(No Model.)

E. S. MATTHEWS.

HYDRAULIC VALVE.

No. 519,639. Patented May 8, 1894.

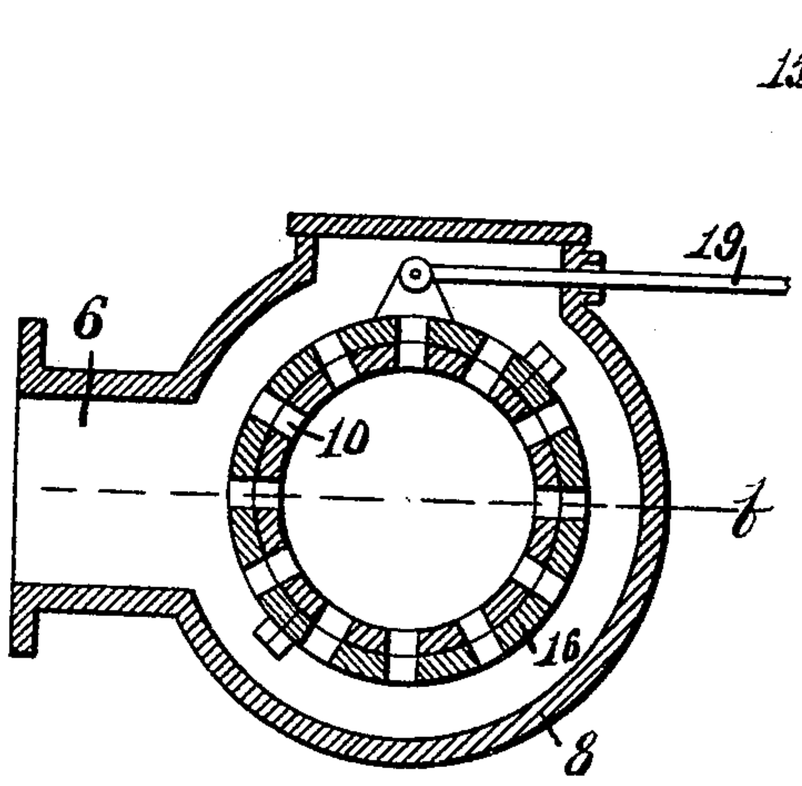

Fig. 2.

Fig. 1.

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HYDRAULIC VALVE.

SPECIFICATION forming part of Letters Patent No. 519,639, dated May 8, 1894.

Application filed December 5, 1891. Serial No. 414,184. (No model.)

To all whom it may concern:

Be it known that I, EDWIN S. MATTHEWS, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Hydraulic Valves, of which the following is a specification.

This invention pertains to improvements in that class of hydraulic valves employed for the control of reciprocating motors such, for instance, as are exemplified in hydraulic elevators. It is the function of valves of this general class to admit the pressure-fluid to the motor to cause the motor to move in one direction and, again, to cut off the pressure and permit the escape of the fluid in order that the motor may move in the other direction. In hydraulic elevators these valves are of course always operated from the moving car. When the car reaches the upper limit of its motion it is the duty of the operator to cut off the pressure. If he fails to do so a serious shock may occur, and similarly when the car reaches the lower end of its stroke. Automatic stop-valves are often applied to valves of this character to provide that when the car reaches either limit of its stroke the stop-valve will be automatically operated so as to avoid shock.

My present invention relates to improvements in this class of valves, and is of such nature that the operation of the safety-stop is positive, and that the closure of the safety-stop by the automatic action when the car reaches one limit of its stroke does not interfere with the free starting of the motor to move the car in the other direction from that limit.

My present invention will be readily understood from the following description taken in connection with the accompanying drawings, in which—

Figure 1, is a vertical longitudinal section of a hydraulic valve exemplifying my invention, the valve being shown in connection with an elementary exemplification of hydraulic elevators; and Fig. 2, a horizontal transverse section of the valve in the plane of line "*a*" of Fig. 1, the section of Fig. 1 being taken in the plane of line "*b*" of Fig. 2.

In the drawings:—1, indicates the usual cylinder of a direct acting hydraulic elevator which has been chosen as exemplifying the motor to be controlled by my improved valve: 2, the elevator car attached to the piston of the elevator-cylinder and moving up or down as usual according as the water is admitted under the piston, or allowed to escape therefrom by the action of the valve: 3, the position of the car at the upper limit of its stroke: 4, the position of the car at the lower limit of its stroke: 5, supply-pipe leading from water-main or other source of water supply under pressure: 6, discharge-pipe leading to sewer or other point of discharge for the water, both of these pipes being connected with the elevator cylinder through the medium of a controlling valve as will be explained: 7, motor-pipe through which the water goes to and from the elevator-cylinder under the control of the valve: 8, a cylindrical valve-casing of ordinary construction: 9, ports therein to admit the water from the supply-pipe 5: 10, ports in the valve-casing to permit the water to go to discharge-pipe 6: 11, ports in the valve-casing to permit the water to pass to and from the elevator-cylinder: 12, a double piston within the valve-casing adapted for reciprocating adjustment within the valve-casing so as to permit water from supply-pipe 5 to go to the elevator-cylinder, or to permit water to flow from the elevator-cylinder to the discharge-pipe 6, or to cut off connection with supply-pipe and discharge-pipe so that the contained water is confined within the elevator-cylinder: 13, the usual counterbalancing-piston connected with the double pistons 12 to prevent the excessive pressure of the supply water from improperly moving the valve-pistons or unduly resisting their proper adjustment: 14, valve-rod by means of which the double pistons are adjusted: 15, the usual valve-moving apparatus, illustrated as a hand-rope, by means of which the attendant on the car can operate the valve: 16, a stop-valve arranged to open and close the discharge-ports 10 and illustrated as a ported ring encircling that portion of the valve-casing containing the ports 10 and adapted, by a movement of slight rotation, to cover those ports or, when those ports coincide with the ports in the ring, to open those ports: 17, a similar stop-valve at the supply-ports 9: 18, a rod adapted by its

reciprocating motions to move the stop-valve 17 and effect its opening and closing: 19, a similar rod for the other stop-valve 16: 20, a reciprocating cam-plate: 21, cam-slots in this plate engaged by the rods 18 and 19, the slots having such form that, when the plate is in the mid-position illustrated, both stop-valves will be open, and when the plate is moved in one direction it will close the stop-valve of the supply without disturbing the other stop-valve, and when it is moved in the other direction it will close the stop-valve of the discharge without disturbing the supply stop-valve, the movement of the plate to mid-position however opening both stop-valves: 22, a tappet connected with the cam-plate and arranged to be engaged by some moving part of the elevator-mechanism as the car nears the lower limit of its travel, the illustration showing this tappet as arranged to be engaged directly by the car itself, so that the downwardly moving car will move the cam-plate downwardly and effect the closure of the discharge stop-valve 16 in an obvious manner: 23, a similar tappet similarly arranged to move the cam-plate upwardly when the car nears its upper limit of travel: 24, a rod exemplifying a connection between the two tappets and the cam-plate, the cam-plate itself being a mere exemplification of mechanism whereby the movement of the car is caused to close the proper stop-valve as the car approaches the limit of its travel: 25, a lever pivoted at an intermediate point and connected at one end to the cam-plate: 26, a weight: and 27, suspenders connecting the weight with the lever at each side of its pivot, whereby the tendency of the weight is to bring the lever and cam-plate to normal mid-position regardless of which way the cam-plate is moved from that position.

The construction of the stop-valves and of the mechanism for operating them will be readily understood from an inspection of the drawings in connection with the description which has been given, and it will be readily understood that this form of stop-valve and connecting mechanism is merely exemplifying in character, the nature of the invention being largely independent of details of construction.

The operation is as follows: Fig. 1 shows the double pistons in position to admit water to the hydraulic cylinder, and the car is consequently going up. The operator may, at any point in the travel of the car, move the valve-pistons upwardly and stop the flow of water to the elevator-cylinder, and thus bring the car to rest, or he may move the valve-pistons still farther up and permit the water to flow to the sewer from the elevator-cylinder and thus permit the car to descend, all in the usual manner. The car is going up and if in proper time as the car nears the upper limit of its travel, the operator properly manipulates his valve, all will be well. But if he fails to do so there would, in the absence of a safety-stop, be a sudden arresting of the car at the upper limit of its travel, while under more or less of the full pressure of the supply-water. But, in the construction shown, as the car reaches its upper limit of travel, it engages the tappet 23 and raises the cam-plate against the resistance of weight 26, and this upward motion of the cam-plate obviously will push on rod 18 and close stop-valve 17 thus cutting off the further admission of supply-water to the elevator-cylinder no matter what position the controlling-valve may be in. But the other stop-valve 16 has not been disturbed and the operator is at perfect liberty to cause the car to descend by moving his valve to permit the water to discharge from the elevator-cylinder, and as soon as a car begins to descend away from the tappet which it has engaged, the weight will restore the supply-stop-valve to its normal open position in an obvious manner. Similarly, when the car reaches the lower limit of its stroke, the lower tappet will be engaged and the discharge stop-valve will be closed and the further flow of water from the elevator-cylinder will be prevented, thus avoiding shock at the lower end of the car travel and, as before, the operator is at full liberty to use his valve freely for purposes of ascension and when the car begins to ascend the weight will restore the closed stop-valve to normal open position. Thus it will be seen that shock will be prevented at either extremity of car travel by the positive closure of a stop-valve and that the closure of such stop-valve does not at all interfere with the free use of the controlling-valve for causing the movement of the car in the other direction. It will be further observed that the system permits of the use of as tight stop-valves as can be practically constructed and that elevators or other motors provided with the system can be operated at maximum speed except at the points of approach to limit of travel where safety absolutely precludes full speed.

I do not herein make claim broadly to incorporating a safety-stop and main valve in one unitary structure.

I claim as my invention—

1. The combination, substantially as set forth, of a cylindrical valve casing having suitable ports communicating respectively with the supply pipe, the discharge pipe, and the motor cylinder pipe, a movable valve piece adapted to place said motor passage alternately in communication with both of the other passages, or to cut it off from communication with either, a stop valve in the form of a ported ring arranged to close communication with the said supply passage, another stop valve in the form of a ported ring arranged to close communication with the discharge passage, and mechanism connecting with the said two stop valves and adapted to serve in closing either of them alternately re-

gardless of the position of the said movable valve piece.

2. The combination, substantially as set forth, of a valve-casing provided with a supply passage and a discharge passage and a passage to communicate with the motor to be controlled, a movable valve-piece, as a double piston, adapted to place said motor passage in communication alternatively with said supply passage or said discharge passage or to cut it off from communication with either or both, a safety-stop adapted to cut off communication between said valve-casing and its supply and discharge, mechanism for moving said safety-stop to effect the cutting off from the supply and discharge alternatively, and a weight or equivalent resistance connected with said safety-stop and adapted to resist its movement to either closed position and to maintain it in normal open position.

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