(No Model.) 2 Sheets—Sheet 1.

H. W. FORSLUND.

AUTOMATIC STOP VALVE.

No. 544,638. Patented Aug. 13, 1895

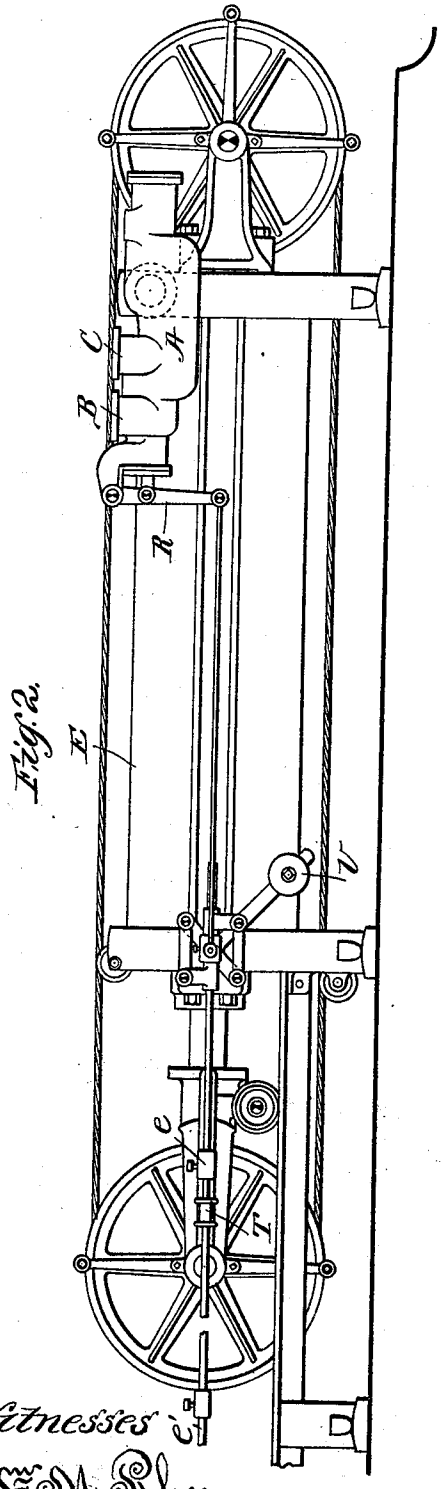

Fig. 2.

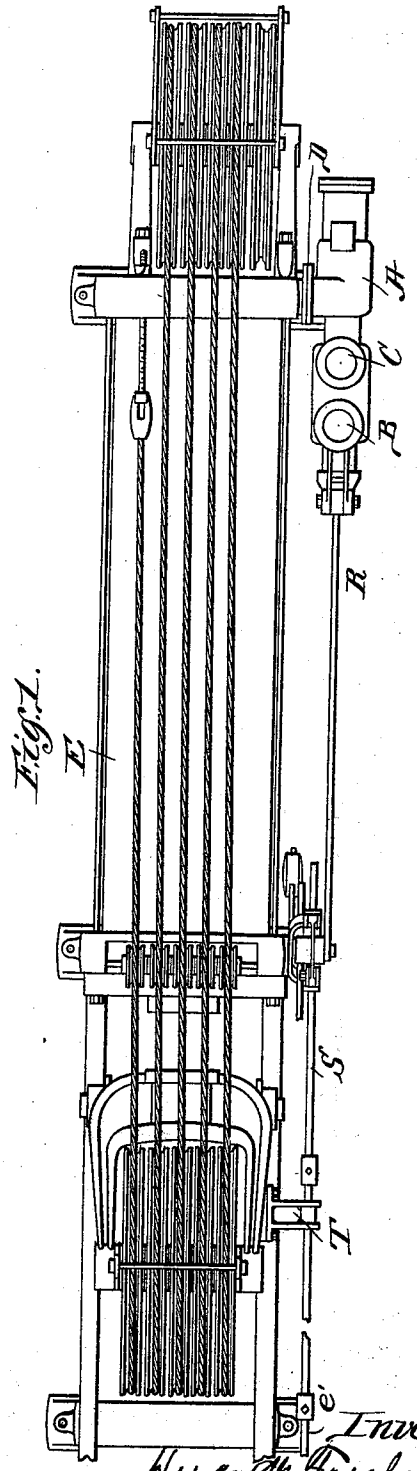

Fig. 1.

Witnesses
Wm. M. Rheem.
J. L. Garrett

Inventor.
Hugo W. Forslund
By Hall and Brown
Atty's.

(No Model.) 2 Sheets—Sheet 2.

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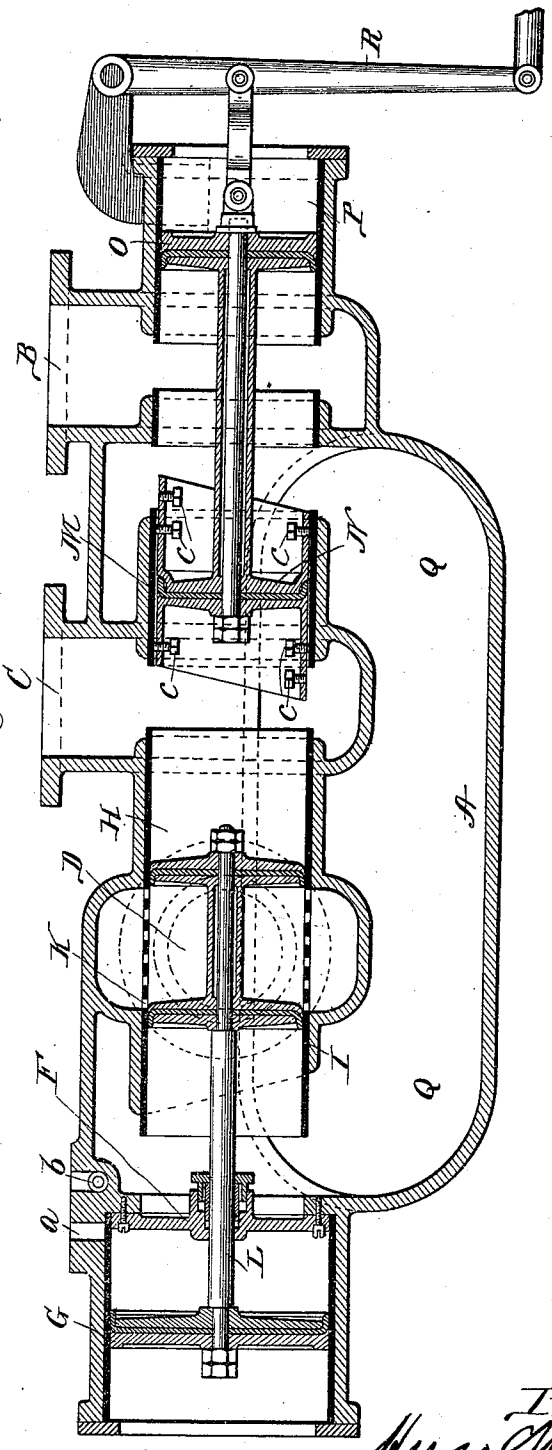

Fig. 3

Witnesses
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UNITED STATES PATENT OFFICE.

HUGO W. FORSLUND, OF CHICAGO, ILLINOIS.

AUTOMATIC STOP-VALVE.

SPECIFICATION forming part of Letters Patent No. 544,638, dated August 13, 1895.

Application filed September 16, 1891. Serial No. 405,863. (No model.)

To all whom it may concern:

Be it known that I, HUGO W. FORSLUND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Automatic Stop-Valves, of which the following is a specification.

This invention relates to automatic stop-valves for hydraulic elevators and similar purposes.

The object of the invention is to automatically stop the elevator at the top and bottom of the well independently of the position of the valves which control the flow of fluid to the motor; and it consists in the construction and arrangement substantially as hereinafter described, and pointed out in the claims.

Like letters of reference are used to designate the same parts in the several figures of the drawings, in which—

Figure 1 is a plan view of the main cylinder, piston, and cables, the main valve and the automatic stop-valve, together with the appliances for operating the latter. Fig. 2 is a side elevation of the same, and Fig. 3 is a longitudinal vertical section of the main valve and automatic stop-valve and their proper parts and pistons.

The present invention is intended as an improvement on the automatic stop-valve described in application Serial No. 362,364, filed August 18, 1890, by H. W. Forslund, and may be conveniently used in connection with such an auxiliary or supplemental valve as is shown and described in such application, although it may be used with other forms of valves.

Preferably a cylinder A is employed with proper inlet and exhaust ports B and C and suitably-bored portions for the said valves and pistons. This valve-cylinder A is suitably connected by an opening D with the main cylinder E, and is further connected by small passages *a* and *b* with the auxiliary or supplementary valve. (Not shown.) These passages referred to are on opposite sides of a diaphragm F, which latter is arranged near the inner end of the bored extension of the valve-cylinder, in which plays the piston G, as is fully set forth in the former application above referred to. Within this valve-cylinder, near the side of the diaphragm, opposite the piston G, is a barrel of such a diameter as fits the main valve I. This barrel for the main valve may be provided with the usual lining and the hinged central portion to provide a proper channel for the entrance and exit of the fluid, and the lining is perforated at a point opposite this channel. The main valve I is preferably constructed of two pistons or heads K K′, which may be suitably packed, and normally these pistons are arranged apart about the width of the channel just referred to. These pistons are carried upon a rod or shaft L, which at its outer end also carries the driving-piston G before referred to. The exhaust port or channel C is in communication with the barrel H, but its communication with the main cylinder of the elevator is opened or closed by the main valve. In the position shown in the drawings the main valve has closed this communication. At the side of the exhaust-channel C, opposite the main barrel H, is a shorter barrel M, which may be suitably bored and lined.

In its shorter barrel are arranged the stop or safety valves. These valves, as may be seen, are entirely independent in their hydraulic action. The valve to the left, when shifted, serves to close the supply or inlet port, and the valve to the right serves, when operated, to close the outlet or exhaust port. A convenient manner of arranging these valves is as shown in the drawings, in which they are placed back to back and connected by a rod which extends through the same and to the mechanism intended to operate them from the outside. When these valves are joined back to back in the manner illustrated, they, nevertheless, act hydraulically as independent valves, although mechanically they may be considered as a double valve, and may be operated by a single mechanism, so as to move alternately to the right or left, according as it is desired to close the inlet-passage or the independent exhaust-passage. The rod for operating these valves is shown as screw-threaded upon one end and as having a nut in front and packing arranged between the backs of the valves. Of course with such construction these valves may be readily taken apart and the packing renewed or adjusted. The valve which closes the inlet-port passage is shown as provided with a hollow

stem, joined to the balancing-piston O, which plays in a barrel P, and through which the rod which joins the valves passes. The diameter of these valves is somewhat smaller than that of the barrel in which they play, so as to provide a space between the barrel and valves, for a purpose which will be hereinafter stated.

The passage-way Q affords communication between the inlet-channel and the barrel in which plays the main valve, except when such communication is closed by the stop-valve or the main valve. Secured to the outer end of the piston which carries the stop-valve is a connecting-ring, which is pivoted to a lever R, which latter is connected to a sliding rod S. The sliding rod S has two adjustable collars *e e'*, secured thereon by set-screws, and at a distance apart corresponding to the throw of the lift or the plunger in the main cylinder of the elevator. Secured to the upper or outer end of the plunger just referred to is an arm T, which in its movement plays between the two adjustable collars *e e'* and throws the rods to which these stops are secured in one direction or the other, as the case may be. The rod S is always returned to its normal position as soon as the pressure of the arm T upon either of the collars is removed, and for this purpose the preferable arrangement employed is that shown and described in the former application, illustrated in Figs. 1 and 2 of the present drawings and designated by the letter U.

The operation of this device is as follows: In the position shown in Fig. 3 of the drawings the elevator is at rest at some intermediate point. Now, if the auxiliary valve is so manipulated that its exhaust-port is in communication with the space between the piston G and the diaphragm, the fluid will flow into the valve-cylinder through the inlet-port B and will press upon one side K′ of the main valve and force such valve to the right until the opening to the main cylinder is uncovered, and then the fluid which has done this will enter the main cylinder and, operating the motor, force the elevator upward. Of course, if the position of the auxiliary valve is not changed during this operation, the elevator will continue to ascend until it finally violently strikes the top of the elevator well or shaft, unless some provision is made to prevent this.

According to the present arrangement, just before the elevator reaches the top of the well or shaft the arm T will strike the collar *o'*, and thus the rod upon which such collar is placed will cause a pull upon the lever R and draw the stop-valve N over until it closes the inlet-port, which will cut off the pressure of fluid and thus arrest the movement of the elevator. The action of this valve is entirely independent of the position of the main valve, for it is controlled by the arm secured to the plunger of the elevator, and consequently, even if the operator omits to close the valve in time, the stop-valve being actuated will arrest the movement. As soon as the elevator starts downward the stop-valve is drawn back to its normal position by the action of a weight which was lifted when the stop-valve was thrown over to close the inlet-opening. When the elevator approaches the bottom of the well, the arm T will strike the collar *e* and throw the stop-valve across the exhaust-passage, and hence arrest the downward movement of the elevator.

The mechanism just described for returning the double stop-valve to its central position, so as to open both the supply and exhaust ports, is convenient, but not necessary. In lieu of such mechanism there might be other arrangements employed, and indeed neither such mechanism nor its equivalent is absolutely necessary, because, as before stated, when the inlet or supply stop-valve is shifted to close its port the outlet or exhaust stop-valve remains in an open or unclosed position, and the elevator-cage may descend whether or not any mechanism is used to return the stop-valves to their central position. In the same manner, when the exhaust stop-valve is closed, when the elevator-cage has reached the bottom of the hatchway, the movement of such cage may be reversed, and it will proceed to the top, and at that point the supply stop-valve will be automatically closed and the exhaust stop-valve opened by means of the connections to the engine, whether or not the weight or other centering device is employed. The object of the weight or other centering device is merely to permit the movement of the cage to be reversed at some point intermediate of its lowest and highest limit of travel. In other words, with no centering device at all, but merely with connections to the hydraulic engine, so that the inlet stop-valve will be closed when the elevator-cage reaches the top landing and the exhaust stop-valve will be closed when the elevator-cage reaches its lowest landing, both stop-valves will perform their functions perfectly as safety devices; but if the elevator-cage has a range of travel extending for sixteen floors, say, and having reached the eighth floor the operator desires to arrest the upward movement and, further, to descend to the seventh floor immediately, he could not do it unless some centering device for the stop-valve was employed, for the exhaust stop-valve will have been put in closed position by the preceding downward trip of the elevator-cage and will be obliged to remain in that position until the elevator reaches the top, because without the centering device these stop-valves are only shifted at the top and bottom and remain in whatever position they are set until the complete travel of the cage in one direction is made. With some centering device for the stop-valves this difficulty is avoided, because immediately the elevator-cage starts down or up the centering device opens both stop-valves, and thus per-

mits the elevator to be readily reversed at any intermediate point.

Some sort of leakage should be provided for the stop-valve, so as to make the stoppage of the elevator gradual and permit the main valve to be operated in either direction. If the stop-valve was in a position which closed the inlet-port and no leakage was provided, the main valve could not be shifted to open the exhaust-port, because there would be a solid column of water between the piston K′ of the main valve and the body of the stop-valve; but by providing a leakage around the stop-valve or through its sides the main valve, when operated, will force the fluid against its head into the inlet-passage. In a similar manner the fluid can be forced around the stop-valve into the exhaust-passage when the exhaust has been cut off by the stop-valve. It is obvious that the amount of leakage through the stop-valve may be regulated by taking out the screws and making more openings. It is also manifest that the amount of leakage around or through that portion of the stop-valve which closed the inlet-passage may be regulated and set definitely and the leakage around or through that portion which will close the exhaust-passage may be regulated or set differently, so that the leakage on the opposite sides of the double stop-valve may be regulated to be unequal, and the operation of the stop-valve at the top and bottom of the well consequently varied to suit the circumstances of the situation. This arrangement for leakage is not claimed in this application, but forms the subject-matter of another application having Serial No. 390,494, and filed April 25, 1891.

In the present arrangement of parts the stop-valve and the main valve are in the same cylinder, and the latter valve is placed between the inlet and the exhaust ports, so that it may be opened to close either of them.

It is obvious that what I have designated as the "double" valve in this specification is the preferable form on account of its simplicity in construction and convenience for operation, yet, hydraulically considered, this double valve amounts to two valves, and it is manifest that there may be changes made in the details of my present invention by those skilled in the art without departing from the principle thereof.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a hydraulic motor, of a single valve cylinder provided with inlet and exhaust ports and an opening to the main cylinder of the motor; a channel communicating with these several openings, a single main valve for opening and closing communication between the motor cylinder and the inlet and exhaust ports of the valve cylinder alternately; a stop valve arranged between such inlet and exhaust ports; devices extending from the stop valve adjacent to a moving part of the motor for alternately and positively actuating said stop valve through its projecting mechanism; substantially as and for the purpose set forth.

2. The combination with a hydraulic motor of a valve cylinder provided with inlet and exhaust passages and an opening to the main cylinder of the motor; of a main valve, mechanism for operating the same for opening and closing the opening to the motor; a stop valve arranged between the inlet and exhaust ports and in the same cylinder with the main valve; and devices connected with the stop valve and means upon a moving part of the motor for alternately operating the stop valve and its devices in opposite directions; substantially as and for the purpose set forth.

3. The combination in a fluid controlling valve of a casing having an inlet port an outlet and a cylinder port; with a main or change valve, and a double stop valve located between and in position to alternately close said inlet and outlet ports automatically; substantially as and for the purpose set forth.

4. The combination in a fluid controlling valve having a cylinder port and separate inlet and outlet ports, of a main or change valve, and automatic stop valves located between and in position to alternately close said inlet and outlet ports; substantially as and for the purpose set forth.

5. The combination in a fluid controlling valve having inlet, outlet and cylinder ports, and a passage connecting such ports and a main valve for primarily controlling such ports; with a double stop valve arranged in a barrel outside of the passageway connecting the inlet and outlet ports but in position to alternately and automatically close either of them; substantially as and for the purpose set forth.

6. In a controlling valve for elevators the combination of the casing, having an inlet port an outlet or exhaust port, and a cylinder port; a passage connecting all such ports; and a main or change valve for primarily controlling such ports; with a double stop valve located in a barrel in such casing between the inlet and exhaust ports and in position to automatically close either while leaving the other open; substantially as and for the purpose set forth.

7. In a fluid controlling valve the combination of a casing having inlet, exhaust and cylinder ports and a fluid passage connecting such ports; of a main valve, and a double stop valve arranged in a barrel outside of the fluid passage and yet in a location between the inlet and exhaust ports; and a single stem projecting outwardly and connecting with the actuating devices of a moving part of the engine; substantially as and for the purpose set forth.

HUGO W. FORSLUND.

Witnesses:
AMOOR C. SMITH,
JOHN E. DORMAN.