

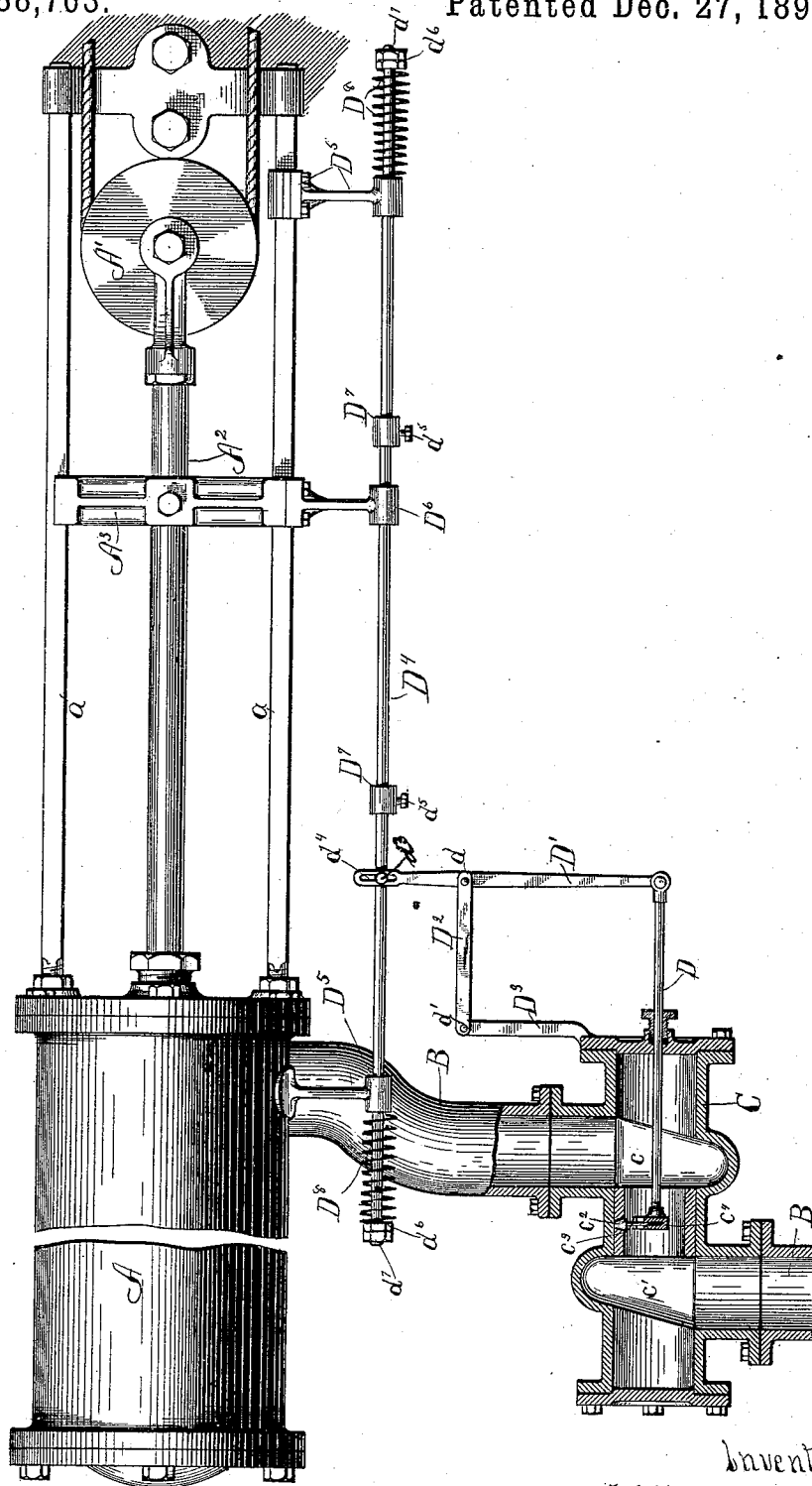
(No Model.)

W. H. HULTGREN.

AUTOMATIC STOP VALVE FOR HYDRAULIC ELEVATORS.

No. 488,763.

Patented Dec. 27, 1892.



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UNITED STATES PATENT OFFICE.

WILLIAM H. HULTGREN, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO THE MICHIGAN ELEVATOR AND ENGINE COMPANY, OF SAME PLACE.

AUTOMATIC STOP-VALVE FOR HYDRAULIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 488,763, dated December 27, 1892.

Application filed January 26, 1892. Serial No. 419,269. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. HULTGREN, of Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Automatic Stop-Valves for Hydraulic Elevators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in stop or safety valves of the type commonly used on hydraulic elevators, whereby the admission of water to or the discharge of water from the cylinder of the elevator is effected, automatically, by means independent of the means provided for actuating the main valve of the cylinder.

In the accompanying drawing, in which the valve, forming the subject of this application is fully illustrated: the figure is a view showing this improved valve in section and so much of the cylinder and cross-head of an elevator as is necessary to show the devices for actuating the valve.

In the drawing, A is the main cylinder of a single acting hydraulic elevator, which contains a piston from which the sheaves or pulleys, A', are actuated through the medium of a rod A². Said rod is shown as provided with a cross-head A³ running on guides *aa*. Water for operating the elevator is admitted and discharged from the cylinder of the elevator through a pipe, B, the passage of water therein, being controlled, primarily, by a main valve, not shown in the drawing, which is operated by suitable means from the car of the elevator. In this pipe and intermediate between the main valve and the cylinder of the elevator is placed a secondary stop or safety valve, actuated automatically and independently of the means for operating the main valve. This secondary valve and the means for operating it constitute the subject of the present application. The valve consists of a cylindric valve-casing, C, having two openings or connections, *c* and *c'*, separated laterally from each other and adapted for attachment to the parts or sections of the pipe B.

Within this casing and adapted to be moved so as to close both of the openings, one at a time, is a hollow, open-ended valve-piston, C'. The distance between the openings in the valve cylinder is shown as equal to, but may be greater than, the length of the piston, which is held, normally, in the space between the openings, by means provided therefor, as hereinafter described. In the piston of this valve is a small hole or opening, *c*², adapted to be closed by means of a valve or plug, *c*³, borne on a shank fitted to a socket and free to respond to the pressure of water on either side of it, so that it will be closed, if the pressure from the inside of the cylinder is greater than that from without, and will be opened, if the pressure from without is greater than from within. The object of this device is to allow the passage of water from the elevator cylinder in order to start the piston of the elevator on its return, when it has been stopped at the limit of its movement in either direction. The method of its operation will hereinafter be fully described in connection with the description of the operation of the valve. The necessity for this device is obvious when it is borne in mind that the openings in the safety valve are closed by suitable connections with the cross-head of the elevator, which hold the valve positively closed and prevents the mechanism for returning the piston of the valve to its middle position, from acting so long as it is at its extreme limit of motion either way, therefore, unless this opening were in the piston of the valve, the piston of the elevator must remain stationary at that end of its stroke which it first reaches.

Attached to a bar, *c*⁴, extending across the space within the piston is a piston rod, D, which passes through a hole in the cylinder head, which is properly packed, in any suitable manner, to prevent leakage. Attached to the outer end of the piston rod is a lever, D', pivoted at *d*, to the end of a link, D², which is in turn pivoted at *d'*, to a standard, D³, attached to the valve cylinder, or other convenient place. The pivotal joints of the link, D², are in a line, practically perpendicular to the direction of the strain on the lever, D', so that

it, the link, will act as a fulcrum for the lever without subjecting the piston rod to any strain tending to bend it. The object of having the link pivoted at, d' , is to allow the piston rod to move in a straight line, which would obviously be impossible were the link rigid and the lever rigidly connected to the piston rod. The other end of the lever, D' , is connected to a rod, D^4 , passing through and free to move in brackets, D^5 , one secured to the cylinder of the elevator and the other to the guide rod of the elevator cross-head, but in such position beyond or above the cross-head that it will not interfere with the movement thereof. The connection between the lever, D' , and the rod, D^4 , will preferably be made by means of a pin, d^3 , attached in any suitable manner to the rod, D^4 , passing through a longitudinal slot, d^4 , in the end of the lever. Some other analogous device may, of course, be substituted for this one in order to allow the oscillatory motion of the lever D' about its pivot.

The rod, D^4 , is actuated by means of a tappet, D^6 , attached to the cross-head of the elevator, so as to move therewith. This tappet preferably embraces the rod, D^4 , between the collars, D^7 , and is adapted to strike against said collars in approaching both limits of its movement. The collars are secured to the rod by set-screws, d^5 , or in any other suitable manner, to allow of their adjustment on the rod. As adjusted to carry out the purpose of this invention, one of these collars will be in such position that the tappet on the cross-head will strike it just before the elevator has reached its limit of motion in one direction, and the other so that the tappet will strike it just before the elevator has reached the limit of its movement in the other or opposite direction. The position of the tappet and of the collars in relation thereto and the relative lengths of the arms of the lever are such that the piston of the safety valve will be moved such a distance in either direction that it will cover the opening in the pipe at the end of the valve cylinder toward which the valve piston moves, at the time the car has reached the extreme upper or lower limit of its movement. The rod D^4 , projects, at each end, through the supporting brackets, D^5 , and coiled springs, D^8 , are placed thereon between said brackets and shoulders on the rods, herein shown as formed by means of nuts, d^6 , upon the ends of the rods. Said nuts are located in such positions that one or the other of the springs will be compressed by moving the rod in either direction, and the rod will be returned to its middle position by the resiliency of the compressed spring when the piston starts in the opposite direction. The tension on said springs may be adjusted by means of nuts against which they bear and which are threaded upon the ends of the rod to afford such adjustment. Said nuts may be secured in any position in which they may be placed by means of lock-nuts, d^7 . The middle posi-

tion of the rod also represents the middle position of the piston of the valve, when it is between the two openings in the valve cylinder and any motion of the rod causes the piston to begin to close one opening or the other, and such motion may be continued until the opening is wholly closed, when water can neither enter nor escape from the cylinder of the elevator; the flow of water through the pipe being then completely stopped.

The operation of the valve is as follows: Supposing the car of the elevator to be ascending, the main valve connected with the admission pipe and the car not yet at the limit of its upward movement. Under these conditions water is flowing through the stop valve from the main valve to the elevator cylinder and the main valve may be closed and opened as often as desired without, in any manner affecting the safety-valve. As the car continues to ascend and just before it reaches the upward limit of its movement, which corresponds with the lower or backward limit of the piston's movement, the tappet on the cross-head will strike the collar, D^7 , nearest the cylinder thereby moving the rod, D^4 , and by means of the intermediate connections, causing the piston, C' , to cover the opening c . The flow of water will thus be completely stopped, the pressure of the water from the interior of the valve-piston, holding the valve-plug, c^3 , into the hole, c^2 , in said piston. The piston and all parts of the elevator actuated thereby will thus be held stationary, as long as the main valve is open to allow the passage of water to the cylinder or is closed against the passage of water either way. If now the main valve is thrown over, in position to allow the discharge of the water from the cylinder, the water in the safety valve casing and in the section of the pipe B, between the safety and the main valve, runs off, relieving the pressure holding the plug, c^3 , shut and leaves it free to respond to the counter pressure whereby it is opened, allowing the water in the cylinder to run out, very slowly at first, permitting the piston to respond to the gravity of the cab tending to move it toward the opposite end of the cylinder. As it moves, the cross-head is moved also, the tappet carried thereon recedes from the collar on the rod, D^4 , which is thus left free to respond to the force of the springs tending to return it to its central position. The piston of the valve is also moved, by the same agencies, toward its middle position and the port, c , will begin to open. It is evident that the more the port c is opened, the faster the water will be discharged from the main cylinder of the elevator. The movement of the parts will thus be gradually accelerated until the main piston has reached its middle position, when the passage of the water therethrough will be unobstructed, and will be controlled solely by the main valve until the cab and piston reach the other limit of their path, when the above described operation will be repeated, the pis-

ton of the safety-valve being moved over the opening, *c'*, the plug forced into the opening in the piston of the safety-valve, by the internal pressure of the water thereagainst.

5 The main valve being reversed the water under pressure overcomes the internal pressure of the water in the cylinder, the hole in the valve-cylinder is opened and the piston started, as before, which operation is repeated
10 as often as the elevator cylinder reaches the limit of its movement in either direction.

I claim as my invention:

The combination with the main cylinder and piston of a hydraulic elevator and a pas-
15 sage by which water is supplied to and discharged from said cylinder, of a safety-valve in said passage comprising a tubular casing having two ports which are separated from each other by a central space, and a hollow
20 open-ended valve-piston which stands in said space between the said ports when the valve is open and which may be shifted in either

direction from said central position to close the valve, means for actuating the said valve-piston comprising a spring or springs applied 25 to maintain the valve normally in its central position, and a part moving with one of the operative parts of the elevator mechanism and acting to shift the valve over one of said ports against the action of said spring or 30 springs as the main piston approaches the limit of its stroke in either direction, said valve-piston having in its side wall a water opening or passage provided with an inwardly opening check valve, substantially as 35 described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM H. HULTGREN.

Witnesses:

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CHAS. N. STEENECK.