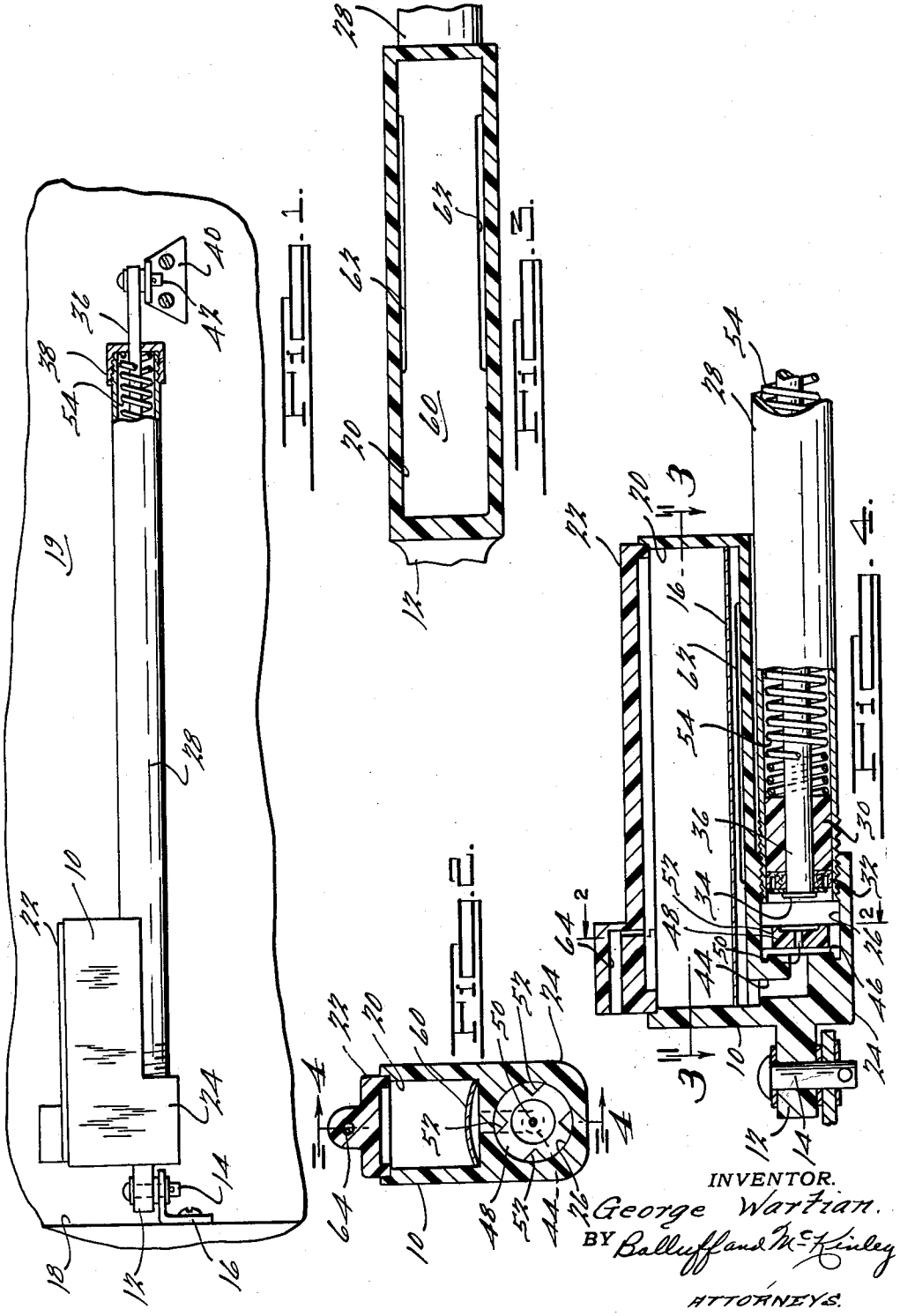
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DOOR CLOSER

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DOOR CLOSER

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This invention relates to a door closer and has particular reference to a door closer in which a piston is adapted to compress a spring as the door is opened and in which the rate of closing of the door is controlled by forcing a liquid trapped behind the piston through a restricted bleed orifice. The construction of the present door closer is such that the hydraulic liquid is contained within the cylinder on only one side of the piston and does not flow through the piston or valve devices carried by the piston, thereby eliminating the need for a seal between the cylinder and the piston rod which is attached to the door.

A principal object of the invention is to provide a new and improved spring actuated hydraulically regulated door closer.

Another object of the invention is to provide a door closer which is simple in construction and efficient in operation.

A further object of the invention is to provide a door closer having an improved means of regulating the closing movement of the door.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawing, which by way of illustration shows a preferred embodiment of the invention and what I now consider to be the best mode of applying the principles thereof. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawing:

FIG. 1 is a side elevational view of the door closer;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 4;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 4; and

FIG. 4 is a sectional view taken on line 4—4 of FIG. 2.

The door closer comprises a housing 10 having a hinge member 12 projecting from one end thereof and adapted to receive a pin 14 for pivotally connecting the housing 10 to a bracket 16 secured to the door frame 18. The housing defines a reservoir 20 adapted to contain a supply of liquid such as oil and is provided with a cover plate 22 secured thereto in any suitable manner. The housing further includes a boss 24 projecting downwardly from its bottom wall at one end thereof. The boss is provided with a cavity defining a valve chamber 26 which is threaded at its outer end to receive the inner end of a cylinder 28 in the form of a cylindrical tube. A piston 30 is reciprocable within the cylinder 28 and includes a washer 32 secured thereto by a rivet 34 on the end of the piston rod 36. The piston rod 36 projects through the end cap 38 on the outer end of the cylinder 28 and is pivotally connected to a bracket 40 by means of a pin 42. The bracket 40 is secured to the door 19, although it will be apparent that the housing could be mounted on the door and the piston rod mounted on the door frame if desired.

A passage 44 provides communication between the reservoir 20 and the valve chamber. A valve seat 46 is formed around the passage 44 where the latter enters the chamber 26. A valve member 48 is slidable axially within the chamber 26 and is provided with a restricted opening 50 therein in line with the passage 44. The valve member 48 is provided with a series of notches 52 in its outer periphery defining passages for the unrestricted flow of liquid past the valve member 48 into the inner end of the cylinder 28 when the valve member 48 is disengaged from the valve seat 46, as shown in the drawing.

When the door is opened the piston 30 will be moved by the piston rod 36 outwardly through the cylinder 28 against the force of the spring 54 which is confined between the piston 30 and the end cap 38, thus providing a predetermined resistance to opening movement of the door. The movement of the piston through the cylinder will reduce the pressure within the valve chamber 26 sufficiently to pull the valve member 48 away from the valve seat 46 so as to permit substantially unrestricted flow of oil from the reservoir 20 through passage 44 and around valve member 48 into the left-hand end of the cylinder 28.

When the door is released, the spring 54 will force piston 30 to the left and the increased pressure in the valve chamber 26 will force the valve member 48 into engagement with its valve seat 46, thereby closing the unrestricted communication between the reservoir 20 and the valve chamber. The liquid thus trapped in the left-hand end of the cylinder 28 and the valve chamber 26 can escape only through the bleed orifice 50 thereby controlling the rate of closing movement of the door.

A baffle 60, which is arcuate in cross section as shown in FIG. 2, is located in the bottom of the reservoir 20 and is provided with elongated cut-out portions 62 at each side thereof. The upper end of the passage 44 opens into the space beneath the baffle 60 and the oil returning through the passage 44 is prevented by the baffle 60 from being ejected directly against the underside of the cover plate 22. The cover plate 22 is provided with a vent passage 64 communicating with the reservoir 20. The baffle 60 prevents the returning liquid from possibly being discharged through the vent passage 64 and insures that the liquid above the baffle 60 will be in a relatively quiescent state.

It will be seen that the present invention provides a relatively simple device of very few parts but which is very efficient in operation and will accurately regulate the rate of closing of the door. By virtue of the valve construction used herein the oil is prevented by the seal 32 from reaching the right-hand end of the cylinder 28 and there is therefore no need for a seal between the piston rod 36 and the outer end of the cylinder. The opening in the end cap 38 through which the piston rod extends may be large enough to provide an air vent for the right-hand end of the cylinder.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A door closer comprising a housing having a valve chamber therein, a cylinder having one end threaded into and communicating with said valve chamber and extending outwardly from said housing, a piston reciprocable in said cylinder, a piston rod secured to said piston and projecting through the other end of said cylinder, a spring urging said piston toward said one end of said cylinder, a liquid reservoir in said housing, a passage in said housing between said reservoir and said valve chamber, a valve seat at one end of said valve chamber around said passage and opposed to said one end of said cylinder, a disc-shaped valve member slidably mounted in said valve chamber and having a restricted opening therethrough aligned with said passage, said valve member being engageable with said valve seat as said piston moves toward said one end of said cylinder whereby the liquid trapped in said cylinder is discharged back to said reservoir

through said restricted opening to regulate movement of said piston toward said one end of said cylinder, said valve member having notches in its periphery and being movable away from said valve seat in response to the suction created by movement of said piston toward the other end of said cylinder thereby to open said passage to permit unrestricted flow of liquid from said reservoir into said cylinder, and means on said housing and on the outer end of the said piston rod for pivotally mounting one of such members on a door frame and the other on a door.

2. A door closer according to claim 1 including a baffle extending across the bottom of said reservoir, said baffle overlying the opening of said passage into said reservoir and being spaced from the bottom wall of said reservoir

to define a space into which the liquid returning from said cylinder is discharged.

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