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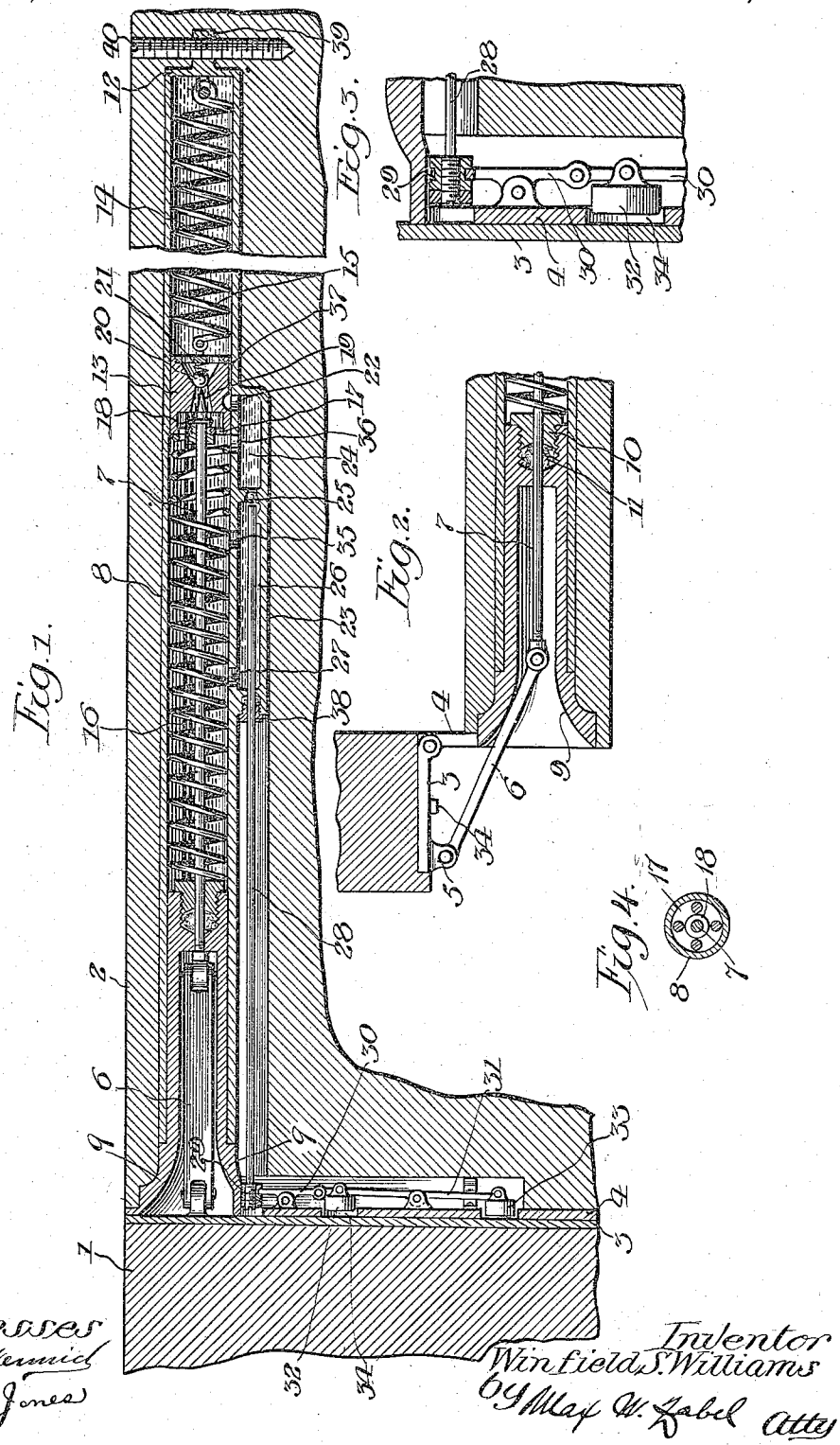
COMBINED DOOR CHECK AND CLOSER.

APPLICATION FILED FEB. 7, 1911.

1,176,802. Patented Mar. 28, 1916.



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COMBINED DOOR CHECK AND CLOSER.

1,176,802. Specification of Letters Patent. Patented Mar. 28, 1916.

Application filed February 7, 1911. Serial No. 607,097.

To all whom it may concern:

Be it known that I, WINFIELD S. WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Combined Door Checks and Closers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to combined door checks and closers and has for its object the provision of an improved device of this character which is applicable to doors in such a way that it may be concealed from view.

It is the particular object of my invention to provide a simplified door check and closer of this character in which the number of parts necessary is reduced to a minimum and which shall have a high efficiency in its operation.

Generally speaking the device is designed to automatically close the door after it is opened, and is of use for single or double acting doors.

The device has means for permitting closure of the door throughout varying desired speeds. The device also has means whereby the door can be locked in any desired open position. The device also has means whereby this locking may be prevented if desired when the door is open to an angular position exceeding a predetermined amount. Means may also be provided so that the door may close with a given speed until it has reached a nearly closed position, at which time the speed of closure is rapidly increased so as to insure the absolute closure of the door.

I will describe my invention more in detail by reference to the accompanying drawing illustrating one embodiment thereof, in which:

Figure 1 is a longitudinally sectional view of my improved door check and closer with a portion of the door and casing likewise shown in section; Fig. 2 is a horizontal section of the link construction, Fig. 3 is a detail of the locking mechanism, and Fig. 4 is a sectional view of the arrangement of the piston and piston rod.

In the drawing I show a door casing 1 and a longitudinal sectional view of a portion of a door 2. A hinge having plates 3 and 4 is provided fastened respectively to the casing and the door. The portion 3 of the hinge has a projection 5 to which a link 6 may be pivotally secured. The link 6 extends to within the door check proper and is pivotally fastened to a piston rod 7. The door check proper comprises a cylinder 8 whose left hand extremity is closed and sealed with a tubular member 9. The member 9 has a packing box 10 through which the piston rod 7 passes and suitable packing 11 prevents the escape of fluid or liquid therethrough. The cylinder 8 is closed at its outer end by the head 12 as indicated, thus forming an inclosing cylindrical chamber within which a piston 13 may reciprocate. The piston 13 is secured to the inner end of the piston rod 7 to be reciprocated by the movement of the said rod, said rod being connected by the link 6 to the plate 3 of the hinge. Liquid 14 is preferably employed in the operation of the door check as here illustrated, although of course, it may be arranged in accordance with my invention to operate with any other suitable fluid. A tension spring 15 is preferably employed fastened to the head 12 and one extremity of the piston 13, which spring tends to draw the piston to the right. A compression spring 16 abutting between the tubular member 9 and the piston 13 is provided and likewise tends to move the piston toward the right. The springs are coil springs in both instances, the spring 16 being located as stated between the inner face of the piston and the outer face of the tubular plug member. The piston rod 7 is held in place within a spider structure 17 of the piston by means of a collar 18. In this way the piston rod 7 when moving toward the left as when the door is opened draws the piston 13 with it. The piston rod 7, however, has a slight lost motion as will be apparent, so that should the door be locked by instrumentalities to be explained later, an unusual pressure is exerted against the door tending to close the same, then the piston rod 7 in its automatic movement toward the right will move the collar 18 away from its seat and by virtue of the projection 19 will displace the check valve 20 from its seat for purposes to be explained hereinafter. The check valve 20 has a spring 21 and is so arranged that when the piston moves toward the left, liquid or other fluid may pass through the piston from the left hand cyl-

inder chamber to the right hand cylinder chamber, but when the piston is moved in a direction toward the right, this check valve 20 normally prevents the return of the liquid through the piston from the right hand cylinder chamber to the left hand cylinder chamber.

Assuming that the door is opened the liquid from the left hand side of the piston is withdrawn to the right hand side of the piston and after the door is released by the person opening the same the springs 15 and 16 tend to move the piston to the right, thus closing the door by virtue of the link 6. In its automatic movement toward the right the liquid in the right hand cylinder chamber being prevented from passing through the piston, passes through a port 22 which communicates with a preferably cylindrical tube 23, which tube 23 may be part of the cylinder 8. The liquid in passing through the port 22 enters the duct 24 and may pass through a check valve 25 into a cylindrical chamber 26 through a port 27, back to the left hand cylinder chamber.

The valve 25 is so arranged that its opening may be controlled by a valve rod 28, which valve rod is screw threadedly mounted within a support 29. By rotating the rod 28 it is moved toward or away from the valve 25 and thus permits a more or less opening of the same, thereby to regulate the speed of the returning door. The support 29 is mounted on a bell crank lever 30, and this bell crank lever is under the control of another lever 31 having two push buttons 32 and 33. In the normal position, as shown in Fig. 1, the valve 25 is permitted to open in accordance with the adjustment of the valve rod 28. After the door is opened and it is desired to lock the same in position so as to prevent its return, then push button 33 is actuated and it moves the valve rod 28 to the right through the agency of the levers 30 and 31 into engagement with the valve 25 to close the same so that no fluid or liquid may pass by the valve 25, and the springs 15 and 16 can therefore not return the door to normal position.

If, without unlocking by means of the push button devices, the door is forcibly closed, it is necessary to prevent breakage of the parts, and to this end the projection 19 on the piston rod 7 comes into play. Thus if it is attempted to forcibly close the door the valve rod 7 is pushed slightly toward the right without thereby moving the piston which is held in place by the liquid, but in its movement toward the right the piston rod by virtue of the projection 19 unseats the valve 20 and permits the return of liquid from the right hand cylinder chamber to the left hand cylinder chamber. It will thus be seen that the valve rod 7 is permitted a slight movement relative to the piston 13 and thus when this valve rod is forced to the right (Fig. 1), with the valve 20 closed, then the piston 13 being held in position permits a slight relative movement between the valve rod 7 and the piston 13, thereby unseating the ball 20 and permitting liquid from the right side of the piston to flow to the left side thereof, thus permitting the door to be slowly moved when in its locked position provided the pressure is of such strength as to overcome the normal retaining influence of the spring. A projection 34 is provided on the hinge plate 3 so that should the door forcibly be entirely closed this projection 34 actuates the push button 32 and restores the parts to their normal position.

Should the door be opened to an angular position of one hundred and ten degrees and locked in place as may be done with the construction so far described, a forcible attempt to close the door, the link 6 being almost at right angles to the piston rod 7, would tend to break the apparatus of the door check. It is thus advisable to prevent locking of the door when opened to an angular position of more than one hundred and ten degrees. This is done by providing a port 35 which is passed by the piston in its left hand movement immediately the door exceeds in its angular opening the one hundred and ten degree opening referred to, and the liquid can thus pass from the right hand cylinder chamber to the left hand cylinder chamber, through port 35, passageway 26, and port 27, port 27 being never closed by the piston, even should the door be open one hundred and eighty degrees. If the door thus is opened, say one hundred and fifty degrees and locked by means of the push button 33, the ports 35 and 27 will permit the flow of liquid uninterruptedly until the piston in its movement toward the right has closed the port 35, at which time the return of the liquid is limited to the valve 25, and the locking operation takes effect. Any degree of angular opening of the door may be chosen as the critical angle beyond which the locking by the push button 33 may be ineffective. A port 36 is provided which is opened just prior to the time the piston has reached its extreme right hand position, that is, a position in which the door is very nearly shut. The opening of this port 36, however, to the left hand cylinder chamber permits the uninterrupted flow of liquid from the right hand cylinder chamber to the left hand cylinder chamber without the regulating influence of the valve 25, and this sudden release of the liquid permits the door to make its final closure with an increased effort, thus to insure positive and definite closure. Slightly before this port 36 takes effect, however, say through an angular space of ten to fifteen degrees, it is desired that the door close

more slowly than during its long sweep after being open, say ninety degrees. This is accomplished by having the port 22 in a position where it is somewhat subject to the regulation of the piston 13.

The port 22 is always open to the right hand cylinder chamber but when the door in its closing movement has reached a point about ten or fifteen degrees away from absolute closure, the piston is over the port 22 and somewhat restricts the flow of liquid by compelling the liquid to flow through the groove 37 provided in the lower portion of the said piston. It will thus be seen that during each closure of the door from, say a ninety degree opening, the liquid will pass uninterruptedly through the port 22, then through the regulating valve 25 and back into the left hand cylinder chamber. When the door however, is within about fifteen degrees of being shut, the piston 13 somewhat restricts the flow of liquid through the port 22 and the door begins to move more slowly. When the door is very nearly closed the port 36 is opened and the door moves with greatly increased speed and freedom to insure closure. A packing box 38 serves to prevent loss of liquid at the point of entrance of the valve rod 28. The head 12 of the cylinder has an eye 39 preferably integral therewith which is adapted to receive the screw 40 to hold the check in place.

It will be seen from the description which has been given that the door check shown herein is capable of providing all of the necessary operative conditions as outlined in the preamble. I do not, of course, means to limit myself to the particular structure as it is set forth herein, nor to the use of all of the devices and means as set forth herein, as my invention is capable of a great many modifications and a great variety of uses, but

Having thus described one embodiment which my invention may take with its various sub-combinations, what I claim as new and desire to secure by Letters Patent is:

1. A door check and closer, having a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; an emergency valve carried by said piston and controlling the flow of the liquid in one direction from one side of said piston to the other, said valve inert during the normal closure of the door; and a door actuating spring within said cylinder, and acting on said piston to close the door.

2. A door check and closer, having a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; an emergency check valve carried by said piston and controlling the flow of fluid in one direction from one side of said piston to the other, inert during the normal closure of the door; and door actuating springs within said cylinder and acting on opposite ends of said piston to close the door.

3. A door check and closer, having a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; a valve carried by said piston and controlling the flow of fluid in one direction from one side of said piston to the other; means by which said valve may be unseated to relieve sudden pressure upon the door; means for permitting the return of said fluid; and a door actuating spring within said cylinder and acting on said piston to close the door.

4. A door check and closer, having a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door, a check valve carried by said piston and controlling the flow of fluid in one direction from one side of said piston to the other; means associated with the piston rod for temporarily unseating the check valve; means for regulating the return of said fluid; and door actuating springs within said cylinder and acting on opposite ends of said piston to close the door.

5. A door check and closer, having a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; an emergency valve carried by said piston and normally controlling the flow of fluid in one direction from one side of said piston to the other; means associated with the piston rod for temporarily unseating the check valve; a duct for permitting the return of the fluid; and a door actuating spring within said cylinder and acting on said piston to close the door.

6. In a door check and closer, in combination with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; an emergency valve carried by said piston and normally controlling the flow of liquid in one direction from one side of said piston to the other; means associated with the piston rod for temporarily unseating the check valve; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; and a door actuating spring within said cylinder and acting on said piston to close the door.

7. In a door check and closer, in combi-

nation with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve carried by said piston and normally controlling the flow of liquid in one direction from one side of said piston to the other; means to automatically unseat the said valve when sudden unusual strain is brought to bear upon the door in closing; a duct for permitting the return of said fluid, means for adjustably controlling the flow of fluid through said duct, and a door actuating spring within said cylinder and acting on said piston to close the door.

8. In a door check and closer, in combination with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve carried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for adjustably controlling the flow of fluid through said duct; means for actuating said controlling means to hold the parts in a given predetermined position; and a door actuating spring within said cylinder and acting on said piston to close the door.

9. In a door check and closer in combination with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same; said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve carried by said piston and controlling the flow of fluid in one direction from one side of said piston to the others; a duct for permitting the return of said fluid; means for adjustably controlling the flow of fluid through said duct; means for actuating said controlling means to hold the parts in a given predetermined position; and door actuating springs within said cylinder and acting on opposite ends of said piston to close the door.

10. In a door check and closer in combination with a checking cylinder; a piston movable therein; a check valve carried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; a by-pass controlled by the piston to permit return of the fluid independently of said return permitting means aforesaid; and a door actuating spring within said cylinder and acting on said piston to close the door.

11. In a door check and closer in combination with a checking cylinder; a piston movable therein; a check valve carried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; a by-pass controlled by the piston to permit return of the fluid independently of said return permitting means aforesaid; and door actuating springs within said cylinder and acting on opposite ends of said piston to close the door.

12. In a door check and closer, in combination with a checking cylinder; a piston movable therein; a check valve carried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; a by-pass controlled by the piston to permit return of the fluid independently of said return permitting means aforesaid; a second by-pass controlled by the piston to permit return of the fluid independently of said return permitting means aforesaid; and a door actuating spring within said cylinder and acting on said piston to close the door.

13. In a door check and closer in combination with a checking cylinder; a piston movable therein; a check valve carried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; a by-pass controlled by the piston to permit return of the fluid independently of said return permitting means aforesaid; a second by-pass controlled by the piston to permit return of the fluid independently of said return permitting means aforesaid; and door actuating springs within said cylinder and acting on opposite ends of said piston to close the door.

14. In a door check and closer in combination with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve carried by said piston and controlling the flow of fluid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; means controlled by the piston when near the limit of its return stroke to throttle the return of the returning fluid; and a door actuating spring within said cylinder and acting on said piston to close the door.

15. In a door check and closer, in combination with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve car-

ried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for controlling the flow of fluid through said duct; means controlled by the piston when near the limit of its return stroke to throttle the return of the returning fluid; and door actuating springs within said cylinder and acting on the opposite ends of said piston to close the door.

16. In a door check and closer, in combination with a checking cylinder; a piston therein, a piston rod associated with said piston to move the same, said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve carried by said piston and controlling the flow of liquid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for adjustably controlling the flow of fluid through said duct; means controlled by the piston when near the limit of its return stroke to throttle the return of the returning fluid; and a door actuating spring within said cylinder and acting on said piston to close the door.

17. In a door check and closer, in combination with a checking cylinder; a piston therein; a piston rod associated with said piston to move the same; said piston and piston rod being movable in a plane parallel to the plane of the door; a check valve carried by said piston and controlling the flow of fluid in one direction from one side of said piston to the other; a duct for permitting the return of said fluid; means for adjustably controlling the flow of fluid through said duct; means controlled by the piston when near the limit of its return stroke to throttle the return of the returning fluid; door actuating springs within said cylinder and acting on opposite ends of said piston to close the door.

18. In a door check and closer, in combination with a checking cylinder; a piston therein; a piston for moving said piston rod, said piston and piston rod being movable in a plane parallel to the plane of the door; a door actuating spring interposed between the said cylinder and piston, for acting on said piston to close the door; means on said piston permitting of the flow of fluid in one direction from the cylinder chamber on one side of said piston to the cylinder chamber on the other side of said piston; and ports in said cylinder controlled by said piston to govern the return flow of said fluid.

In witness whereof, I hereunto subscribe my name this 25th day of January A. D., 1911.

WINFIELD S. WILLIAMS.

Witnesses:
A. LYDA JONES,
HAZEL JONES.