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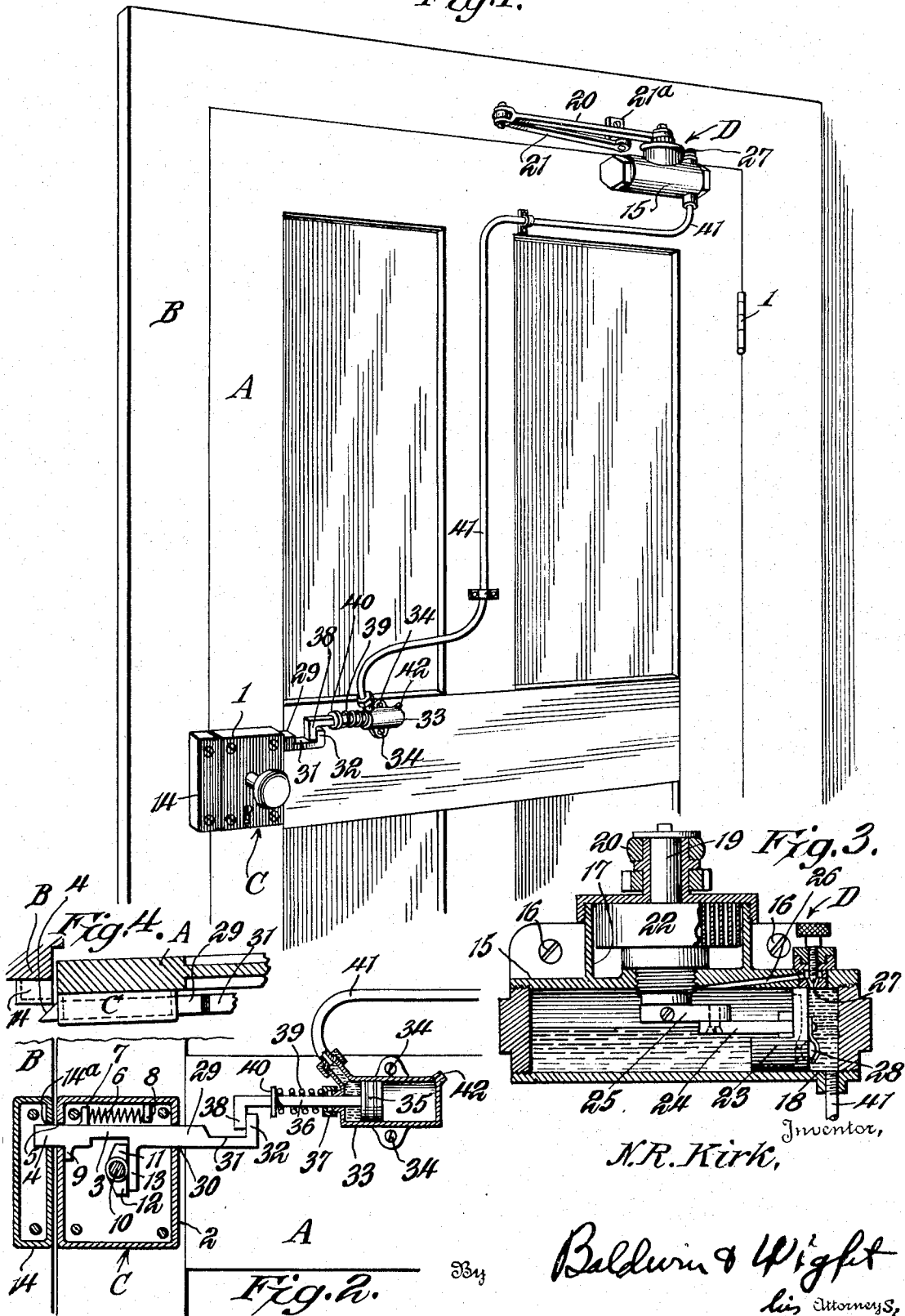
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LATCH OPERATING MEANS

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Fig. 1.



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LATCH OPERATING MEANS

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3 Claims. (Cl. 16—49)

This invention relates to latch operating means and more particularly to a novel means adapted automatically to retract a door latch while the associated door is being moved to closed position under the retarding action of a door check.

As is well known, it is common practice to provide doors with automatic closing devices, usually spring operated, in connection with a door "check" for retarding the closing action so as to prevent slamming. Many kinds of combined closers and door checks have been known for a long time and are today in extensive use. Most of these devices include a spring for moving the door to closed position and a piston operating against fluid pressure, either pneumatic or liquid, for retarding the closing action and preventing slamming of the door. Usually the piston acts against a body of fluid which is allowed to escape so as to permit the piston to advance, and, by varying the rate at which the fluid can escape, the effective retarding action produced and consequently the closing speed of the door can be varied.

In many cases it is found that, when the adjustment of the fluid escapement is such as to retard the closing action to the desired degree, the action of the closing spring is not strong enough to cause the door latch to be cammed inwardly, i. e., to be moved into retracted position by engagement with the keeper. This results in the door's being held open slightly. If the closer or check is so adjusted as to permit the door to close with sufficient speed to cause retraction of the latch upon engagement of the latter with the keeper, an objectionably hard slam results.

An object of the present invention is to provide means actuated under the control of a door check for maintaining the latch in retracted position so as to permit a very slow and quiet closing of the door yet assuring complete closing thereof with subsequent automatic operation of the latch into projected position in engagement with the keeper. Other and more specific objects will become apparent from the following detailed description, the appended claims, and the accompanying drawing, in which:

Figure 1 is a perspective view of a door showing one form of latch operating means embodying the invention applied thereto;

Figure 2 is a vertical sectional view of a latch mechanism and operating mechanism therefor, parts being shown in elevation;

Figure 3 is a vertical sectional view of a conventional form of combined door closer and check; and

Figure 4 is a top plan view of a latch mecha-

nism and associated keeper shown as applied to a door and door frame, the latter parts being shown in horizontal section.

Generally stated, my invention includes means associated with a door latch and being operable under the control of a door check for maintaining the latch in retracted position during closing of the door and until the latch has swung past the keeper. Preferably, the latch operating means is responsive to the retarding pressure in a fluid pressure controlled door check, the pressure medium employed being either air or liquid, as may be desired.

A practical embodiment of the invention is illustrated in the accompanying drawing, in which I have shown a door A as being hinged at 1 to a door frame B. The door is provided with latch mechanism generally designated C and including a casing 2 and a latch bolt 3 slidably mounted therein, the nose 4 of the latch bolt being formed with the usual inclined keeper engaging surface extending through an opening 5 in the casing. A spring 6 interposed between a lug 7 in the top of the latch bolt and a lug 8 integral with the casing serves constantly to urge the latch bolt into projected position, as shown in Figure 2, a stop lug 9 on the lower side of the latch bolt being adapted to abut against the adjacent wall of the casing 2 for limiting outward movement of the latch bolt. A spindle 10 is journaled in the casing at right angles to the latch 3 and is provided with upper and lower cam parts 11 and 12 adapted to cooperate with a downwardly extending projection 13 of the latch bolt for retracting the latter upon rotation of the spindle in either direction. A keeper 14 is secured to the door frame B and is provided with an opening 14a adapted to receive the latch bolt nose 4. The latch bolt shown and described herein is of a simple conventional form, and it will be understood that the specific construction thereof forms no part of my invention, nor is it necessary that my invention be used in connection with latch mechanisms of this specific nature.

For automatically closing the door at a desired retarded rate, I have provided a combined door closer and check generally designated D. This closer and check includes a casing 15 secured to the door by means of screws 16 and being formed with a spring chamber 17 and a cylinder 18 extending at right angles to the spring chamber 17. A vertical shaft 19 extends upwardly through the spring chamber and is provided with a crank arm 20 pivotally connected to a link 21 which in turn is pivotally connected to a bracket 21a

secured to the door frame B. A spring 22 housed within the spring chamber is connected to the latter and to the shaft 19, and serves constantly to urge the shaft in a counter clockwise direction as viewed from above so as constantly to urge the door to closed position.

The door check comprises a piston 23 mounted for reciprocation within the cylinder 18 and being connected to the shaft 19 by means of a link 24 connected at one of its ends to the piston and at its other end being pivotally connected to a crank 25 secured to the lower end of the shaft 19. When the door is in open position, the piston 23 will be to the left of the position shown in Figure 3. When the door is moved towards its closed position under the action of the spring 22, the piston 23 will be forced to the right by rotation of the shaft 19 and the crank 25 and will force fluid contained in the right hand end of the cylinder 18 through a restricted passage 26, the resistance offered by the fluid acting to retard the closing movement of the door. A needle valve 27 interposed in the restricted passage 26 serves as a means to vary the rate at which fluid can be forced through the passage, and consequently provides for the regulation of the closing speed of the door. When the door is being moved to open position, the piston 23 will move to the left, and a ball check valve 28 provides relatively open communication between the cylinder on opposite sides of the piston so as to reduce to a minimum the resistance offered to opening of the door. The door closer and door check described above are of conventional form and are more specifically described in the United States Letters Patent to Taylor 730,417, of June 9, 1903. It will be understood that the specific construction of door closer and check does not per se constitute my invention, and that my invention may be employed in connection with door checks of other specific constructions.

Considering the structure described so far and assuming that the needle valve 27 is adjusted in such a manner as to permit a closing speed which will not result in an undesirable slam, the spring 22 will move the door toward its closed position under the retarding action of the fluid escaping through the passage 26. When the latch bolt nose 4 engages the keeper 14 as shown in Figure 4, the resistance to the retraction of the latch bolt offered by the spring 6 will in many cases stop further movement of the door so that it will come to rest before being closed completely. On the other hand, if it is assumed that the needle valve 27 is so adjusted as to permit a more rapid closing of the door in order that retraction of the latch bolt is assured, an objectionable slam will result.

In order to permit an adjustment effecting a very slow closing of the door and yet to assure complete closing of the latter, I provide means for automatically retracting the latch bolt during the closing movement of the door and for automatically allowing the bolt to be projected by the spring 6 after the latch bolt nose has been moved into registry with the opening 14a in the keeper. In the construction shown, the bolt is provided with a tail or extension 29 which projects through an opening 30 in the latch casing, and which is formed with a reduced rear end portion 31 and with an upwardly extending projection or lug 32 at the extreme rear end of the latch bolt tail. A cylinder 33 is secured to the door by means of screws 34, and mounted in the cylinder is a piston 35 provided with a stem 36

extending through a packing gland 37 in the end of the cylinder adjacent the latch. The outer end of the stem is provided with a downwardly extending projection 38 which is adapted to engage the inner face of the lug 32 on the latch bolt tail, and a spring 39 interposed between a washer 40 and the gland 37 urges the piston 35 to the left. A pipe 41 provides constant communication between the left hand end of the cylinder 33, i. e., the end nearest the latch mechanism, and the right hand or "pressure" end of the cylinder 18 of the door check. A vent 42 is provided in the right hand end of the cylinder 33 so as to prevent the entrapping of air therein, which would have a dash pot effect and interfere with the operation of the piston 35.

It will be noted that the plug 32 on the latch bolt tail and the extension 38 on the piston stem 36 provides a lost motion connection between the piston 35 and the bolt. By virtue of this connection, whenever the piston 35 is moved to the right, the latch bolt will be retracted, but assuming the parts to be in their Figure 2 or normal positions, the latch bolt may be retracted by operation of the spindle 10 without its being necessary to move the piston 35.

The operation of the latch operating means will be described briefly. Assuming that the door is open and that the needle valve 27 is so adjusted as to permit a restricted rate of flow through the passage 26 so as to effect a very slow closing of the door, the spring 22 will move the door slowly toward its closed position against the resistance offered by the fluid escaping in advance of the piston 23. The piston acting against the body of fluid and the fluid escaping through the small opening presented by the valve 27 will result in pressure being built up in the right hand end of the cylinder 18, and this pressure will be communicated through the pipe 41 to the left hand end of the cylinder 33, where it will act upon the piston 35 and move the latter to the right. The projection 38 on the piston stem 36 will engage the lug 32 on the latch bolt tail and will move the bolt to retracted position. The bolt will be maintained in retracted position as long as the spring 22 is moving the door to closed position against the pressure of the fluid. As soon as the door is closed completely so that no further movement of the piston 23 can take place, the pressure in the cylinder 18, the pipe 41, and the cylinder 33 will diminish, and the springs 6 and 39 will return the bolt and piston 35 to the Figure 3 positions, in which the bolt nose will extend into the opening 14a of the keeper. Thus, through the provision of my improved latch operating means, the door may be closed very slowly so as to prevent the occurrence of objectionable slams, yet complete closing of the door is assured because of the fact that the latch bolt nose is maintained retracted during the entire closing movement, and hence cannot act to arrest closing of the door until it is completed.

Although the form of apparatus illustrated and described herein is considered to embody the invention in a practical form, it will be understood that various modifications may be made in the specific construction and arrangement of the parts without departing from the spirit of the invention as defined in the claims.

I claim:

1. The combination of a door latch bolt; manually operable means operatively connected to the latch bolt for actuating the latter; a door closer; a fluid pressure controlled door check, both asso-

ciated with said latch; a cylinder; means affording communication between said cylinder and said door check; a piston mounted in said cylinder; and a lost motion connection between said bolt and piston.

2. The combination with a door, of a door latch bolt; a door closer adapted constantly to urge said door to closed position; a fluid pressure controlled door check connected to said door, said check including a check cylinder and a check piston; a latch cylinder; a latch piston operable therein and being connected to said latch bolt; and means forming a passage providing constantly closed communication between said check cylinder and said latch cylinder.

3. The combination with a door, of a door latch bolt; a door closer adapted constantly to urge said door to closed position; a fluid pressure controlled door check connected to said door, said check including a check cylinder and a check piston; a latch cylinder; means forming a passage providing constantly closed communication between said check cylinder and said latch cylinder; a lost motion connection between said latch bolt and said latch piston; and manually operable means connected to said latch bolt for operating the latter independently of said latch piston.

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