March 5, 1940. N. B. HURD 2,192,745

DOOR CLOSER

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Fig. 1.

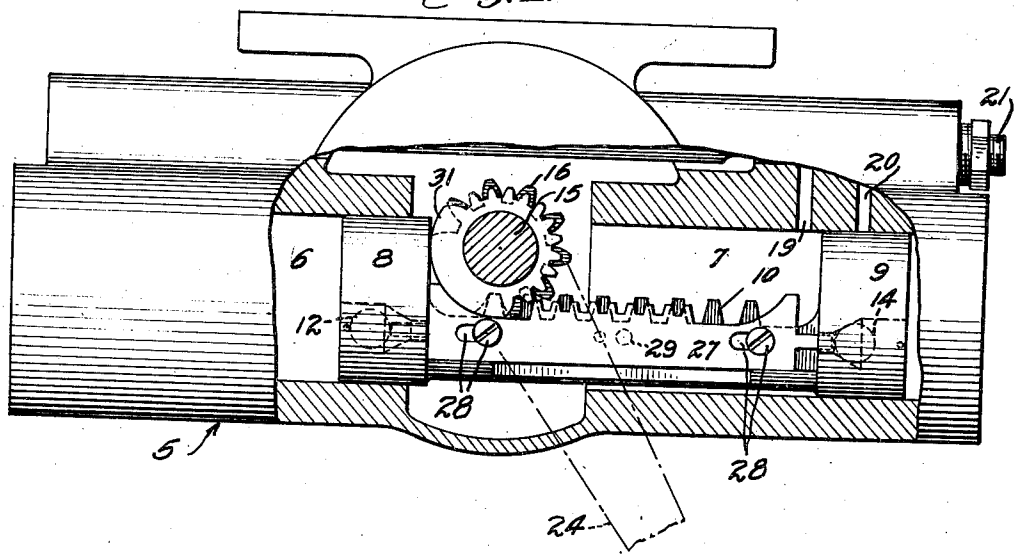
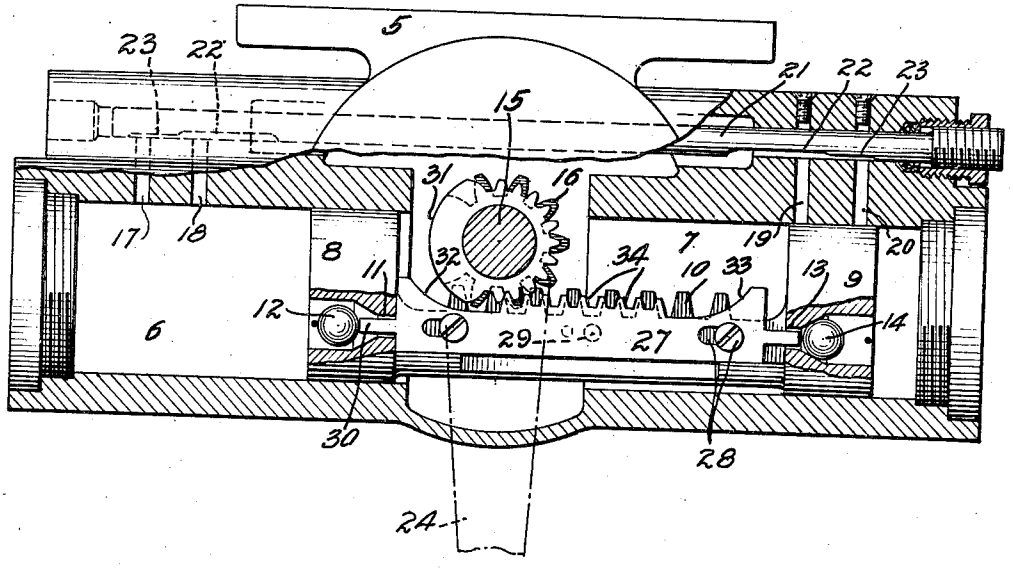


Fig. 2.



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Fig. 3.

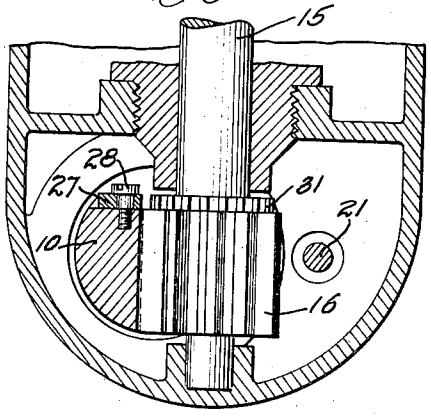


Fig. 4.

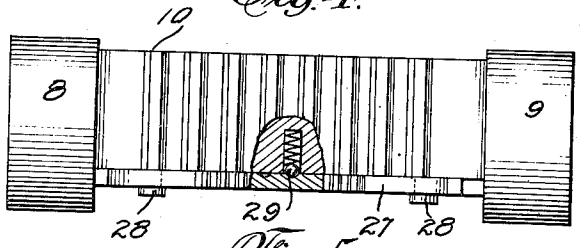
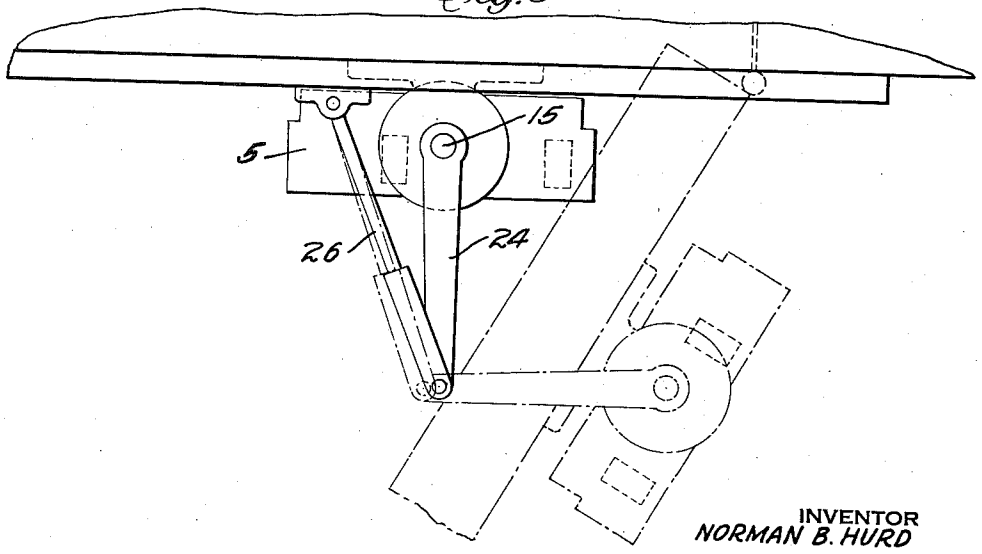


Fig. 5



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Patented Mar. 5, 1940 2,192,745

UNITED STATES PATENT OFFICE

2,192,745

DOOR CLOSER

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Application January 7, 1939, Serial No. 249,690

13 Claims. (Cl. 16—56)

My invention relates to a door closer.

In door closers of the double end piston type one piston is used in operating left-hand doors while the other piston is utilized for right-hand doors. The pistons usually have check valves therein for permitting the free flow of fluid into said cylinders and manually adjustable valves are provided for limiting the egress of fluid from said cylinders to limit the rate of door closing. The adjusting valve for controlling the piston which is inactive is usually open when that piston is not used. In other words, the active piston and the adjustable means are employed only for that cylinder having the active piston. With such a door closer, if when the door is closed someone closes the adjustable valve so as to seriously restrict or prevent the egress of fluid from the inactive cylinder, the door cannot be opened. Such a condition is annoying and may be dangerous.

It is an object of my invention, therefore, to provide means for eliminating danger of causing the inactive piston of a door closer to prevent opening the door.

Another object is to provide improved safety means in a door closer which is easily operated.

Another object is to provide improved safety means for a device of the character indicated which may be operated without opening up the door closer and which cannot be operated while the door closer is properly connected to the door.

Another object is to provide an improved manual adjusting means for the valves of a double end piston door closer.

Other objects will be hereinafter pointed out or will become apparent to those skilled in the art.

In the drawings which show, for illustrative purposes only, a preferred form of the invention—

Fig. 1 is a top plan view of a double end piston rack and pinion type door closer, parts being broken away to illustrate the interior construction;

Fig. 2 is a view similar to Fig. 1, illustrating certain parts in different positions and having parts broken away on a different section to show other interior parts;

Fig. 3 is a central, vertical sectional view through the shaft of the closer shown in Figs. 1 and 2;

Fig. 4 is a rear view in elevation of the double end piston assembly, illustrating a feature of the invention;

Fig. 5 is a more or less conventional or diagrammatic view, illustrating a door closer of the type illustrated applied to a left-hand door.

In said drawings, 5 indicates a door closer casing having opposed cylinders 6—7. In these cylinders are pistons 8—9 connected to each other as by means of the rack bar 10 as is usual in constructions of the type indicated. The piston 8 has a passage 11 therethrough controlled by a check valve 12. The piston 9 has a similar passage 13 therethrough controlled by the check valve 14. These checks open outwardly, as will be clear. The casing is provided with a closer shaft 15 which carries a pinion 16 meshing with the rack 10 so that upon rotation of the shaft 15 under the influence of the closer arm the pistons will be moved back and forth as is usual in devices of this type.

The cylinder 6 forwardly of the piston 8 has passages 17—18 and the cylinder 7 has corresponding passages 19—20 through which fluid in advance of the pistons may escape back into the casing at the tail ends of the pistons. Heretofore, it has been usual to provide independent hand adjusted valves for the two sets of passages for the cylinders. Such independent valves usually confuse the inexpert and trial is required to determine which valve controls the check when installed on a particular handed door. However, I provide a single manually operated valve means which may be in the form of a valve rod or bar 21 having slabbed off or grooved portions 22—23. Such slabbed off or grooved portions extend over the respective passages in the cylinders and by rotating the rod 21 such passages are more or less closed so as to regulate the speed at which the piston can move toward the head end of its cylinder under the influence of the closer arm. It will be seen that the slabbed off portions 22 will permit a relatively heavy flow of fluid and a relatively quick closing of the door while the terminal portions 23 of the valve substantially restrict the flow and cause the latter portion of the door closing movement to be substantially retarded. Since only one cylinder is active in connection with any one door, the single adjusting valve 21 may be employed for controlling the passage of fluid from either cylinder and even though the passages for the other cylinder be completely closed off no harm will result by reason of a further feature of my invention. With the door closer installed on a left-hand door as viewed in Fig. 5, with the closer arm 24 connected to the shaft 15 and the end of the arm connected by the usual link 26 with the door, it will be seen that the closer shaft 15 will be operated in a clockwise direction upon opening of the door. When the shaft 15 is thus operated in a clockwise direction only the piston 9 is active, that is to say, the fluid flows from the

casing past the check valve 14 into the head end of the cylinder 7. When the door is closed under the influence of the spring (not shown) in the closer, the check valve 14 of course closes and the flow of fluid from the cylinder through the passages 19—20 is restricted by the valves as heretofore described. Ordinarily during the opening of the door the check valve 12 would be closed and reliance would be placed on the opening of the passages 17—18 for the free by-pass of the checking fluid from the inactive cylinder. However, as stated above, should those valve controlled passages be closed or substantially restricted, the door could either not be opened at all or only slowly and with difficulty. I have provided an improved means for rendering the piston 8 inactive whether or not the passages 17—18 are opened.

I provide means for unseating the valve 12 while the piston 8 is inactive, that is, while the closer is used on a left-hand door. In the form shown there is a plate 27 movably carried with the pistons, preferably as by means of a pin and slot connection 28 between the plate 27 and the rack bar. A detent 29 of suitable form serves to hold the plate 27 in either its extreme left-hand position as illustrated in Figs. 1 or 2, or in its extreme right-hand position, as will be understood. Thus, when the plate 27 is moved to its left-hand position as illustrated in the drawings, the unseating nose 30 will unseat the valve 12 and hold it in such unseated position so that during reciprocation of the pistons in their cylinders the checking fluid may freely flow through the passage 11 and it will be impossible by closing off the passages 17—18 to prevent a free opening of the door. If the closer is used on a right-hand door, the plate 27 is moved to its extreme right-hand position so as to unseat the check valve 14 and leave the valve 12 free to act since the cylinder 7 would then become the active cylinder. It might be here stated that the piston passages 11—13 are of substantial extent and are not closed off by the end of the plate 27 as would appear at the left-hand side in Fig. 2.

In addition to the parts just described, I preferably provide means to simplify and regulate the shifting of the plate 27. In the form shown the closer shaft 15 carries a cam 31 which, when the shaft is rotated counterclockwise to the position shown in Fig. 1, will engage a cam surface 32 on the plate 27 and shift the plate 27 to its extreme left-hand position. If the shaft 15 be rotated in a clockwise direction to a sufficient extent (beyond normal) the cam 31 will engage the cam surface 33 on the plate 27 and shift the plate 27 so as to unseat the valve 14. In the preferred form the plate carrying the cam 31 is in the form of a pinion and the plate 27 is provided with rack teeth 34 for coaction therewith so that during normal operation of the door closer the pinion will always mesh with the rack plate 27 and maintain it in proper relative position on the main rack bar so that the detent 29 need not be relied upon for securely holding the plate 27 in place.

Now when a closer is to be used on a left-hand door as illustrated, the arm 24 being disconnected from the link 26 is moved so as to rotate the shaft 15 in a counterclockwise direction until the unseating plate 27 is moved by the cam surfaces 31—32 to its extreme left-hand position so as to unseat the check valve 12. The closer applied to the door is then connected up and when normally connected as viewed in Fig. 5, the closer arm 24 will stand out at substantially right angles to the door. In this position it will be obvious that the cam surfaces 31—32 will be disengaged from each other, as viewed in Fig. 2, but the rack teeth 34 will be engaged by the pinion teeth on the cam plate 31 and the plate 27 will at all times be held in proper position by means of the rack teeth. The closer will then operate normally on a left-hand door. If the closer is to be used on a right-hand door, it is only necessary to move the closer arm through slightly more than 180° so as to cause the cam 31 to engage the cam surface 33 for shifting the plate 27 to unseat the check valve 14. The closer arm is then removed from the shaft 15, turned over 180°, and again put on the shaft 15, after which the closer arm 24 may be connected to the link and all parts will then be in a position to properly operate with a right-hand door.

It will thus be seen that I have provided improved safety means which will render it impossible to close off the hand adjusting valves and render it impossible or difficult to open a door.

I have furthermore improved a closer of the type indicated in that I have simplified and cheapened the valve adjustment.

While the invention has been described in considerable detail and a preferred form illustrated, it is to be understood that various changes may be made within the scope of the invention as defined in the appended claims.

I claim:

1. A door closer including a casing having opposed cylinders, interconnected pistons in said cylinders, means for moving said pistons, each of said pistons having a check valve therein, and means for holding one of said check valves off its seat to freely by-pass fluid from one end of its cylinder to the other, for the purpose described.

2. A door closer including a cylinder and a piston, a closer arm for actuating said piston, a valve for controlling the flow of fluid from one side of said piston to the other, and means actuated by said closer arm for freely by-passing fluid from one side of said piston to the other.

3. A door closer including a cylinder and piston, check controlled means for normally controlling the flow of fluid from one side of said piston to the other, a closer arm, and means actuated thereby for controlling said check controlled means to freely pass fluid in both directions from one side of said piston to the other.

4. A door closer including a casing, opposed cylinders therein, pistons in said cylinders, said pistons being connected to each other, each of said pistons having a check controlled passage therethrough, and means for maintaining one of said check controlled passages open at all times.

5. A door closer including a casing having opposed cylinders, pistons in said cylinders, rack bar means for connecting said pistons, pinion means meshing with said rack means for actuating said pistons, passage means for by-passing fluid from one side of one of said pistons to the other, and means for constantly maintaining said passage means open for freely by-passing fluid from one side of said piston to the other in both directions.

6. A door closer including a casing, opposed cylinders therein, pistons in said cylinders, rack bar means connecting said pistons, a pinion for actuating said rack bar means, each of said pistons having a check controlled passage, and means actuated upon rotation of said pinion

means to abnormal position for constantly maintaining one of said check controlled passages open at all times.

7. A door closer including a casing having opposed cylinders, pistons therein, means for connecting said pistons, a closer shaft, means for actuating said pistons upon rotation of said shaft, passage means for passing fluid from one side of one of said pistons to the other, and means controlled by said shaft for controlling said passage means to freely by-pass fluid from one side of said piston to the other at all times.

8. A door closer including a casing having opposed cylinders therein, pistons in said cylinders, a rack bar connecting said pistons, each of said pistons having an outwardly opening check valve therein, a closer shaft having a pinion for coaction with said rack bar for moving said pistons, a valve opener for unseating the check valve in one of said pistons, and means controlled by said closer shaft for actuating said unseating means.

9. A door closer including a casing having opposed cylinders, pistons in said cylinders, a rack bar connecting said pistons, a closer shaft, a pinion carried thereby meshing with said rack bar for actuating said pistons upon rotation of said shaft, each of said pistons having a passage therethrough, and a check valve for controlling the flow of fluid therethrough in one direction, valve unseating means for unseating said valves alternately, and means actuated upon rotation of said closer shaft to an abnormal position for actuating said unseating means to unseat one of said valves.

10. A door closer including a casing having opposed cylinders, pistons in said cylinders, passages through said pistons, check valves for controlling the flow of fluid through said passages in one direction, a rack bar connecting said pistons, a closer shaft, a pinion carried thereby for actuating said rack, a second rack bar carried by said first rack bar and having valve unseating projections for unseating said check valves alternately, said two rack bars being movably connected to each other, a second pinion carried by said closer shaft and coacting with said second mentioned rack, and means carried by said last mentioned pinion for shifting said second mentioned rack to move the latter so as to unseat one of said check valves in said pistons.

11. A door closer including a casing having opposed cylinders, pistons therein, door closer means for actuating the same, passage means from each cylinder, a single manually controlled valve for controlling said passage means, check controlled passage means communicating with opposite ends of each of said pistons, and means for constantly maintaining the check controlled passage means for one piston open.

12. A door closer including a casing having opposed cylinders therein, pistons in said cylinders, means for actuating the same, each cylinder having a passage for controlling the flow of fluid from said cylinder under pressure of said pistons, a single manually movable means having control means thereon for controlling both of said passages, check controlled passage means in each piston, and means for maintaining one of said check controlled passage means open.

13. A door closer including a casing having opposed cylinders, pistons in said cylinders, means for actuating said pistons, each cylinder having a passage for permitting the flow of fluid therefrom under the influence of an advancing piston therein, a single valve member having valve parts for controlling the passages from both of said cylinders, each of said pistons having a passage therethrough, a check valve for each said last mentioned passage, and means for selectively maintaining one of said check valves unseated.

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