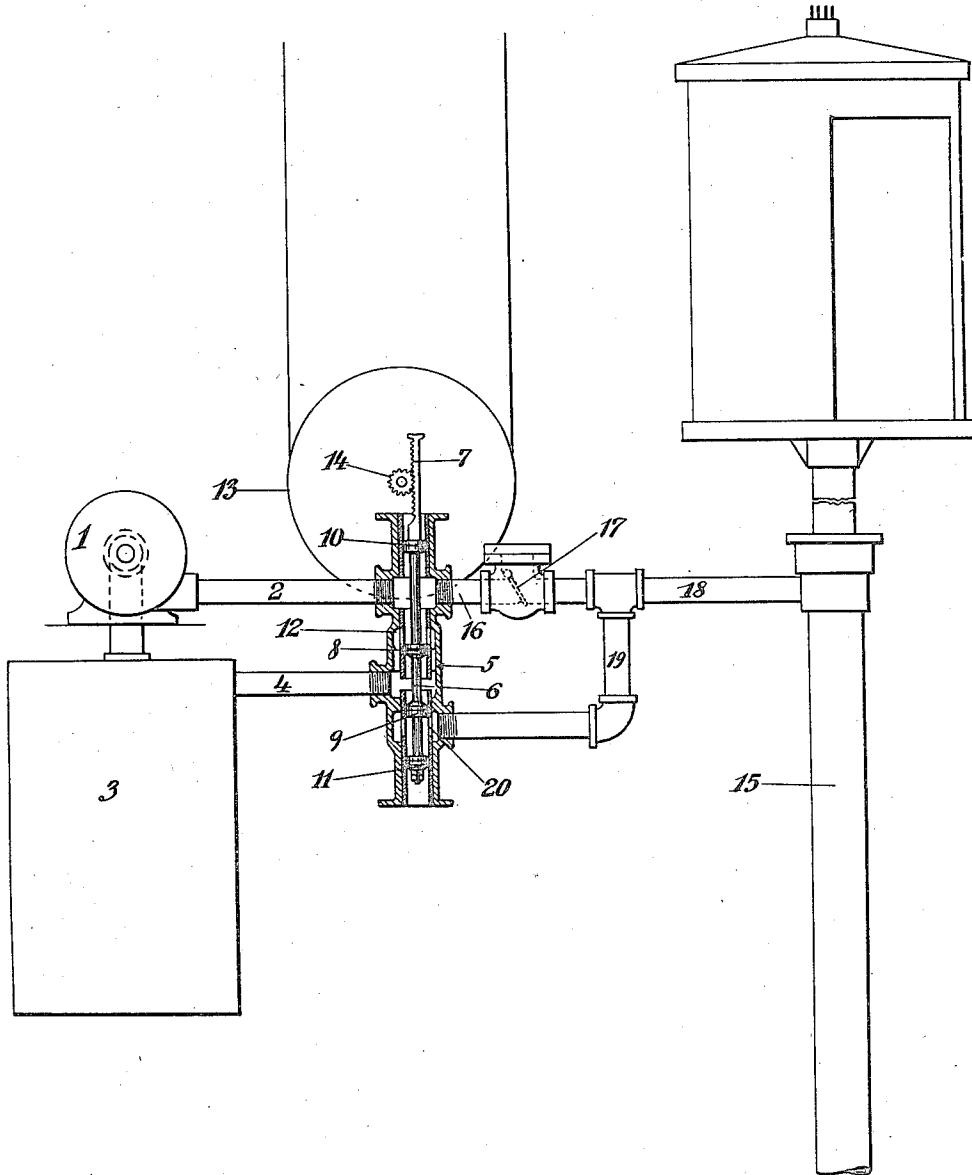


E. L. DUNN.
ELEVATOR VALVE MECHANISM.
APPLICATION FILED DEC. 19, 1913. RENEWED NOV. 8, 1915.

1,165,653.

Patented Dec. 28, 1915.



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UNITED STATES PATENT OFFICE.

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ELEVATOR VALVE MECHANISM.

1,165,653.

Specification of Letters Patent.

Patented Dec. 28, 1915.

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To all whom it may concern:

Be it known that I, EDWARD L. DUNN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Elevator Valve Mechanism, of which the following is a full, clear, and exact specification.

This invention relates to elevator valve mechanism, and has particular reference to a valve mechanism which is to be used where a continuously running pump is used in lieu of a storage pressure supply. Such mechanism is required for many situations where space must be saved, such as lifts for search-lights in fortifications, ash or sidewalk lifts in office buildings, lifts on board ships, such as for ammunition, etc., and many other places.

According to this invention, a three-way balanced valve is provided with four ports and an interior by-pass controlled by one of the pistons, together with a check valve in one of the passages whereby the pump can be run continuously without wasting power while the elevator is at rest, and by simple movement of the three-way valve the elevator can either be moved in one direction by the direct application of the pump power or in the other direction by exhaust from the elevator cylinder to a small reservoir connected to the pump intake.

The invention is shown diagrammatically in the accompanying drawing, in which—

1 is a pump having a discharge passage 2 connected on its intake side with a tank 3, which is supplied by a pipe 4. The pipes 2 and 4 open through the casing 5 of the valve, which consists of a stem 6 having an operating rack 7 at one end controlling pistons 8, 9 intermediate the ends and balancing pistons 10, 11.

12 represents a by-pass which, when the valve is in normal rest position as shown in the drawing, connects the opposite sides of piston 8 so that the pump simply circulates the water or oil through pipe 2, by-pass 12, pipe 4 to tank 3.

13 represents an operating wheel which is moved by a hand rope and geared to rack 7 through pinion 14.

When the valve stem is lifted, so that pis-

ton 8 cuts off by-pass 12, the power of the pump will be applied directly to the lifting cylinder 15 through pipe 2, pipe 16, check valve 17, opening toward the cylinder and pipe 18. At this time the exhaust pipe 19 leading to the lower end of the valve cylinder is closed. As herein shown, the elevator is lifted by applying power and lowered by permitting its own weight to exhaust the fluid back into the tank 3 through pipe 19, port 20 and pipe 4, when the piston 9 is lowered across port 20. It will be understood, however, that this valve mechanism can be applied to other forms of elevators than that particularly shown herein.

It will be seen that when the valve is in closed position the water or oil is simply circulated through by-pass 12 and pipe 4 at a very low pressure, insufficient to open check valve 17, and therefore without effect on the elevator. When the piston 8 is raised so as to close by-pass 12 it will then be seen that the power of the pump is applied directly to the elevator cylinder, as the piston 9 does not open the exhaust pipe 19 when the piston 8 closes the by-pass 12. When the elevator is lowered, it will be seen that check valve 17 remains closed and the fluid exhausts through pipe 19, port 20 and pipe 4 to the tank. The pistons 8 and 10 balance the pump pressure at all times, and the pistons 9 and 11 at all times balance the motor pressure due to the weight of the plunger, car, etc., so the valve can be very easily moved by hand connections. The tank is made of sufficient capacity to accommodate the fluid displaced during the travel of the car.

It will be seen that by this valve mechanism there is no dead center at any time which blocks the flow of fluid, nor is there any liability of exhausting the water from the cylinder at the wrong time, and the invention is especially suitable where very heavy loads are to be lifted at low speed, inasmuch as shocks and water hammers will be avoided if the fluid is kept in motion continuously.

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 an elevator cylinder, of a pump connected thereto, a three-way valve having opposite open positions

- and an intermediate closed position, a separate circulating passage between the pump intake and discharge controlled by said valve, a check valve in the pump discharge passage between the cylinder and said by-pass preventing return flow from said cylinder to said by-pass, a discharge tank, and a passage from said cylinder to said tank controlled by said three-way valve.
2. The combination with a tank and a continuously running pump, of a hydraulic elevator cylinder directly connected therewith, a by-pass around the pump, a valve between said pump and said elevator for controlling the starting and stopping of the elevator, a check valve in said direct passage opening toward the elevator cylinder, an exhaust passage between said cylinder and said tank, said valve closing the by-pass and said exhaust passage to lift the car, the exhaust passage only to stop the car by permitting said check valve to close, and opening both said by-pass and said exhaust passage to lower the car.
3. The combination of a continuously running pump, a hydraulic motor adapted to be directly operated by pressure from said pump in one direction, and by gravity in the other direction, a valve between the pump and motor for controlling the latter, said valve in one position circulating the fluid between the pump discharge and inlet independently of the motor, and in another position cutting off said by-pass and the motor exhaust to drive the motor, and a check valve acting in conjunction with said valve at another position to hold the motor stationary.
4. The combination with a valve casing having a continuously open pressure passage, and connections to a discharge tank and a hydraulic motor, of a hydraulic motor cylinder connected with said pressure passage, a by-pass between said pressure passage and said tank connection, and a movable valve stem in said casing having means for closing said by-pass and said motor discharge to operate the motor by pressure, said by-pass being opened by said valve when said motor is at rest, a check valve for preventing back flow from the motor cylinder when said by-pass is open, said valve having means to open said by-pass and said discharge to permit the motor to move by gravity, and being balanced at one end by the pump pressure and at the opposite end by the motor cylinder pressure.
5. The combination with a valve casing having a pressure inlet opening, and a connection to a discharge tank, of a hydraulic motor cylinder connected with said inlet opening, a check valve between said motor and said valve casing opening toward said motor, and having a discharge passage connected with said valve casing, a by-pass between said pressure inlet and said tank connection, and a movable valve stem in said casing having means for closing said by-pass when the pressure is to be applied to operate the motor, said by-pass being open when said motor is at rest.
6. The combination in a three way valve of a casing, a valve stem moving therein having a plurality of pistons, a pressure supply passage through said valve between two of said pistons at all valve positions, a discharge passage from said casing leading to a tank, a by-pass connecting said pressure supply passage and said discharge passage and controlled by one of said pistons, and a discharge passage leading to said casing and controlled by another of said pistons.
7. The combination in a three way valve of a casing, a valve stem moving therein having a plurality of pistons, a pressure supply passage through said valve between two of said pistons at all valve positions, a discharge passage from said casing leading to a tank, a by-pass within said casing connecting said pressure supply passage and said discharge passage and controlled by one of said pistons, and a discharge passage leading to said casing and controlled by another of said pistons.
8. The combination in a three way valve of a casing, a valve stem moving therein having four pistons, a pressure supply passage through said valve between two of said pistons at all valve positions, a discharge passage from said casing leading to a tank, a by-pass connecting said pressure supply passage and said discharge passage and controlled by one of said pistons, and a discharge passage leading to said casing and controlled by another of said pistons, two of said pistons balancing the supply pressure, and the other two balancing the pressure from the controlled device.
- In testimony whereof I affix my signature, in presence of two witnesses.
- EDWARD L. DUNN.
- Witnesses:
ARTHUR D. KING,
GEORGE E. GARNO.