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CONCEALED DOOR CLOSER AND CHECK

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2 Sheets-Sheet 2

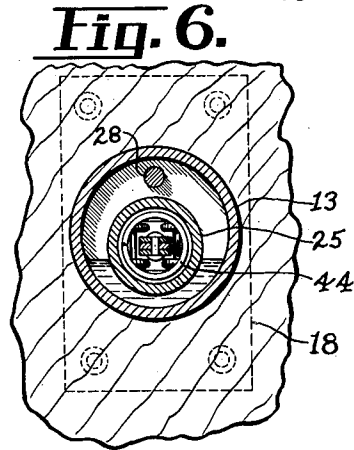
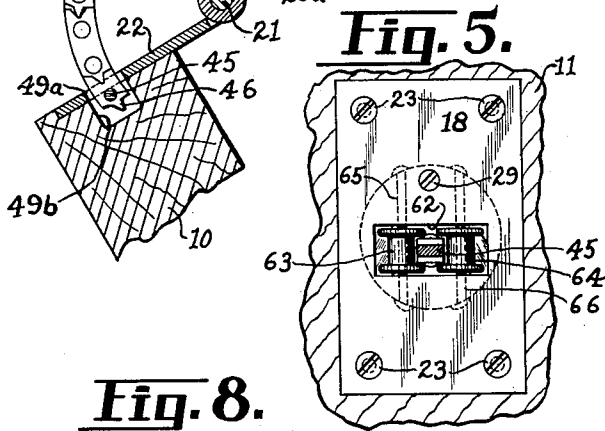
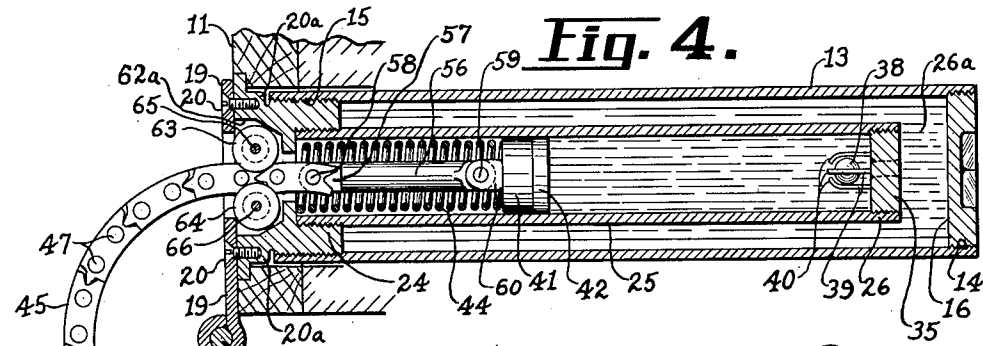


Fig. 8.

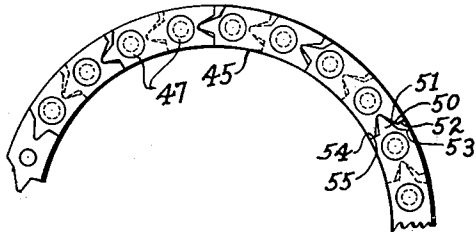


Fig. 9.

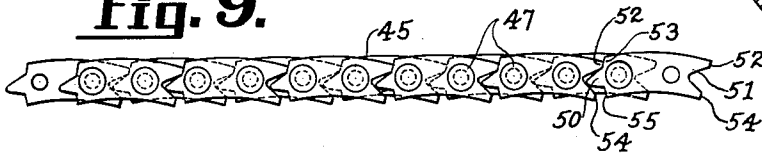


Fig. 10.

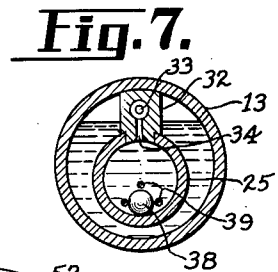


Fig. 7.

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CONCEALED DOOR CLOSER AND CHECK

Application filed February 18, 1931. Serial No. 516,641.

This invention relates to door closers and checks, and more particularly to a device of this nature adapted to be concealed within the door or door jamb.

One object of this invention is to provide a door closer and check of the above nature in which the door is closed by a strong coiled spring and the action of said spring is retarded by a piston working against a liquid of high viscosity.

A further object is to provide a door closer and check of the above nature in which the piston rod is connected to the door plate by a special form of non-jamming link chain.

A further object is to provide a door closer and check of the above nature having a needle valve rod for controlling the speed of closing, said needle valve being adjustable from an aperture in the door jamb plate, and being removable to permit the retarding liquid to be replenished through said aperture.

A further object is to provide a door closer and check of the above nature which will be simple in construction, inexpensive to manufacture, easy to install and manipulate, compact, and very efficient and durable in use.

With these and other objects in view there have been illustrated on the accompanying drawings two forms in which the invention may be conveniently embodied in practice.

In the drawings:

Fig. 1 represents a view in elevation of a door and a door jamb, a portion of the jamb and the adjacent wall being sectioned to show the concealed position of the door check and closer.

Fig. 2 is a horizontal sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary longitudinal sectional view of the door closer and check with the door shown in closed position.

Fig. 4 is a similar sectional view taken at right-angles to the view shown in Fig. 3 of a modified form of the invention in which the door hinge serves as the jamb plate.

Fig. 5 is a fragmentary end view of the door jamb plate taken along the line 5—5 of Fig. 3.

Fig. 6 is a transverse sectional view taken along the line 6—6 of Fig. 3, showing the

level of the checking liquid when the door is open.

Fig. 7 is a transverse sectional view taken along the line 7—7 of Fig. 3 and showing the level of the checking liquid when the door is closed.

Fig. 8 is a plan view of the special link chain shown in the arcuate shape which it assumes when the door is in open position.

Fig. 9 is a plan view of the same shown in the straight shape which the chain assumes when in closed position within the door check and closer.

Fig. 10 is a front view of the same.

Referring now to the drawings in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 indicates a door adapted to be pivotally supported within a door jamb 11 by means of hinges 12, three in number in this instance. Mounted within the door jamb 11 at the hinged side of the door 10 is a cylindrical outer casing 13 having its ends 14 and 15 tapped to receive a threaded end plug 16 and a hollow threaded collar 17, respectively. In the form shown in Figs. 1, 2, 3, 5 and 6, the collar 17 has an integral outer flange 18 adapted to lie flush with the jamb 11. In the modified form shown in Fig. 4, however, the stationary part 19 of the door hinge serves as the jamb plate and is connected as by screws 20 to the collar 20a. The jamb plate 19 is joined by a pin 21 to the movable hinge plate 22 mounted flush with the rear edge of the door 10.

The collar flange 18 is adapted to be secured to the jamb as by screws 23, four in number in this instance, and located at the corners of said plate. The collars 17 and 20a are provided with tapped recesses 24 for receiving the threaded end of a small piston chamber 25 located concentrically with the outer casing 13, the inner end 26 of said piston chamber 25 terminating a short distance from the end plug 16. The space 26a between the exterior of the piston chamber 25 and the outer casing 13 comprises a reservoir for the checking liquid.

In order to permit the adjustment of the door-closing speed and also to allow of the re-

plenishment of the liquid in the reservoir, the collar 17 is provided in its upper section with an aperture 27 within which is located a needle valve rod 28. The outer end of the needle valve rod has a slot 29 for receiving a screw driver, and the inner end of said rod has a conical point 30 for adjustably fitting upon a needle valve seat 31 of a T-shaped member 32. The rod 28 is threaded adjacent the conical point 30 to fit within a tapped hole 31a in the T-shaped member 32, the latter having channels 33 and 34 opening into the liquid reservoir 26a and into the piston chamber 25, respectively.

The end 26 of the piston chamber 25 is tapped to receive a threaded plug 35 having a longitudinal aperture 36 provided with an inner chamfered edge 37 forming a seat for a ball check valve 38. The ball 38 is guided in its opening and closing movements by means of three horizontal prongs 39 projecting forwardly from the plug 35 and having curved extremities 40 for preventing the escape of the ball 38 from the guiding prongs 39.

Located within the piston chamber 25 is a piston 41 having a leather packing disc 42 secured on its rear face as by screws 43, said leather disc 42 being slightly greater in diameter than the piston 41, so as to form a tight fit and prevent leakage of the liquid past the piston as it travels back and forth in the piston chamber 25.

In order to press the piston 41 at all times toward the rear end of the chamber, provision is made of a helical coiled spring 44, one end of which engages the piston 41, and the other end of which abuts against the collar 17 or 20a. In order to connect the door with the piston 41, provision is made of a special form of link chain 45 having three rows of links 46 of identical construction, said links being connected together by rivets 47. As clearly shown in Fig. 10, the outer links are staggered with respect to the inner links. Each of the links 46 are formed in the shape of an arc of a circle, the radius of which corresponds to the distance from the center of the door hinge to said chain. The outermost link 46 of the middle row passes through an aperture 48 in a plate 49 of the first form of the invention or 49a of the second form, being in each case seated within a recess 49b in the door 10.

Each of the links 46 is provided at one end with a projecting V-shaped pointed lug 50, while the other end of each link has a V-shaped slot 51, the angle of said slot being somewhat greater than the angle of the lug 50. Thus, when assembled as shown in Figs. 8 to 10, each lug 50 will project into the V-shaped slot 51 of the next adjacent link. By means of this construction it will be seen that the shoulders 52 on the outer side of the V-shaped slots will engage the shoulders 53 on

the outer side of the lugs 50 when the chain is located within the piston chamber in the position shown in Fig. 3 and will prevent the links of the chain from being bent backwardly beyond the straight line position shown in Fig. 9.

In a like manner the shoulders 54 on the inner side of the V-shaped slots 51 will engage the shoulders 55 on the inside of the lugs 50 when the chain is in the curved position outside of the piston chamber shown in Fig. 4. The chain will thus be prevented from bending beyond said curved position. It will thus be seen that the chain will be limited in its flexing movements between the straight position shown in Fig. 9 and the curved position shown in Fig. 8 in the operations of closing and opening the door.

The ends of the links 46 in the outside rows at the inner end of the chain are adapted to be connected to a connecting rod 56 having a reduced section 57 fitting between said links, said rod being pivotally secured to said links by a rivet 58 passing therethrough. The inner end of the connecting rod 56 is pivotally connected by a rivet 59 to a bifurcated stud 60 having a threaded extremity 61 screwed into the front end of the piston 41.

In order to guide the chain through the aperture 62 (or 62a) at the front of the collar 17 (or 20a), provision is made of a pair of flanged guide pulleys 63 and 64 adapted to rotate upon pins 65 and 66 passing through said collar 17 (or 20a).

Operation

In operation, when the door is swung from the closed position shown in Fig. 3 to the open position of Fig. 4, the piston 41 will be moved forwardly within the piston chamber 25, causing the coiled spring 44 to be compressed and creating a vacuum within the rear end of said piston chamber. The ball check valve 38 will thus be caused to unseat itself and move to the left to the position shown in Fig. 4, thus permitting the liquid from the reservoir 26a to pass freely through the relatively large aperture 36 of the plug 35 into the piston chamber 25.

It will thus be seen that relatively little resistance will be offered to the opening of the door, but as soon as the door is released, the compressed spring 44 will come into action and force the piston 41 to the right in the piston chamber 25. The piston will move rapidly at first, until the ball check valve 38 has been forced back against its seat 37. Further movement of the piston to the right under the influence of the spring 44 will be retarded by reason of the fact that the liquid in the piston chamber is caused to flow through the relatively small bypass openings 33 and 34 in the T-shaped plug 32, whereby the closing of the door will be cushioned to the desired extent. The needle valve

28 may, of course, be so adjusted with respect to the T-shaped plug 32 to obtain any desired closing speed.

While the casing 13 of the door closer and check has been herein disclosed as located within the door jamb and wall of the room, it will be understood that it is within the spirit and scope of the present invention to reverse this arrangement and locate said casing within the door, and fasten the chain to the jamb plate.

While there has been disclosed in this specification two forms in which the invention may be embodied, it is to be understood that these forms are shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosures, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claim.

Having thus fully described the invention, what is claimed as new and for which it is desired to secure Letters Patent, is:

In a door closer and check, an outer casing, an inner chamber located therewithin, the space between said casing and chamber comprising a reservoir for a checking liquid, a door-checking piston fitting within said chamber, a spring within said piston chamber for urging said piston to door-closing position, means to permit a free flow of liquid from said reservoir into said chamber when the door is being opened, a bypass of restricted area connecting said chamber with said casing to check the closing of said door, and a needle valve rod located in the outer part of said casing and operable from the exterior of said casing for adjusting the effective area of said bypass, said needle valve rod being removable from said casing to permit replenishment of the checking liquid in said reservoir.

In testimony whereof, I have affixed my signature to this specification.

GUSTAV H. ANDERSON.