

Nov. 20, 1962

R. K. GRAY ET AL  
VALVE FOR DOOR CLOSER

3,064,303

Filed May 18, 1959

*Fig. 1.*

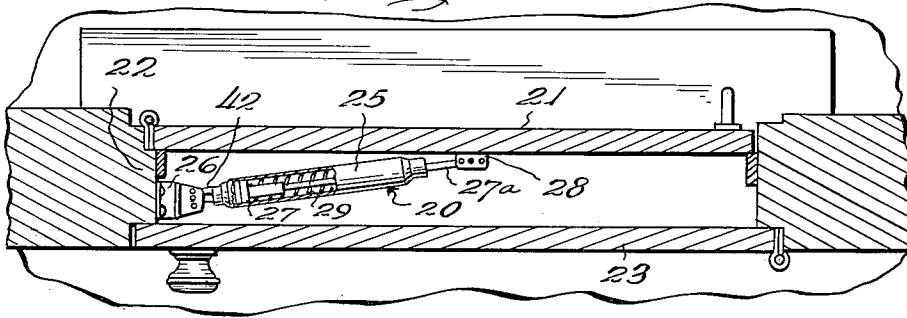


*Fig. 2.*

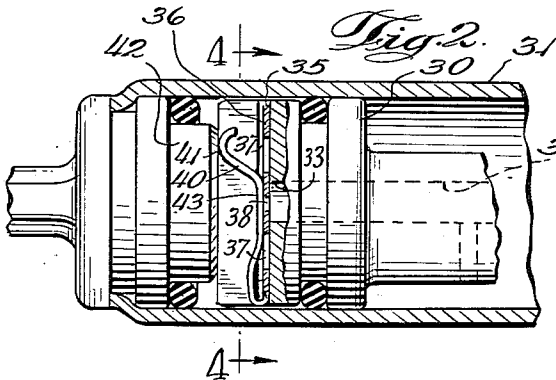


*Fig. 4.*

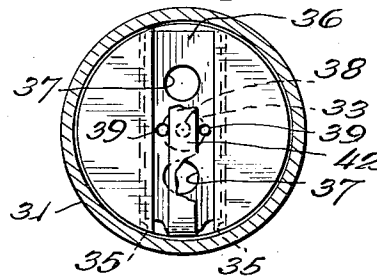


*Fig. 3.*

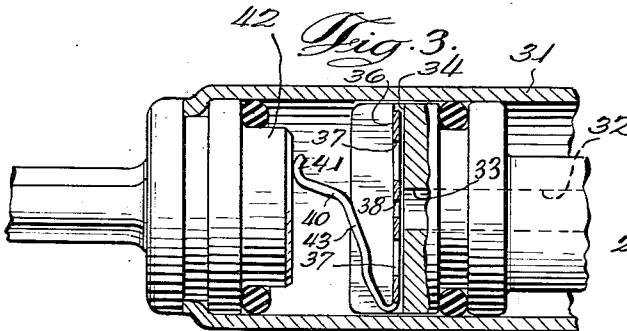
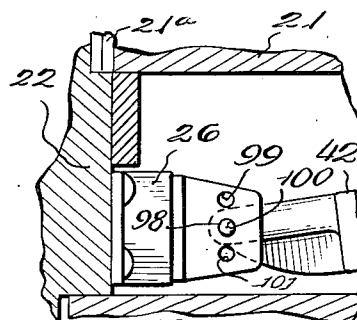


*Fig. 5*

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3,064,303

## VALVE FOR DOOR CLOSER

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Filed May 18, 1959, Ser. No. 814,117

2 Claims. (Cl. 16—52)

This invention relates to a door closer and more particularly to a hydraulic piston and cylinder door closer.

A principal object of this invention is the provision of improved valve means for controlling the flow of hydraulic fluid through the piston of a piston and cylinder door closer to effect a retarding action on the movement of the door during closing.

One feature of the invention is the provision in a hydraulic door closer of a cylinder with a piston slidable therein and having a flow passage therethrough. A spring urges the piston toward closed position and a valve including spring means is mounted on one of the piston and cylinder and engageable with the other on closing movement of the piston, a portion of the valve spring means having a flow restricting relation with the flow passage.

Another feature is a spring valve which includes a plate portion carried by the piston and having a flow orifice therethrough and an extension projecting toward an end member of the cylinder and engageable therewith on closing movement of the piston, moving a portion of the extension into restricting relation with the flow orifice in the plate. A further feature is that the plate portion of the valve member is loosely carried on the face of the piston and moves away therefrom on opening movement of the piston and is forced against the face of the piston on closing movement.

And a further feature is the provision in a piston and cylinder door closer of a jamb bracket to which the cylinder is connectable at one of a plurality of points spaced across the width of the jamb. Variation of the point of connection between the cylinder and bracket controls the maximum extent of opening of the door and the closing force exerted by the return spring on the door.

Further features and advantages will readily be apparent from the following specification and from the drawing, in which:

FIGURE 1 is a plan view of a door closer embodying the invention, mounted on a door;

FIGURE 2 is a fragmentary section of an embodiment of the invention;

FIGURE 3 is a view similar to FIGURE 2 showing the parts in a different position;

FIGURE 4 is a section taken generally along line 4—4 of FIGURE 2;

FIGURE 5 is an enlarged fragmentary detail of the jamb mounting bracket.

The invention is disclosed herein as embodied in a hydraulic piston and cylinder door closer of the general type disclosed and claimed in our copending application Serial No. 764,400 filed September 30, 1958 and assigned to the assignee of this application. However, there are certain features of the invention which may find application in other types of door closers, as will appear to those skilled in the art from the following description.

Turning now to FIGURE 1, a door closer 20 is shown connected between an outer or storm door 21 and the jamb 22 adjacent the hinged edge of the door. The use of door closers is of course not limited to storm doors, as they may be used, for example, on the inner door 23 or on interior doors of homes, offices, or other establishments. The closer 20 includes a cylinder 25 connected at one end with a jamb bracket 26 secured to the jamb 22, a piston 27 connected through rod 27a with a door

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bracket 28 secured to door 21 and a return spring 29 urging the piston to the left in FIGURE 1, closing door 21.

When the door opened, the piston is retracted in the cylinder compressing spring 29. During this action, hydraulic fluid in the cylinder flows through a passage in the piston from the right side of the cylinder to the left. When the door is released, spring 29 urges piston 27 to the left pulling the door closed. A valve arrangement is generally provided in the fluid flow passage through the piston to control the rate of closing. The present invention is particularly concerned with this valve arrangement and with secondary valve mechanisms for retarding or slowing the closing rate just as the door is about to latch. Details of the construction of the closer and its operation not found herein may be found in the aforementioned copending application.

In FIGURES 2—4, piston 30 is slidable in cylinder 31 and has a flow passage 32 therethrough terminating in an orifice 33 in the central portion of the left face 34 of the piston. A pair of channels 35 are formed on either side of the piston face 34 and carry a valve member 36 of springy material. The grooves 35 are wider than valve member 36 so that it can move back and forth between the position shown in FIGS 2 and 3. On opening movement of piston 30 (to the right), i.e. movement corresponding for opening of the door, valve member 36 moves to the left as shown away from the face 34 of the piston. The hydraulic fluid in the cylinder flows through passage 32 and the openings 37 and 38 in valve member 36 into the left section of the cylinder 31. On closing movement of the piston, i.e. corresponding with closing movement of the door, the piston moves to the left and valve member 36 seats against the face 34 of the piston closing opening 37. The return flow of hydraulic fluid is through the opening 38 and two small openings 39, on either side thereof into passageway 32.

Extending outwardly and upwardly from the lower end of valve member 36 is a spring arm 40 which has a curved end portion 41 that engages cylinder end member 42 shortly before the piston reaches its fully closed position. In the final stage of piston movement, the spring extension 40 is forced into the position illustrated in FIG. 2 with the central portion 42 thereof overlying and closing off opening 38 in the valve member. The return flow of hydraulic fluid is then limited to that which passes through the small openings 39, further retarding the speed of closing to prevent door 21 from slamming.

In FIG. 5, the novel construction of jamb bracket 26 is illustrated. End member 42 of cylinder 25 is connected with the jamb bracket by a pin 98 inserted through holes in the bracket and end member. Bracket 26 is provided with three holes 99, 100 and 101, for this purpose, the holes being spaced across the width of the door jamb. The hole selected for making the connection between the bracket and closer cylinder determines the maximum opening angle of the door, and by varying the angle between the door and closer, controls the closing force applied to the door by the return spring. With hole 99 closest to door hinge 21a, the maximum door opening angle and minimum closing force are provided. With hole 101 farthest from hinge 21a, minimum door opening angle and maximum closing force are achieved. Intermediate hole 100 provides intermediate values of opening angle and closing force.

While we have shown and described a certain embodiment of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. In a hydraulic door closer: a cylinder; a piston

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slidable in said cylinder and having a flow passage there-  
through; a spring urging said piston toward closed posi-  
tion; and valve means of springy material including  
a plate portion carried by said piston, having a fluid  
flow orifice therethrough and an extension projecting to-  
ward an end member of said cylinder, engageable there-  
with on closing movement of the piston, moving a  
portion of the extension into restricting relation with the  
flow orifice in said plate portion.

2. In a hydraulic door closer: a cylinder; a piston 10  
slidable in said cylinder and having a flow passage there-  
through, having a pair of channels in the face thereof;  
a spring urging said piston toward closed position; and  
valve means of springy material including a plate por-  
tion loosely carried in said channels adjacent the piston 15  
face, said plate portion having a flow orifice therethrough  
and an extension projecting toward an end member of  
said cylinder, engageable therewith on closing movement

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of the piston, moving a portion of the extension into re-  
stricting relation with the flow orifice in said plate por-  
tion, said plate portion moving away from the face  
of said piston on opening movement and against the face  
of the piston on closing movement of the piston.

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