(No Model.)

2 Sheets—Sheet 1.

C. WHITTIER.

ELEVATOR MECHANISM.

No. 435,957. Patented Sept. 9, 1890.

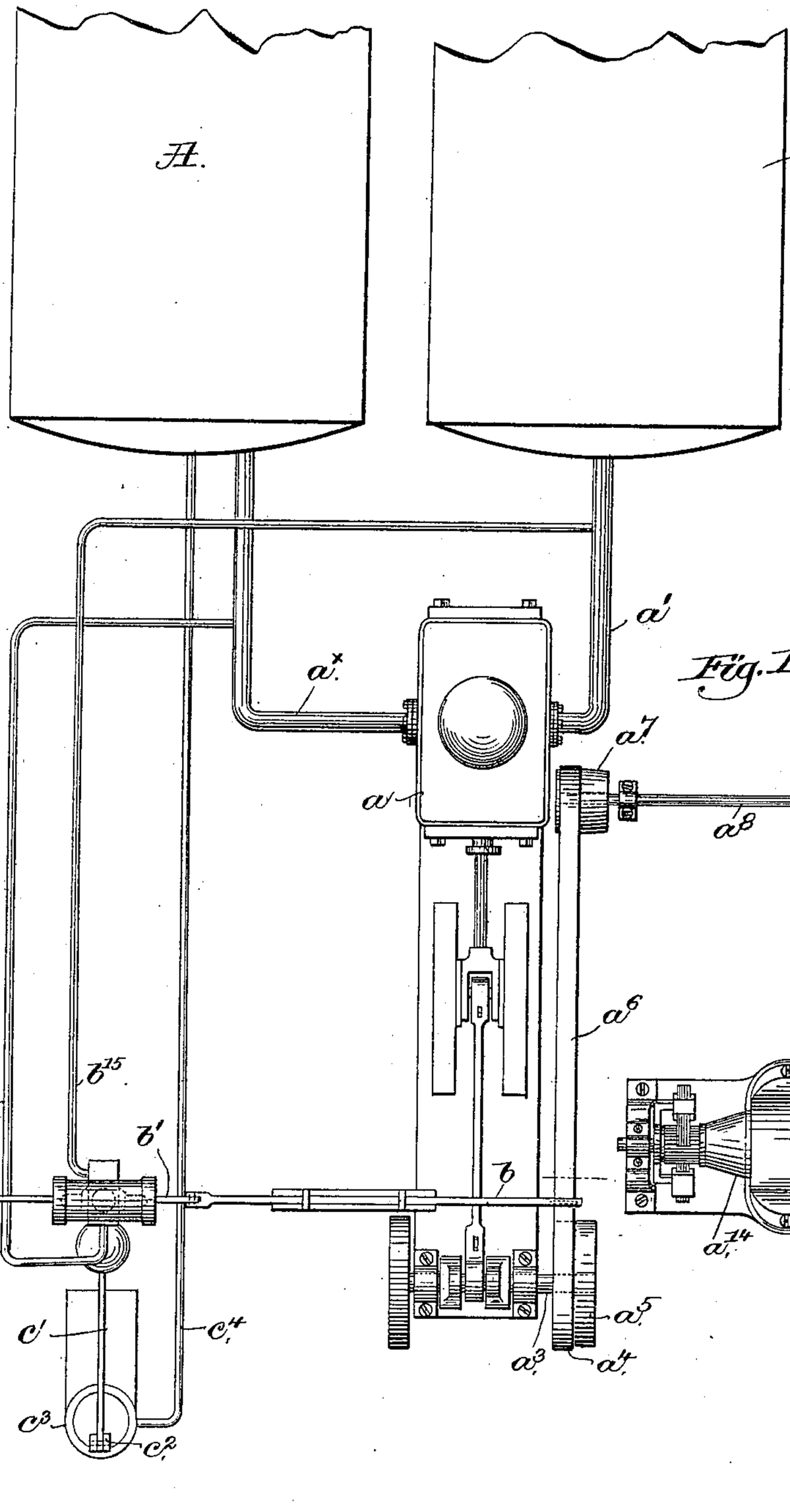

Fig. 1.

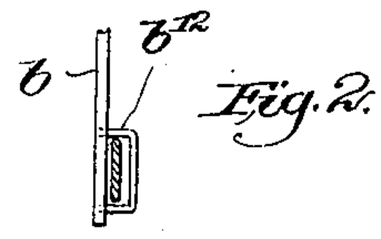

Fig. 2.

Witnesses.
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Inventor:
Charles Whittier.
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(No Model.) 2 Sheets—Sheet 2.

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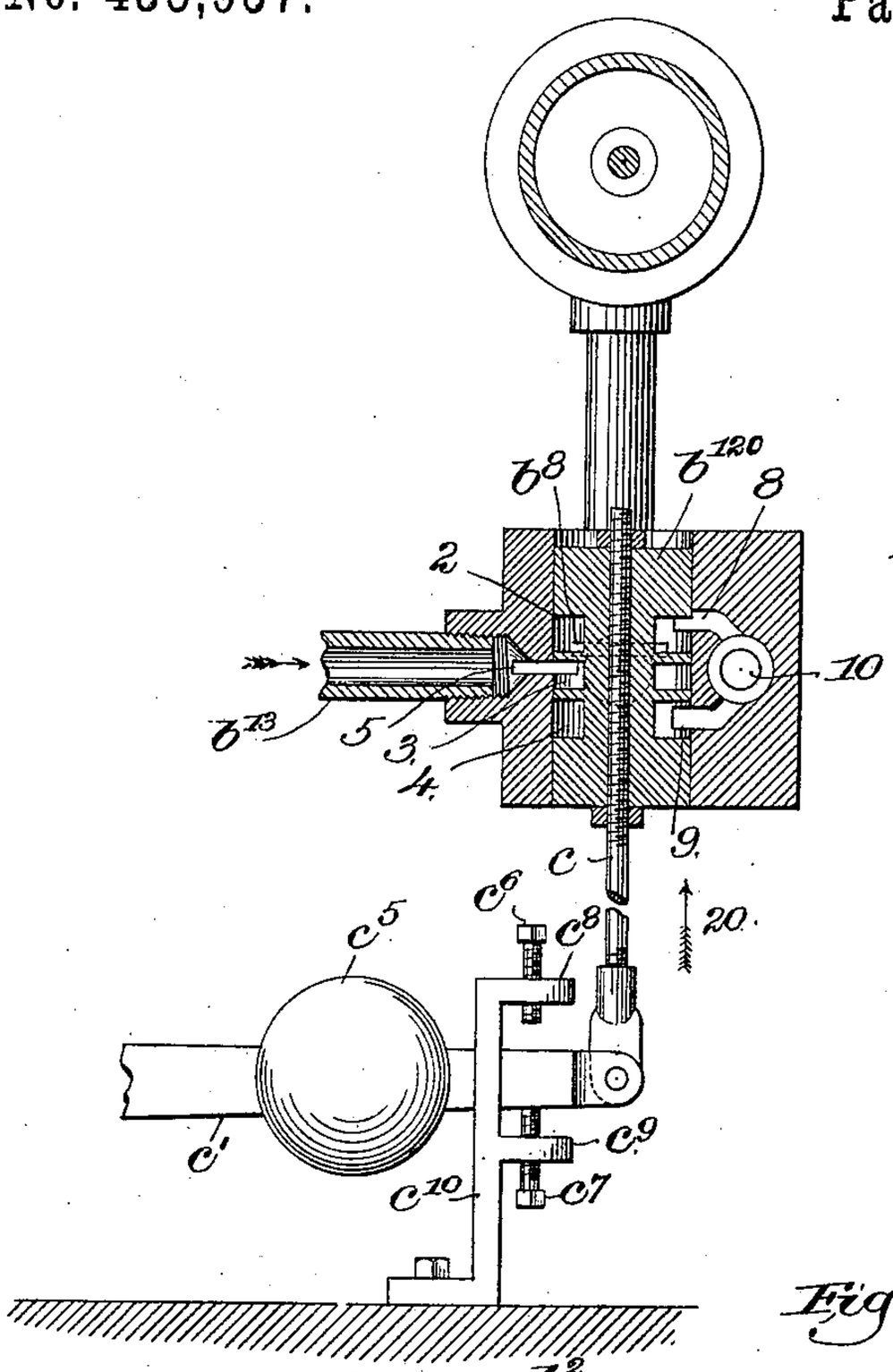

Fig. 3.

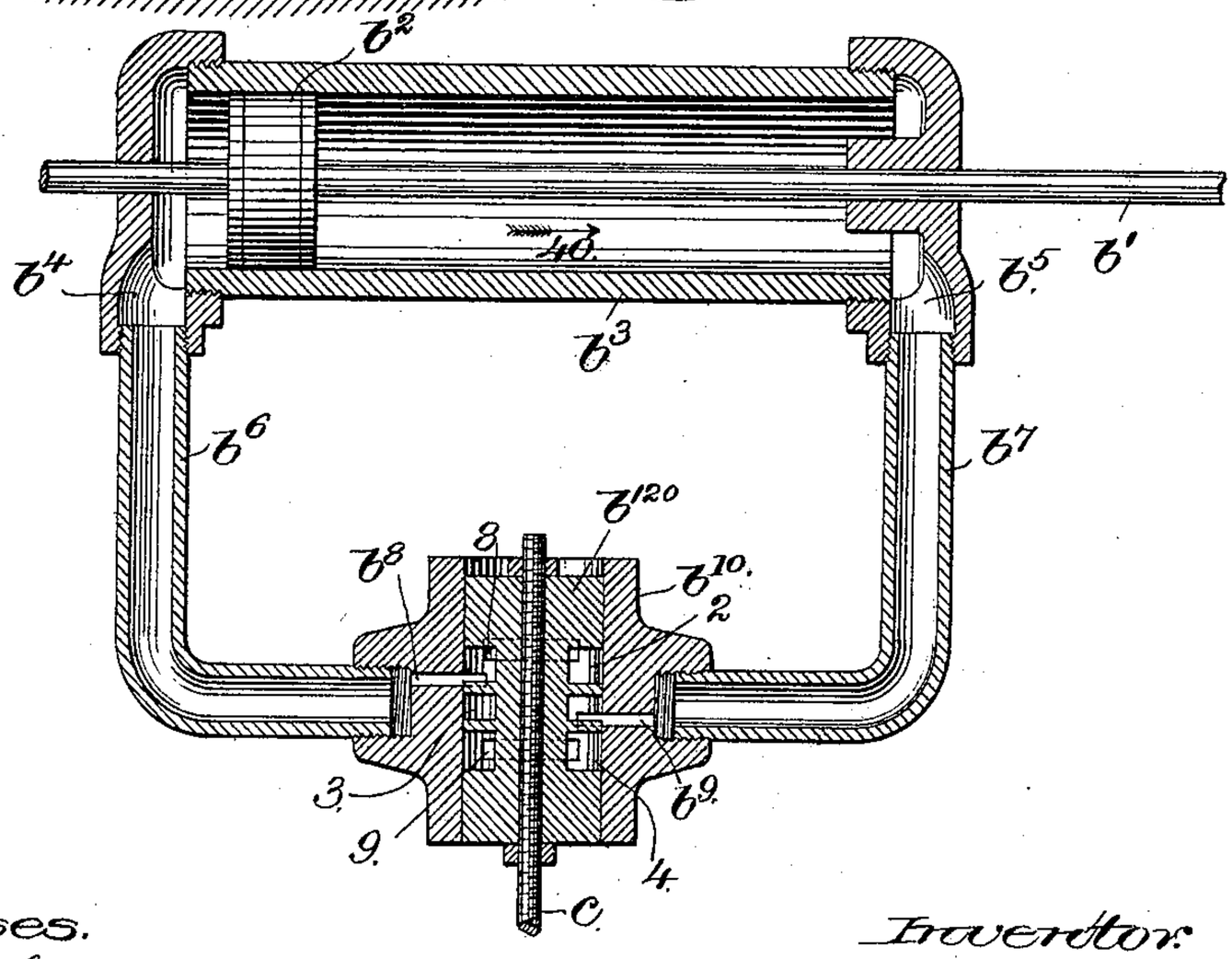

Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

CHARLES WHITTIER, OF BOSTON, MASSACHUSETTS.

ELEVATOR MECHANISM.

SPECIFICATION forming part of Letters Patent No. 435,957, dated September 9, 1890.

Application filed June 20, 1890. Serial No. 356,109. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WHITTIER, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Elevator Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to elevator-operating mechanism of that class in which the elevator is operated by fluid, usually water, in a tank or vessel, the said water preferably being contained in the said tank under pressure.

My present invention is an improvement upon elevator-operating mechanism substantially such as shown and described in United States Patent No. 399,716, granted to me March 19, 1889, and has for its object to provide mechanism, as will be described, whereby a continuously-running motor may be used to drive the pump.

In accordance with my present invention the crank or driving shaft of the pump is provided with a fast and loose pulley connected by a belt with a pulley on a counter-shaft having a second pulley connected by a belt with a pulley on the armature-shaft of the electric motor, and the pump-driving belt is connected with a shipper mechanism operatively connected to a piston having its movement controlled by a valve which is operated by the water in the tank or vessel.

My invention in a hydraulic elevator mechanism therefore consists in the combination of the following instrumentalities, viz: a water-supply tank, a pump connected thereto and provided with a fast and loose pulley, an electric motor, a counte-rshaft, and belts connecting said counter-shaft with the pump-pulleys and with the motor-shaft, and a shipper mechanism for said belt comprising a rod or lever, a piston to operate it, a valve to move said piston, and a regulator to operate said valve, substantially as will be described.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a top or plan view of an elevator-operating mechanism embodying my invention; Fig. 2, a detail of the shipper mechanism; Fig. 3, a detail in elevation and section to be referred to, and Fig. 4 a sectional detail of the piston and its operating-valve.

Referring to Fig. 1, A represents a tank or vessel in which is stored the fluid or water used to actuate the elevator, and A′ represents the waste-water or discharge tank.

The tank A is preferably a closed vessel, and the water is stored therein under pressure, it being forced into said tank by a pump a, having its inlet-pipe a' connected, as herein shown, to the discharge or waste-water tank A′, and its outlet-pipe $a^{\times}$ connected to the supply-tank A. The pump a, which may be of any usual or well-known construction, has its crank or driving shaft a^3 provided with a fast pulley a^4 and a loose pulley a^5, connected by a belt a^6 to a substantially small pulley a^7 on a counter-shaft a^8, provided near its opposite end, as herein shown, with a substantially large pulley a^9, connected by a belt a^{10} with a substantially small pulley a^{12} on the armature-shaft a^{13} of a motor a^{14}, which may be of any usual or desired form. The belt a^6 is shifted from the fast pulley a^4 to the loose pulley a^5, and vice versa, by means of a shipping mechanism operated, as will be described, by the water-level in the tank A.

The belt-shipping mechanism comprises, as herein shown, a rod or bar b, secured to or forming part of the piston-rod b' of a piston b^2 in a cylinder b^3, provided at its opposite ends, as herein shown, with ports b^4 b^5, (see Fig. 4,) the said ports being connected by pipes b^6 b^7 to ports b^8 b^9, in a valve-casing b^{10}. The shipper-rod b, as herein shown, is provided with a bail or hook b^{12}, (see Fig. 2,) which surrounds or incloses the belt a^6.

The valve-casing b^{10} is provided preferably with a piston-valve b^{120}, having, as shown in Figs. 3 and 4, three annular ports 2 3 4, the port 3 communicating with the inlet-pipe b^{13} by the port 5 in the valve-casing, the said pipe being connected to the supply-pipe $a^{\times}$ for the tank A. The valve-casing b^{10} is provided at its opposite ends with ports 8 9, communicating with a common discharge or outlet port 10, connected, as herein shown, by the pipe b^{15} to the pipe a'.

The valve b^{120} is provided with a valve-stem c, connected to one end of a lever c', forming

part of a regulator herein shown as the well-known Clark diaphragm regulator, the said lever being pivoted at its other end, as at c^2, and acted upon by a pin or stud, (not shown,) but which is extended up through the casing c^3, and having its other end resting upon a diaphragm in said casing, the lower part of the said casing being connected by a pipe c^4 to the tank A. The lever c' is provided with an adjustable weight or ball c^5, by which the pressure required to raise the said lever may be determined. The movement of the piston-valve b^{120} is limited, as shown, by adjusting-screws c^6 c^7, (see Fig. 3,) movable in arms c^8 c^9 of an upright or standard c^{10}.

As shown in Fig. 4, the lever c' is in contact with the lower adjusting-screw c^7, and the piston-valve b^{120} is in position to admit fluid into the pipe b^7 and into the cylinder b^3 at the right of the piston b^2, the latter being shown in its extreme left position, the driving-belt a^6 being on the fast pulley a^4. With the parts in this position the motor a^{14} rotates the counter-shaft a^8, which in turn drives the pump and forces water from the discharge-tank A′ into the supply-tank A, the said pump being maintained in operation as long as the water-level in the tank is below a predetermined point, the water-level being reduced below the predetermined point when the elevator is in use. When the water-level in the tank has reached a predetermined point, the said water acts on the diaphragm of the regulator and raises the lever c' until it comes in contact with the screw c^6. As the lever c' is raised the piston-valve b^{120} is moved in the direction of arrow 20, Fig. 3, and the annular port or passage 3 is connected with the port b^8 in the valve-casing, thereby connecting the supply-pipe b^{13} with the pipe b^6 through the port 5, passage 3, and port b^8, and connecting the port b^9 and pipe b^7 with the port 9, leading to the discharge-pipe b^{15} for the valve-casing. The water from the tank A passes through the pipe b^{13}, port 5, passage 3, and port b^8, the pipe b^6 and port b^4 into the cylinder b^3, thereby moving the piston toward the right or in the direction of arrow 40, Fig. 4, and moving the driving-belt a^6 from the fast pulley a^4 to the loose pulley a^5, thus stopping the pump without stopping the motor. The water in the cylinder b^3 at the right of the piston is forced through the port b^5, pipe b^7, port b^9, passage 4, port 9, and pipe b^{15} into the waste-tank A′. The piston b^2 and the valve b^{120} remain in the position described as long as the water-level in the tank A is at a predetermined point; but when the said water-level falls below the said predetermined point the weighted lever c' descends until it comes in contact with the lower stop or limiting screw c^7, the valve b^{120} being moved into the position shown in the drawings and the piston b^2 moved in the direction opposite to that indicated by arrow 40, the water from the tank A passing through the pipes $a^\times$, b^{13}, port 5, passage 3, port b^9, pipe b^7, and port b^5 into the cylinder b^3, and the water in the said cylinder at the left of the piston is forced through the port b^4, pipe b^6, port b^8, passage 2, port 8 into the discharge-pipe b^{15}. When the piston is moved in the direction opposite to that indicated by arrow 40, the driving-belt h^6 is moved from the loose pulley a^5 onto the fast pulley a^4. The pump is thus automatically started and stopped, while the electric motor remains running all the time, thereby dispensing with resistance-boxes and reducing the wear upon the motor to a minimum, and when the belt a^6 is on the loose pulley the motor is performing substantially no work and is relieved from strain, thus largely economizing in electrically-actuated elevator mechanism.

I claim—

1. In a hydraulic elevator mechanism, the combination of the following instrumentalities, viz: a water-supply tank A, a pump connected thereto and provided with a fast and loose pulley, an electric motor, a counter-shaft, and belts connecting said counter-shaft with the pump-pulleys and with the motor-shaft, and a shipper mechanism for said belt comprising a rod or lever, a piston to operate it, a valve to move said piston, and a regulator to operate said valve, substantially as described.

2. In a hydraulic elevator mechanism, the combination of the following instrumentalities, viz: a water-supply tank A and waste-water tank A′, a pump having its inlet-pipe connected to the tank A′ and its outlet-pipe to the tank A, a fast pulley and a loose pulley on the pump-shaft, a counter-shaft provided with pulleys, a belt connecting a pulley on the counter-shaft with the pulleys on the pump-shaft, an electric motor provided with a pulley on its armature-shaft, a belt connecting the armature-pulley with a pulley on the counter-shaft, and a belt-shipping mechanism comprising a rod connected to the pump-driving belt, a piston connected to said rod, a cylinder, a valve-casing provided with a port communicating with the tank A and with a water-outlet port, a valve in said casing, and a regulator connected to the valve to operate the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES WHITTIER.

Witnesses:

JAS. H. CHURCHILL,

EMMA J. BENNETT.