E. S. MATTHEWS.

AUTOMATIC STOP VALVE MECHANISM.

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Witnesses:

Edwin S. Matthews
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To all whom it may concern:

Be it known that I, Edwin S. Matthews, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic Stop-Valve Mechanism, of which the following is a full, clear, and exact specification.

This invention relates to automatic stop mechanism for elevators, and more particularly has reference to stop valve mechanism which may be disposed in the to-and-from pipe directly at the cylinder port, and which when closed, will positively hold the car, together with means independent of, but controlled by the stop valve, for securing a quick start in the opposite direction.

The stop valve mechanisms heretofore devised have been so constructed as to necessitate a separate casing disposed a considerable distance from the cylinder port, thus increasing the chance of failure between the cylinder and the stop valve, besides taking up much valuable space.

By my invention, I have provided a stop valve mechanism located in a casing forming a part of the main cylinder head and acting directly upon the main cylinder port, the casing being connected directly with the main valve.

The stop valve mechanism I have illustrated, comprises a double valve adapted to be moved in either direction from a central position to stop off the main cylinder port, in combination with auxiliary passages from the main valve to the cylinder controlled by the stop valve, and permitting a quick start of the car only in the opposite direction.

The invention will be more fully understood in connection with the accompanying drawing in which—

Figure 1 is a plan view partly in section of my invention in connection with parts of a plunger elevator system. Fig. 2 shows a side elevation, with my improved stop valve in section.

I have illustrated my invention as applied to a direct plunger elevator in which 1 is the hydraulic cylinder, 2 the plunger, 3 the main valve having the inlet port 4, exhaust port 5 and operating stem 6. Connecting the main cylinder 1 and the main valve 3 is the integral laterally extending to-and-from pipe 7. As shown in the drawing, the automatic valve casing, and the gland or stuffing box of the main cylinder are cast integral in one piece having a passage 8 leading to the cylinder port 9. One end of the pipe 7 is closed by a head 10, and the other is connected to the to-and-from port 20 of the main valve. The pipe 7 is preferably provided with a lining, and contains a double spool valve comprising two hollow spools 12 mounted on a stem 11, which may be actuated from a moving part in any well known manner as the elevator car approaches the ends of the travel. It will be understood from the drawings that the ports 9, 13, and 14 lead through the lining into chambers or bustles around the lining, and these ports are connected by auxiliary pipes 12, 21, containing regulating cocks 15. The pipe 12 has a check valve 22 opening from the ports 13 toward the main cylinder, and the pipe 21 has a similar check valve 23 which opens from the main cylinder toward the ports 14.

16 are plugs having projections for regulating the opening of the check valves and also permitting access for repairs.

The auxiliary passages are independent of the stop valve but are controlled by its position, so that only the passage which will start the car in the opposite direction is effective when the stop valve is closed, and this passage cannot under any circumstances permit a start of the car in the same direction as it was moving when it actuated the stop valve. Another characteristic of this construction is that the auxiliary passages are not to be necessarily connected with the to-and-from pipe, as shown in the drawings, since the same effect will be produced if each pipe leads independently from the cylinder to its corresponding side of the main valve so as to have the flow of water there-through controlled by the main valve.

The spool valve comprises two or more perforated disks 25 mounted on the stem 11, and hollow cylinders 26, together with packings 27 at each end of the cylinder, the whole being secured together by a nut 28 threaded on the stem 11. Any well known means for reciprocating the stem 11 at the ends of the travel may be provided so as to close the main cylinder ports 9, and springs or other devices are provided to return the valve to center after the car has moved away from the end.
The operation of my invention is as follows, assuming the main valve stem 6 to have been moved so as to open the port 4: The supply will flow through port 20, disks 25, ports 9, to the main cylinder 1, causing the car to ascend. As the car approaches its upper limit, it will through the connections not shown, cause the valve stem 11 to be moved to the left in Fig. 1 so as to bring the right hand spool 10 and its packings in position to close the cylinder ports 9, and the left hand spool and its packings to close the auxiliary ports 13. In this position, the car is absolutely stopped and held so, irrespective of the main valve, which the operator may have neglected to close or which may have failed to operate. When the operator desires to go down, (the automatic still being closed), he opens the main exhaust port 5, allowing the water in the main cylinder 1 to escape through pipe 21, check valve 23, ports 14, the perforated disks 25, and the exhaust port 5. The car is thus started downward, independently of the automatic valve, but cannot be started upward, because the ports 13 are closed by the right hand spool, and the check valve 23 prevents the passage of water from the supply port 4 to the cylinder 1 through ports 14. As soon as the car has moved downward sufficiently, the stop valve will be returned to central position. At the bottom, the action is precisely similar, except that the stop valve is moved to the right, closing ports 9 and 14, and allowing supply water to start the car upward through ports 13, check valve 22, and pipe 12.

By providing a to-and-from pipe integral with the cylinder stuffing box or gland, and placing the stop valve in this passage at the main cylinder port, a much greater degree of safety is assured than has heretofore been possible with the known forms of automatic stop valves. It is well recognized that the stop valve should be as close to the main cylinder as possible, and also that it be effective under all circumstances, which results are attained by my construction. The use of hollow spool valves enables the device to be very compact, and the valves are furthermore balanced. The use of outside auxiliary passages provided with cocks, one for starting up and one for starting down, enable the speeds to be readily controlled independently of each other, and thus is of value, particularly with a plunger elevator, which can be started upward considerably faster than it can be started downward, without injury.

It will be understood that my invention is not to be limited to use with any particular type of elevator, and that modifications and changes may be made in the construction I have illustrated without departing from the scope of the invention.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is,—

1. The combination with a hydraulic motor cylinder, and a controlling valve connected therewith by a to-and-from passage, of a stop valve in said passage adapted to be moved to stop the motor, and connections from said motor cylinder to said controlling valve, said stop valve acting to close one of said connections and thereby permitting the motor to be started in the opposite direction through the other, substantially as described.

2. The combination with a hydraulic motor cylinder, and a controlling valve connected therewith by a to-and-from passage, of a stop valve in said passage adapted to be moved to shut off the flow, passages from said motor cylinder to said controlling valve independent of said stop valve, and means for controlling said passages so that only the one acting to start the car in the opposite direction will be effective when the stop valve is closed, substantially as described.

3. In an automatic stop valve, the combination, substantially as set forth, of a chamber having an inlet and an outlet, passages placing the inlet in communication with the outlet, a check valve in one of said passages opening toward the outlet, a check valve in the other of said passages opening toward the inlet, and an automatic stop valve adapted to shift and close the outlet and one or the other of said passages.

4. In an automatic stop valve, the combination, substantially as set forth, of a chamber having an inlet and an outlet, a plurality of auxiliary passages between said inlet and outlet, a check valve in one of said passages opening toward the outlet, a check valve in the other of said passages opening toward the inlet, an automatic stop valve adapted to shift and close the outlet and one or the other of said passages, and means for regulating the rate of flow through said passages.

5. In an automatic stop valve, the combination, substantially as set forth, of a cylindrical valve chamber having an inlet and an outlet, a passage leading from the outlet to the inlet, a second passage leading from the outlet to the inlet, a check valve in each of said passages, one opening toward and the other from the outlet, and a piston valve in said chamber arranged to shift and close said outlet and one or the other of said passages.

6. In an automatic stop valve, the combination, substantially as set forth, of a cylindrical valve chamber having an inlet and an outlet, a passage leading from the outlet to the inlet, a second passage leading from the outlet to the inlet, a check valve in each of said passages.
said passages, one opening toward and the other from the outlet, a piston valve in said chamber arranged to shift and close said outlet and one or the other of said passages, and regulating valves in said passages.

7. In an automatic stop valve, the combination, substantially as set forth, of a cylindrical valve chamber having an inlet and an outlet, a passage from the outlet to the chamber at each side of the outlet, check valves in said passages, one opening toward and the other from the outlet, and a double piston valve in said chamber, normally straddling the outlet and leaving the outlet and said passages open from the chamber, and arranged by one motion to close the outlet and one of said passages and by another motion to close the outlet and the other of said passages.

8. In an automatic stop valve, the combination, substantially as set forth, of an automatic stop valve arranged to close communication between an operating cylinder and its controlling valve, passages placing said cylinder and controlling valve in communication past the automatic stop valve and closing alternatively when the automatic stop valve acts, and check valves in said passages, one opening toward and the other from the operating cylinder.

9. In a hydraulic elevator, the combination, substantially as set forth, with a hydraulic cylinder and a controlling valve therefore, of a main conduit and two additional conduits placing the controlling valve in communication with the hydraulic cylinder, a check valve in each of said additional conduits, one of said check valves opening toward and the other away from the controlling valve, and automatic stop valve mechanism arranged to close the main conduit and one or the other of the additional conduits.

10. An automatic stop valve mechanism comprising a valve casing having a change valve connected therewith at one end, a motor cylinder connected therewith at an intermediate point, a pair of valves mounted on a stem in said casing and movable to alternatively cut off said working cylinder, and a plurality of single way oppositely arranged passages from said working cylinder to said change valve, one or the other of which forms a connection between said change valve and the motor cylinder to permit reversal of the motor, the other being cut off by movement of the valve stem to stop the motor.

11. The combination with a valve cylinder having an intermediate port, of a pair of hollow spool valves disposed on a stem, one at either side of said port and permitting unrestricted flow of water through said cylinder in normal position, either of said spool valves being movable across said port to close it, a pair of single way auxiliary passages, and means whereby when either spool valve closes said port one of said single way auxiliary passages permits reversal of the motor, and the other is closed by said stop valve.

In testimony whereof I affix my signature, in presence of two witnesses.

EDWIN S. MATTHEWS.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."