into an opening in a concrete floor 41. This scheme is used when there is no threshold strip 20. The arrangement of FIG. 8 is much the same, except that where resilient tile 43 is present upon the floor, an opening 45 is cut through the tile and a washer 47 is placed in this opening. The washer 47 has about the same thickness as the tile, and raises the door an appropriate amount above the concrete floor 41. In FIG. 9, carpet 49 is upon the floor, and thus a thick washer 51 is used in place of the thin washer 47. The arrangement is otherwise similar to FIG. 8, except that a longer screw 32 is used.

The various installation arrangements just described have the common feature of providing the post 28 at a proper location in the doorway. As is best seen in FIG. 5, a metal sleeve 46 is fitted to the post 28, with its lower end against the collar or shoulder 30. This sleeve has an enlarged annular flat surface 48 at its upper end which supports a thrust bearing consisting of a washer 50 of nylon or bronze or the equivalent between a pair of steel washers 52. The inside surface 54 of the cap 56 rests against the top washer 52 and the sides of the cap extend downwardly to provide a skirt 58. The external sleeve surface 60 and the internal skirt surface 62 are cylindrical, and between the two a bearing bushing 64 of nylon, for instance, is fitted. At its lower external edge, the bushing is formed to provide a slightly outwardly projecting peripheral ridge 66 which snaps into a groove 68 in the cap to prevent separation of the

assembled elements, the upper end of the bushing 64 bearing against an overlying shoulder 70 formed as a portion of the head of the sleeve 46. This structure 26 provides a shell 56 which rotates freely upon the post 28 and is trouble free and economical. For heavy duty use with large, heavy doors, sealed needle bearings 71 may be used in place of the nylon bushing 64, as is illustrated in FIG. 6. These needles are retained by a ring 73 which also has a resilient lip 75 bearing against an enlargement of the post surface at 77 to seal out dirt. Since the sleeve 79, equivalent to the sleeve 46, will have a hard surface to run against the needles, the top surface 81 will also be hard, and therefore one of the thrust washers 52 may be omitted as shown. In both embodiments a clearance hole 83, for the head screw 32, is formed through the cap 56 and thrust washers 50 and 52.

The mechanism which is located within the slot 22 in the bottom edge of the door and which attaches to the shell 56 is illustrated in FIGS. 2 to 4. It comprises a block 80, formed as a die casting for instance, which is secured against the lower surface of the web 24 as by screws 82. This block is formed near the forward end (toward the hinged edge of the door) to provide a half cylindrical socket surface 84 about a vertical axis at the end of a slot 86 having a width only slightly greater than the diameter of the shell 56. The top of the slot 86 is closed by a flat surface 88 which rests against the top of the shell 56 so that the shell supports the weight of the door with the bottom edge of the door slightly above the threshold strip 20. In order to aid in lifting the door into position as the slot 86 is pushed over the shell 56, the front end surface 90 of the block is formed as an inclined plane which slants upwardly and outwardly from the end of the horizontal surface 88 which engages the top surface of the shell 56.

The major central portion of the block 80 is perforated from top to bottom by a narrow vertical slot 92 about 1/4 inch wide or so, the two side portions of the block being joined by end webs 94 and 96 and intermediate structure 98. A latching member 100 is located within this slot and is pivoted at its rearward end about a cross pin 102 so that its opposite end is free to move vertically. This latch is normally urged downwardly by an overlying leaf spring 104 secured at its rearward end to the web 96 by a screw 106. At its forward end, the latch 100 has a downwardly extending detent member 108 having an inner vertical surface 110 which is properly positioned to engage the forward portion of the shell 56 when the shell is seated against the socket forming surfaces 84 and 88. The nose portion of the latch has a camming surface 112, much like that at 90, which enables the latch to ride up over the shell 56 as the socket 84-88 is moved into engagement with the shell. When the door is separated from the pivot shell 56, the free end of the latch drops only slightly below the position of FIG. 5, further downward movement being prevented by an intermediate portion 114 of the latch engaging a stop surface 116 formed in the block 80. When the door is installed, a similar stop surface 118 on the latch engages the top of the shell 56.

With the door frame and threshold installed and the pivot post and shell assembly in place and with the door equipped with its portion of the mechanism, the door is prepared to be hung. This is accomplished, so far as the lower pivot is concerned, simply by lining up the door with the shell 56 and pushing the door into place until the latch 100 is heard to snap down over the shell. During this operation, the shell is centered in the slot 86, and the door—because of the inclined surface 90—rides up on the shell 56 until the shell is centered well in the socket formed by the half cylindrical surface 84 and the flat surface 88. Meanwhile, as the door advanced, the nose of the latch 100 moved upwardly as the camming surface 112 progressively engaged the shell 56 until in the final position, with the shell well engaged in the socket 84-88, the latch snaps downwardly under the influence of the spring 104 to the attitude of FIG. 4.

It is anticipated that a structure like that of the previously referred to patent application or something similar will preferably be used to cause substantially simultaneous latching engagement of the door top pivot, but the particular arrangement of the top pivot forms no part of the present invention.

To remove the door, so far as the lower pivot is concerned, it is necessary merely to swing the door to open position, insert a screwdriver or the equivalent into the open end of the door bottom channel 22 and lift the nose of the latch, after which the door can be pulled outwardly and disconnected from the shell 56. Sometimes a removable cover plate (not shown) is used to close the end of the channel 22 in doors of this character and, if desired, a plate of this type may be supplied. If used, it will be attached after the door has been latched in place and removed prior to separation of the door from its pivot.

A pivot structure of this character greatly facilitates the local installation problem and permits most of the work to be shifted to the door factory where it can be accomplished more efficiently. Note also that a subassembly can be made of the shell 56, thrust washers 50 and 52, the nylon bushing 64, and the sleeve 46. The washers 50-52 are simply placed in the inverted cap 56, the sleeve 46 dropped into place, and the nylon bushing 64 inserted and pressed slightly to catch the ridge 66 in the groove 68. This subassembly, or the equivalent subassembly of FIG. 6, can then be supplied to the job, with the intention that it be slipped over the post 28 just prior to hanging the door. This procedure protects the bearing mechanism against damage from accidents, water, and dirt, which are common during building construction, since the doors need not be hung until the building is otherwise substantially completed and has been cleaned. Of course, since the knurled nuts 33 are pressed into the thresholds, the thresholds can be installed at any desired stage of building construction and the posts 28 can be installed later.

From the above description of a preferred embodiment of my invention it will be appreciated that changes in the structure can be made without departing from the spirit or scope of the invention and that, therefore, the scope of the invention is to be measured by the scope of the following claims.

Having described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. A swinging door pivot assembly comprising a first mechanism to be secured in a doorway and a second mechanism to be secured to the door, said first mechanism comprising means providing a stationary member adapted for rigid securement, a rotatable cap, and means providing bearing surfaces between the stationary member and the cap to provide for rotation of the cap relative to the stationary member about a vertical axis, said second mechanism comprising a member adapted for attachment to a door, the last said member having means providing a socket for said cap, said socket being open to the rearward edge of the door to permit entrance of said cap into said socket as the rearward edge of said door slides over said cap, and means providing surfaces for guiding said cap into said socket.

2. A swinging door pivot assembly comprising a first mechanism to be secured in a doorway and a second mechanism to be secured to the door, said first mechanism comprising means providing a stationary member adapted for rigid securement, a rotatable cap, and bearing means between said cap and stationary member to provide for rotation of said cap relative to said stationary member, said second mechanism comprising a member adapted for attachment to a door, the last said member having means providing a socket for said cap, said socket being open to the rearward edge of the door to permit entrance of said cap into said socket as the rearward edge of said door slides over said cap, means providing

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surfaces for guiding said cap into said socket, and latching means for engaging said cap for preventing removal of said cap from said socket.

3. A swinging door pivot assembly comprising a first mechanism to be secured in a doorway and a second mechanism to be secured to the door, said first mechanism comprising means providing a stationary member adapted for rigid securement, a non-rotatable member adapted for quick attachment to the stationary member, and an element rotatable on said non-rotatable member about a vertical axis, said second mechanism comprising a member adapted for attachment to a door, the last said member having means providing a socket for said element, said socket being open to the rearward edge of the door to permit entrance of said element into said socket as the rearward edge of said door slides over said element, and latching means for engaging said element for preventing removal of said element from said socket.

4. A swinging door pivot assembly comprising a first mechanism to be secured in a doorway and a second mechanism to be secured to the door, said first mechanism comprising means providing a stationary member adapted for rigid securement, a non-rotatable member adapted for quick attachment to the stationary member, and an element rotatable on said non-rotatable member about a vertical axis, said second mechanism comprising a member adapted for attachment to a door, the last said member having means providing a socket for said element, said socket being open to the rearward edge of the door to permit entrance of said element into said socket as the rearward edge of said door slides over said element, means providing surfaces for guiding said

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element into said socket, and latching means for engaging said element for preventing removal of said element from said socket.

5. A swinging door pivot assembly comprising a first mechanism to be secured in a doorway and a second mechanism to be secured to the door, said first mechanism comprising means providing a stationary member adapted for rigid securement, a non-rotatable member adapted for quick attachment to the stationary member, a rotatable cap, and bearing means between said cap and non-rotatable member to provide for rotation of said cap relative to said non-rotatable member, said second mechanism comprising a member adapted for attachment to a door, the last said member having means providing a socket for said cap, said socket being open to the rearward edge of the door to permit entrance of said cap into said socket as the rearward edge of said door slides over said cap, means providing surfaces for guiding said cap into said socket, and latching means for engaging said cap for preventing removal of said cap from said socket.

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