L. C. NORTON.

DOOR CLOSER AND CHECK.

APPLICATION FILED AUG. 13, 1914.

1,124,941. Patented Jan. 12, 1915.

Fig. 1.

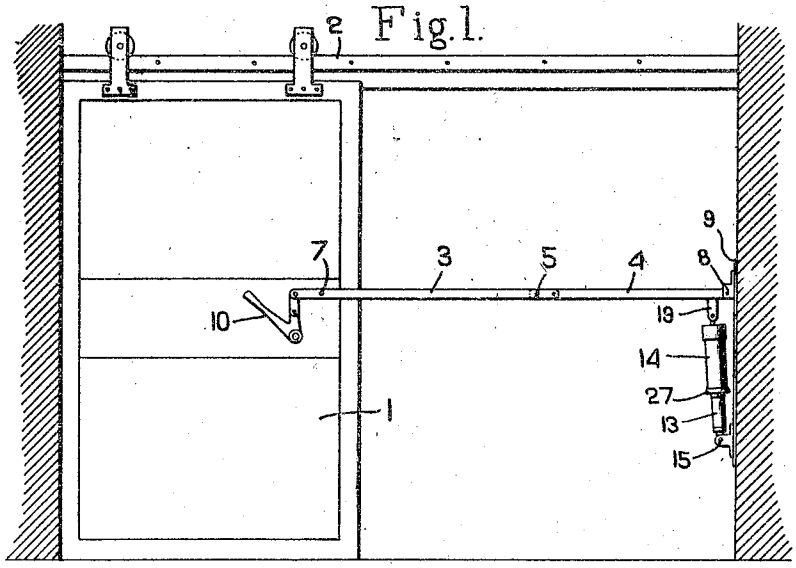


Fig. 2.

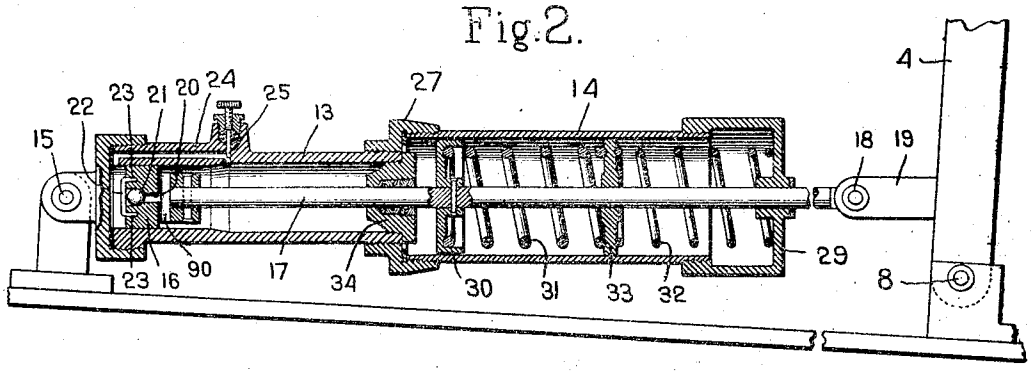
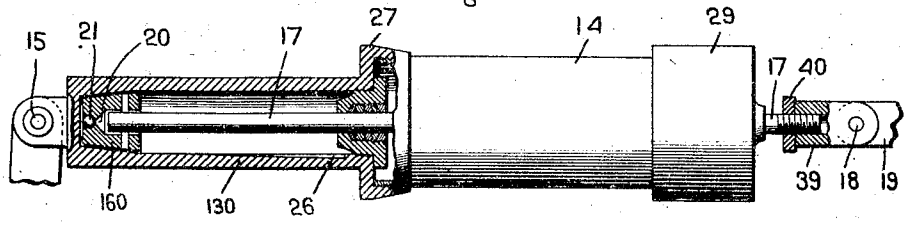


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEWIS C. NORTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO NORTON DOOR CHECK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

DOOR CLOSER AND CHECK.

1,124,941. Specification of Letters Patent. Patented Jan. 12, 1915.

Application filed August 13, 1914. Serial No. 856,541.

To all whom it may concern:

Be it known that I, LEWIS C. NORTON, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented an Improvement in Door Closers and Checks, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to door closer and check devices such as are commonly used in connection with sliding doors that are operated by means of a toggle lever operating mechanism. A door-operating mechanism of this type is shown in my co-pending application Se. No. 809,099, December 27, 1913, and the device of the present application is the door closer and check device which cooperates with the toggle lever mechanism to close the door and simultaneously check its closing movement.

These door closers and checks are commonly made with a spring for closing the door and a dash-pot arrangement for checking the closing movement of the door.

The object of the present invention is to provide a novel door closer and check in which the checking portion of the device is in the nature of a liquid check, and in which the spring by which the door is closed is situated in a chamber separate from the liquid-containing chamber, and also to provide a construction of this type which can be readily adjusted to allow for a quicker or slower checking movement, and to provide means for adjusting the tension of the spring to suit the requirements of use.

Other features of the invention will be more fully hereinafter described and the novelty of the invention will then be pointed out in the appended claims.

In the drawings wherein I have shown a selected embodiment of my invention, Figure 1 is a general view showing a sliding door operated by a toggle lever and having my improved door closer and check associated therewith; Fig. 2 is a longitudinal sectional view through a door closer and check embodying my invention; Fig. 3 is a similar view showing a different form of the invention.

1 designates a sliding door which is supported on a suitable track 2. This door is operated by means of a toggle lever device comprising two members 3 and 4 pivotally connected together at 5, the member 3 being pivoted to the door at 7, and the member 4 being pivoted at 8 to a fixed abutment, such, for instance, as the wall 9. The toggle lever may be operated in any suitable way, as by means of a handle 10.

The device above described is similar to that illustrated in my co-pending application Se. No. 809,099; and forms no part of my present invention.

In door-operating devices of this nature it is customary to provide a door closer and check which is connected to the member 4 of the toggle lever device and which operates automatically to close the door when the latter is opened and to check the closing movement thereof.

My improved door closer and check comprises a door-checking cylinder 13 and a spring-receiving cylinder 14 connected thereto. These two cylinders are preferably rigidly connected together to form a unitary structure, and the cylinder 13 is pivotally connected at its lower end to the fixed abutment, as shown at 15. This cylinder has therein a piston 16, the piston rod 17 of which extends through the cylinder 14 and is pivotally connected at 18 to an arm 19 extending laterally from the toggle member 4. The piston 16 is provided with a centrally-located port 20 that is controlled by a valve 21, said port communicating with the transverse ports 90 that open into the cylinder in front of the piston. The valve 21 is held in place by a guard wire 22 which has its ends inserted into recesses 23 formed in the piston. The walls of the cylinder 13 are provided with a by-pass port 24 which is controlled by a suitable valve 25. This by-pass port extends part way of the length of the cylinder and the portion of the cylinder beyond the by-pass is made slightly larger than the piston. The cylinder is filled with liquid, thus constituting a liquid check, and with this construction it will be seen that the piston can be moved freely outwardly when the door is open because of the opening of the valve 21. When the door is closed, however, the first portion of the movement will be comparatively free, due to the fact that the piston is traveling

through the larger portion of the cylinder, and the liquid in front of the piston can pass around the latter comparatively freely. When the piston passes the by-pass port, however, and comes into the smaller portion of the cylinder which it fits, then the piston can move only as fast as the liquid can flow through the by-pass port as controlled by the valve 25.

The spring for closing the door is received in the spring-receiving cylinder 14, as above stated, and in the preferred embodiment of my invention this cylinder is screwed into the head 27 of the cylinder 13, said head being preferably separate from and detachably applied to the cylinder, although it might be integral therewith. This head is provided with a packing gland 34 through which the piston rod 17 passes and which prevents any leakage of liquid from the cylinder 13.

The spring which I propose to employ for closing the door is a compound spring formed of two members, one of which is stronger than the other. In the illustrated embodiment of my invention these two spring members are shown at 31 and 32, respectively, and are arranged in line with each other. The spring 31 bears against the collar 30 fast on the piston rod and also bears against a separator or floating collar 33 loosely mounted on the piston rod. The spring 32 bears at one end against the separator and at the other end against the head 29 of the piston 14. When the door is opened the upwardly-swinging movement of the member 4 draws the piston rod 17 upwardly, thus compressing the springs 31, 32 and as the spring 32 is lighter and has less strength than the spring 31 said lighter spring 32 will first be compressed after which the spring 31 will be compressed, and during the compression of the spring 31 the collar or separator 33 will slide along the piston rod 17. It will be noted that when the door is in its open position the force of both springs 31 and 32 is applied to the laterally-extending arm 19, and thus tends to close the door. As the door closes the spring 31 is first expanded and thus the initial closing movement of the door is due to the expansive force of the stronger spring. When the door has been partially closed and the stronger spring 31 is expanded, then the weaker spring expands and finishes the closing movement of the door. During this final closing movement, the door is checked as above described. It will be noted that while the stronger spring 31 is acting to close the door the piston can have a comparatively free movement in the cylinder 13, but when the stronger spring has expanded and while the weaker spring is acting the movement of the door is being checked as above described. With this arrangement it is possible to get a quick closing of the door and yet have a complete checking thereof so that the door will not slam.

In order to adjust the tension of the springs I propose to adjustably mount the head 29 on the cylinder 14, this being herein accomplished by screw-threading said head to the cylinder.

In Fig. 3 I have shown a slightly different form of my liquid check in which the piston 160 is tapered and the end of the cylinder 130 is also tapered. This taper construction is employed in lieu of the by-pass 24 in Fig. 2. In other respects this construction is like that shown in Fig. 2, except that the upper end of the cylinder 13 is provided with a groove 26 of varying depth which permits the piston 160 to have a comparatively free movement at the upper end of the cylinder. Moreover in this embodiment the piston rod 17 is adjustably connected to the arm 19. As herein shown, said end of the piston rod is screw-threaded into a head 39 that is pivoted at 18 to the arm 19, a check nut 40 being employed to lock the piston rod in its adjusted position. By means of this construction the piston rod can be lengthened or shortened thereby to vary the position of the piston 160 in the tapered end of the cylinder. The purpose of this is to provide for bringing the door to rest with a more or less gentle movement.

I claim:

1. A door closer and check comprising a checking cylinder and a spring-receiving cylinder connected together, a valved piston in the checking cylinder, a piston rod connected thereto and extending through the spring-receiving cylinder, two springs of different tension in the spring-receiving cylinder and arranged in line with each other, and a separator between said springs slidably mounted on the piston rod and freely movable in said cylinder whereby one spring acts on the piston rod through the other.

2. A door closer and check comprising a checking cylinder having a head at one end and a by-pass port, the interior bore of said cylinder adjacent said port being of less diameter than the remainder of the cylinder, a valved piston in the checking cylinder which fits the portion of smaller diameter, a valve controlling the by-pass port, a spring-receiving cylinder sustained by said head, a piston rod connected to the piston and extending through the spring-receiving chamber, a separator in the latter chamber loosely mounted on said piston rod and movable freely in the cylinder, a collar fast on the piston rod, and two springs of different tension in said spring-receiving chamber, one interposed between said collar and separator and the other between said separator and the head of the cylinder.

3. In a combined door closer and check,

the combination with a checking cylinder, of a spring-receiving cylinder detachably connected thereto and provided with an adjustable head, a valve piston in the checking cylinder, a piston rod connected thereto and extending through the spring-receiving cylinder, a collar fast on said piston rod, and a separator loosely mounted on said rod and movable in the spring-receiving cylinder, two springs, one situated between the collar and the separator and the other between the separator and the adjustable head, said springs being of different tension.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

LEWIS C. NORTON.

Witnesses:
E. BELLEW,
E. M. CLARK.