July 25, 1933. K. SALMEN ET AL 1,919,864

DOOR OPERATING MEANS

Filed May 9, 1932 2 Sheets-Sheet 1

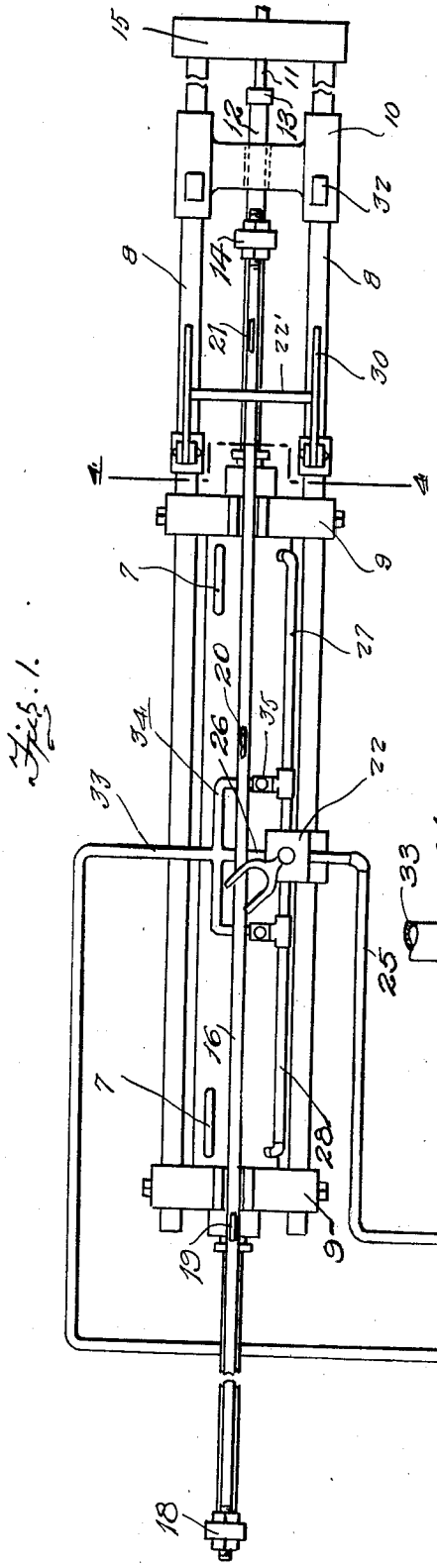


Fig. 1.

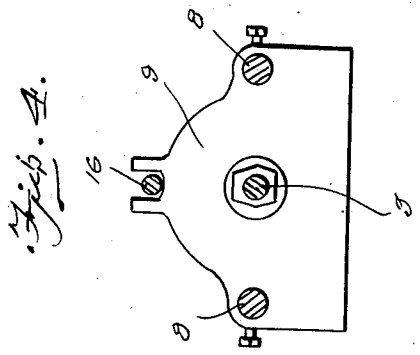


Fig. 4.

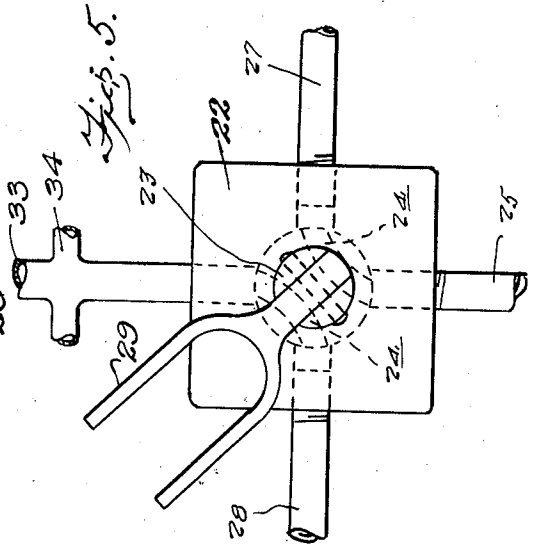


Fig. 5.

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2 Sheets-Sheet 2

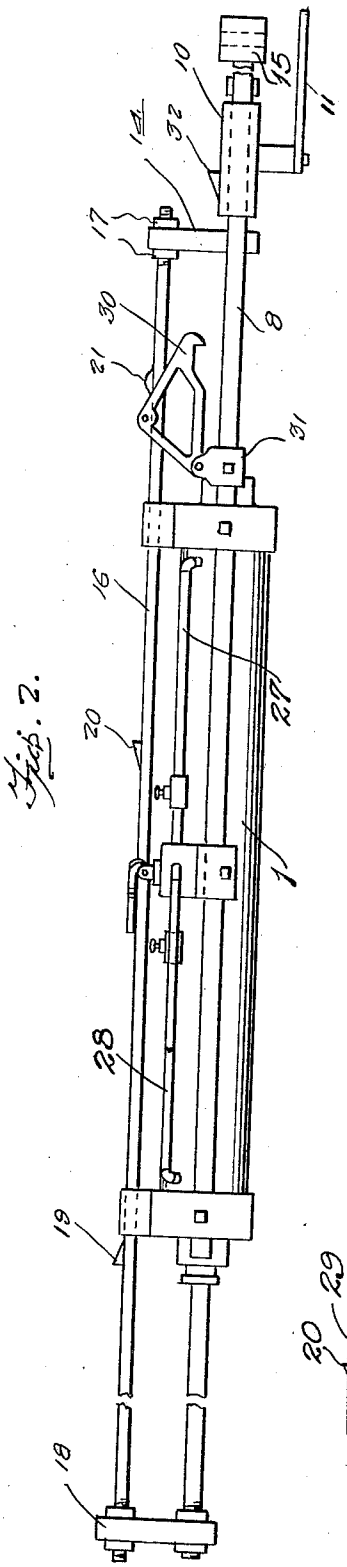


Fig. 2.

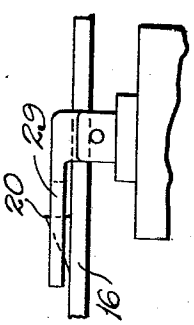


Fig. 4.

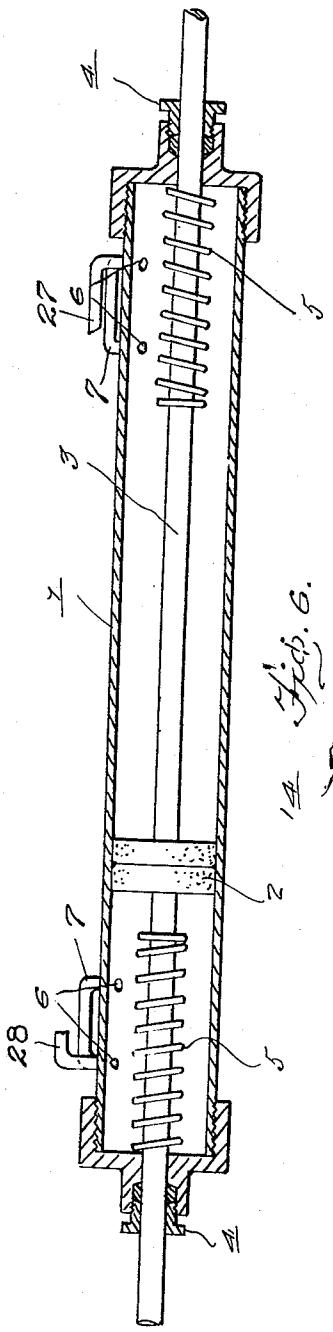


Fig. 3.

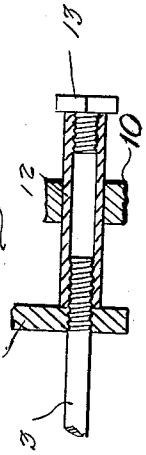


Fig. 6.

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UNITED STATES PATENT OFFICE

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DOOR OPERATING MEANS

Application filed May 9, 1932. Serial No. 610,184.

This invention relates to door operating means for garages and the like, the general object of the invention being to provide pressure actuated means for opening and closing doors of a garage or the like through means of a motor operated compressor.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing the invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:—

Figure 1 is a top plan view of the invention.

Fig. 2 is an elevation thereof.

Fig. 3 is a sectional view through the cylinder.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a view of the valve means.

Fig. 6 is a sectional view through the front end of the plunger rod.

Fig. 7 is a detail sectional view showing how the yoke is pivoted to the plug of the valve and how the yoke rests on the cam carrying rod.

In these drawings, the numeral 1 indicates a cylinder having a piston 2 therein which is preferably of the double cup type, as shown in Fig. 3, and this piston is connected to a rod 3 which passes through the ends of the cylinder which are provided with the packing glands 4 to prevent leakage. Springs 5 incircle the rod, one at each end of the cylinder and these springs are adapted to be compressed by the piston near the ends of the strokes thereof. A pair of ports 6 is located in each end portion of the cylinder, and the ports of each pair are connected together by a tube 7 which forms a by-pass.

A pair of guide rods 8 are supported, one at each side of the cylinder, by the cross members 9 attached to the cylinder and these rods slidably support a cross head 10 adjacent the front end of the cylinder which is connected in any suitable manner to the doors of the garage through means of a lever 11. The front end of the plunger rod 3 is threaded to a tube 12 and a headed bolt 13 is threaded in the front end of the tube, the rear end of the tube abutting against a vertically arranged bar 14 through a hole in which the threaded part of the front end of the rod 3 passes as shown in Fig. 6.

The central part of the cross head 10 is formed with an opening through which the tube passes, and the lower part of the bar 14 and the head of the bolt 13 act as abutments for engaging the cross head and causing the same to move under the action of the piston rod 3.

As will be seen from Figs. 1 and 6 however, the piston rod has a certain amount of movement before either the bar 14 or the head of the bolt 13 engages the cross head to impart movement thereto as that part of the cross head to which the tube 12 passes is of much less width than the length of the tube. The front ends of the guide bars 8 are connected together by the cross piece 15 and a rod 16 has its front end connected to the upper end of the bar 14 by the nuts 17. As will be seen, the rod 16 is located above the cylinder, in Fig. 1, which is a top plan view, and as will also be seen from Fig. 2 which is a side view. This rod 16 is guided in grooves formed in the top parts of the members 9, and of course this rod 16 moves with the piston rod 3. The rear end of the rod 16 and the piston rod are connected together by the cross piece 18. This rod 16 carries the oppositely arranged lugs 19 and 20 and a third lug 21 which is arranged adjacent its front end.

A valve casing 22 is suitably supported adjacent the center of the cylinder and is provided with the plug 23 which is provided with the curved passages 24. A supply line 25 is connected with the valve casing and is located opposite a discharge port 26 in the casing. A pipe 27 leads from the casing to the front end of the cylinder, and a pipe 28 leads from the casing to the rear end of the cylinder, the pipes 27 and 28 en-

ter the casing at opposite sides thereof as shown in Fig. 5 and as will be seen, when the plug is in one position, fluid will pass from the pipe 25 to the pipe 27 and will exhaust from the cylinder through the pipe 28, and the port 26, but when the plug is in another position, the pipe 28 will be connected to the pipe 25 so that fluid will pass into the rear end of the cylinder, and the pipe 27 will be connected with the exhaust port 26 so that fluid will exhaust from the front end of the cylinder.

A yoke 29 has a depending part at the end of its stem which is pivoted to the upper end of the plug 23 for movement about a horizontal axis so that the yoke will rest upon the rod 16 under the action of gravity, as shown in Figures 1, 2 and 7. The pipe 25 may be connected to an air compressor operated by a motor, with the circuit of the motor controlled in any suitable manner. Thus when the motor is started, it will operate the compressor so that air will be forced through the pipe 25, and the valve or plug 23 being set to place the pipe 28 in communication with the pipe 25, the air would pass through the pipe 28 into the rear part of the cylinder and thus force the piston and the rod 3 forwardly. This movement of the piston rod would carry the cross head forwardly so that the doors would be open. As the piston neared the end of the cylinder, it would compress the forward spring 5 and when the piston passed the first port 6, the air would pass through the pipe 7 and flow thru the pipe 27 and discharge through the port 26 and thus the piston would come to rest as there would not be sufficient pressure back of the piston to move it against the resistance of spring 5 which has been partly compressed by the forward movement of the piston.

As the rod 16 moves forwardly with the piston rod, the yoke 29 would ride over the lug 19, due to the bevel on the lug and the pivotal connection of the yoke with the plug, and then the yoke would drop back on the rod in rear of the straight end of the lug. When pressure is reduced in the cylinder the spring 5, which has been partly compressed by the forward movement of the piston, will move the piston rearwardly so as to cover the inner port 6 and this movement of the piston and its rod would cause the straight end of lug 19 to strike the yoke 29 and push said yoke to the position shown in Figs. 2 and 5 so that the valve would be set for closing the doors. After the car has been removed from the garage, the operator starts the motor again and then the compressed air is forced into the front end of the cylinder through the pipe 27 due to the resetting of the valve by the spring 5, which is permitted by the play of the cross head 10 on the tube 12, and thus the air forces the piston 2 rearwardly so that the doors are closed. As long as the compressor is operating, the compressed air will hold the piston 2 bridging a pair of the ports 6 so that the air will pass thru the exhaust 26 as before described but as soon as the circuit to the motor is broken and the compressor ceases to operate, the pressure in front of the piston reduces sufficiently to permit the spring 5 to move the piston 2 a sufficient distance to cause a lug on the rod 16 to reset the valve by means of the yoke 29 and due to the play of the head 10 on the tube 12, this resetting movement is not affected by the doors to which the cross head is connected by the member 11.

A pair of latch members 30 are pivoted to brackets 31 fastened to the guide rods 8, and keeper members 32 are formed on the cross head 10 to be engaged by the latch members when the cross head is moved rearwardly to a position to close the doors. Thus these lock members lock the doors in closed position. However, when the piston and its rod start to move forwardly, the lug 21 will engage the bar 22 which connects the latch members 30 together and thus lifts the latch members out of engagement with the keepers 32 so that the device can open the door. The latch members are lifted out of engagement with the keepers during the first part of the forward movement and before the cross head 10 is moved by the piston and the rod 3, this of course being made possible by the play of the cross head on the tube 12.

When the device is to be used with oil or the like, the supply pipe 25 is connected to a pump 51, the inlet of which is connected to a tank 52 having a vent in its upper end, and this pump is driven from the motor 53 shown in dotted lines in Figure 1. A pipe 33 is connected with the exhaust 26 of the valve 22 for returning the oil to the tank 52 and this pipe has the branches 34 which connect with the pipes 27 and 28, and each branch contains a valve 35. These valves are opened sufficiently to permit only a small amount of oil to pass through them and they act to release the pressure of oil in cylinder 1, when the motor stops, so that a spring 5 can move the piston 2 a sufficient amount to reset the plug 23 through means of the yoke 29 and a stop 19 or 20 on the rod 16, and they also act to regulate the speed at which the doors are to be operated. The device operates in the same manner with oil as it does with air, but in order to avoid waste of oil I provide the pipe 33 and the branches 34 with the valves for returning the oil back into the tank 52 from which it is pumped through the valve 22 when the circuit of the motor 53 is closed.

It is thought from the foregoing descrip-

tion that the advantages and noval features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts provided that such changes fall within the scope of the appended claims.

Having thus described my invention, what we claim as new is:—

1. A device of the class described comprising a cylinder, a piston therein, a rod connected with the piston, a cross head connected to one end of the rod, operating means connected with the cross head, a valve casing, pipes connecting the same with the ends of the cylinder, a supply pipe connected with said casing, said casing having an exhaust, a valve member in the casing for connecting either one of the cylinder pipes with the supply pipe and at the same time connecting the other cylinder pipe with the exhaust port, means connected with the piston rod for setting the valve member for a reverse movement of the piston at the completion of the piston stroke, and a by-pass at each end of the cylinder and bridged by the piston when the same nears the end of its stroke for permitting the fluid on the pressure side of the piston to flow through the opposite side and thus pass to discharge and resilient means in the ends of the cylinder for moving the pistons back of the by-pass when the pressure in the cylinder is reduced.

2. A device of the class described comprising a cylinder, a piston therein, a rod connected with the pipe, a cross head connected to one end of the rod, operating means connected with the cross head, a valve casing, pipes connecting the same with the ends of the cylinder, a supply pipe connected with said casing, said casing having an exhaust, a valve member in the casing, for connecting either one of the cylinder pipes with the pipe and at the same time connecting the other cylinder pipe with the exhaust port, means connected with the piston rod for setting the valve member for a reverse movement of the piston at the completion of the piston stroke, a by-pass at each end of the cylinder and bridged by the piston when the same nears the end of its stroke for permitting the fluid on the pressure side of the piston to flow thru the opposite side and thus pass to discharge, latch means for locking the cross head in its inner position and means for releasing the latch means at the forward movement of the piston and resilient means in the ends of the cylinder for moving the piston back of the by-pass when the pressure in the cylinder is reduced.

3. A device of the class described comprising a cylinder, a piston therein, a rod connected with the piston, an operating member having limited movement from one end portion of the rod and reciprocated by the rod, a valve casing, pipes connecting the same with the ends of the cylinder, a supply pipe connected with said casing, said casing having an exhaust, a valve member in the casing for connecting either one of the cylinder pipes with the supply pipe and at the same time connecting the other cylinder pipe with the exhaust, a slidably supported rod, means for connecting the same with the piston rod, spaced lugs on the rod having straight outer ends and beveled inner ends, an operating member pivoted to the movable part of the valve for movement about a horizontal axis and normally resting on the lug carrying rod, said pivoted member riding over each lug when engaged by the beveled portion thereof, but acting to move the movable part of the valve when engaged by the straight end of a lug, a by-pass fixed to each end of the cylinder, and bridged by the piston when the same nears at either limit of its movement, whereby the pressure in front of the piston will pass through the by-pass into the end of cylinder and then pass through a cylinder pipe to the exhaust of the valve, and a spring member in each end of the cylinder compressed by the piston when the same nears the limit of its movement, whereby the same bridges the by-pass, and when the spring member moves the piston inwardly away from the by-pass when pressure in the cylinder is reduced, and this movement of the piston and its rod acting to move the lug carrying rod to cause a lug thereon to reset a movable part of the valve.

4. A device of the class described comprising a cylinder, a piston therein, a rod connected with the piston, an operating member having limited movement from one end portion of the rod and reciprocated by the rod, a valve casing, pipes connecting the same with the ends of the cylinder, a supply pipe connected with said casing, said casing having an exhaust, a valve member in the casing for connecting either one of the cylinder pipes with the supply pipe and at the same time connecting the other cylinder pipe with the exhaust, a slidably supported rod, means for connecting the same with the piston rod, spaced lugs on the rod having straight outer ends and beveled inner ends, an operating member pivoted to the movable part of the valve for movement about a horizontal axis and normally resting on the lug carrying rod, said pivoted member riding over each lug when engaged by the beveled portion thereof, but acting to move the movable part of the valve when engaged by the straight end of a lug, a by-pass fixed to each end of the cylinder, and bridged by the piston when the same nears the limit of its movement, whereby the pressure in front of the piston will pass through the by-pass into the end of cylinder and

then pass through a cylinder pipe to the exhaust of the valve, a spring member in each end of the cylinder compressed by the piston when the same nears the limit of its movement, whereby the same bridges the by-pass, and then the spring member moves the piston inwardly away from the by-pass when the pressure in the cylinder is reduced, and this movement of the piston and its rod acting to move the lug carrying rod to cause a lug thereon to reset a movable part of the valve, lock means for holding the operating member associated with the piston rod in its inner position, a third lug on the lug carrying rod moving the latch means to inoperative position when the piston and the two rods are actuated by a spring member.

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