(No Model.)

N. C. LOCKE.

HYDROSTATIC PUMP GOVERNOR AND TANK FILLER.

No. 545,082. Patented Aug. 27, 1895.

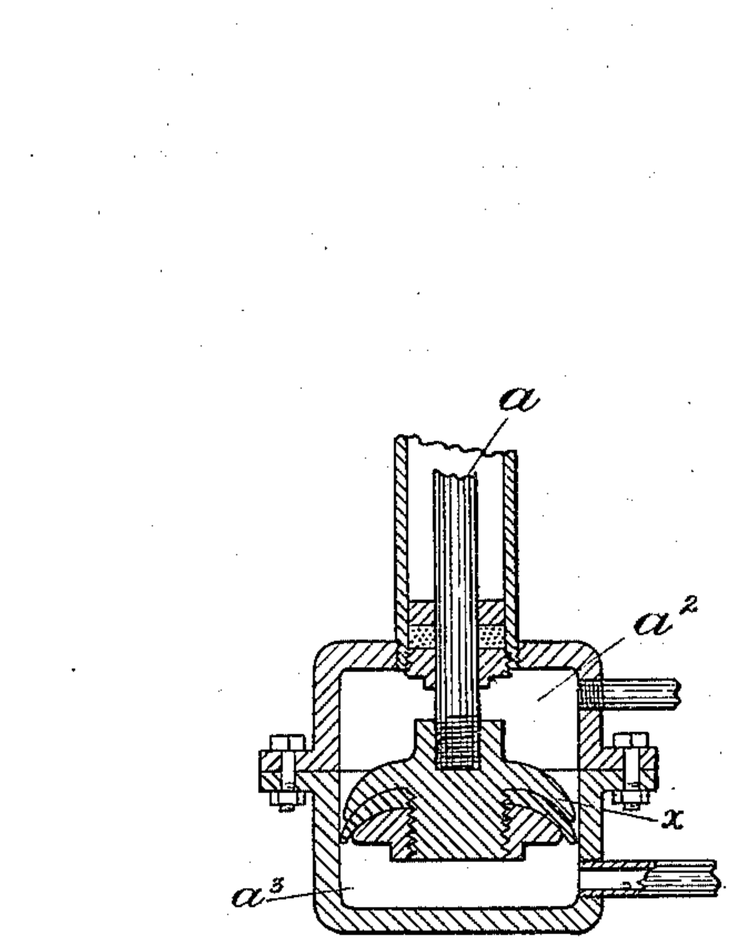

Fig. 2.

Fig. 1.

WITNESSES.
A. F. Crawford.
L. P. Slade.

INVENTOR.
Nathaniel C. Locke
by his attorney
Edmund S. Beach

UNITED STATES PATENT OFFICE.

NATHANIEL C. LOCKE, OF SALEM, MASSACHUSETTS.

HYDROSTATIC PUMP-GOVERNOR AND TANK-FILLER.

SPECIFICATION forming part of Letters Patent No. 545,082, dated August 27, 1895.

Application filed February 2, 1895. Serial No. 537,071. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL C. LOCKE, of Salem, in the county of Essex and State of Massachusetts, have invented a new and useful Hydrostatic Pump-Governor and Tank-Filler, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of one form of pump-governor whose valve-stem is connected with a diaphragm in a casing with water-chambers on both sides of the diaphragm and connected with an elevated tank and water-leg. Fig. 2 shows a modification, in which said valve-stem is connected to a piston instead of a diaphragm.

The object of my invention is to produce a cheap and simple device especially adapted for automatically maintaining the water-supply in water tanks—such, for example, as the water-tanks usually found at the tops of buildings for elevator, fire, and other service. It is desirable to keep these tanks continually filled to the desired level, in order that the maximum supply of water may be in store at all times.

My invention consists, broadly, in the combination of a regulator with a tank and a hydrostatically-operating water-leg, the pressures in the water-leg and tank, and consequently in their respective pressure-chambers, being wholly independent at all times.

In the drawings, showing the best form of my invention now known to me, A is one form of pump-governor, comprising a valve-stem a, attached to a diaphragm a' in an attached pressure-chamber case, there being a pressure-chamber a^2 on one side of the movable partition or diaphragm a' and another pressure-chamber a^3 on the other side thereof. A water-leg B leads from one or the other of the pressure-chambers (from chamber a^2, as shown) and a pipe d leads from the tank D to the other pressure-chamber a^3, as shown. The free end of water-leg B extends up to the high-water line of the tank, or a little higher, if desired, and the tank may be at any desired elevation above the pump-governor, pump, &c. The mouth or inlet of the water-leg is so located that it can not receive water from the tank, the water-leg being preferably outside the tank, as shown, because it is frequently desirable to have the water-leg in one portion of a building and the tank at a distance laterally, and sometimes the water-leg is in one building and the tank in another building; but in this respect the main point, so far as the operation of my device is concerned, is to have the inlet of the water-leg so located that it cannot take in the tank-water, and for this reason the water-leg is either at one side of the tank or, if it runs up through the tank, sufficiently high to prevent its operating as an overflow or trap for water from the tank. By this arrangement a substantially constant pressure is maintained in the water-leg and its connected pressure-chamber, the pressure varying only in consequence of evaporation of water in the water-leg or from some other unintended cause, the pressure in the water-leg not being affected by variations of the height of water in the tank. Ordinarily the pump-governor, pump, &c., are in the basement and the tank and mouth of the water-leg near the roof. If water-leg B be filled to the water-level in tank D, the load on the upper side of diaphragm a'—that is, the pressure in chamber a^2—will exactly balance the tank-pressure through conduit d in chamber a^3 on the other side of the diaphragm, and the diaphragm be in its normal position with the valve of the pump-governor about half-way open and the speed of the pump uniform. If the water in the tank falls below the high-water line—say the line at $x\,x$—then the pressure in chamber a^2 on the diaphragm or piston will be greater than the pressure on the other side of the diaphragm or piston in chamber a^3, and the diaphragm will be moved to open the valve and consequently to increase the speed of the pump which operates to fill the tank. If, on the other hand, the water in the tank rises above the line $x\,x$, then the pressure in chamber a^3 will exceed the pressure in chamber a^2 (the latter pressure being due to the height of the water-column in leg B) and the valve will tend to close, moving wholly or partially toward its seat, according to the height of water in the leg B. Care is to be taken to keep the water in leg B at a height corresponding to the desired high-water line of tank D—say line $x\,x$. The diaphragm is equally exposed to the opposing pressures on

both sides and is consequently free to move under very slight variations in the heights of the two water-columns or variations of pressure in the chambers a^2 and a^3.

The advantages arising from the use of a water-load in opposition to the tank-pressure are very important. Were a mechanical load used the force of gravity or weight could not be distributed over the whole surface of the diaphragm, but would be centralized in a pressure-cap and necessitate a thick and strong diaphragm, which would offer much greater resistance than is now necessary and make the apparatus much less delicate and certain in its operation and also less durable. It will be plain that the valve-stem or spindle a may be disconnected from a valve and compelled to do work other than that of actuating a valve.

Fig. 2 shows a modification in which the ordinary piston is substituted for the diaphragm, the movable partition consisting of either a diaphragm or piston.

What I claim is—

1. The combination of a regulator and its valve; a pressure-chamber case; a movable partition therein which divides the case into independent pressure chambers; means for connecting the valve and movable partition; an elevated tank and water leg, the tank being connected with one pressure-chamber and the water-leg with the other pressure chamber; and the mouth of the water-leg being without the water-occupying portion of the tank, substantially as and for the purpose set forth.

2. The combination of a regulator and its valve; a pressure chamber case; a movable partition therein which divides the case into independent pressure chambers; means for connecting the valve and movable partition; an elevated tank and water leg, the tank being connected with one pressure-chamber and the water-leg with the other pressure chamber; and the water-load in the leg being constant, substantially as and for the purpose set forth.

3. The combination of a regulator and its valve; a pressure chamber case; a movable partition therein which divides the case into independent pressure chambers; means for connecting the valve and movable partition; an elevated tank and water leg, the tank being connected with one pressure-chamber and the water-leg with the other pressure-chamber; and the water-leg being outside the tank, substantially as and for the purpose set forth.

4. The combination of an elevated tank and water-leg with a pressure-chamber-case; a movable partition therein which divides the case into independent pressure-chambers, and a spindle attached to the movable partition and projecting from the case, the tank being connected with one pressure-chamber and the water-leg with the other pressure chamber and the water-leg and its chamber being independent of the tank and its connected pressure-chamber, substantially as and for the purpose set forth.

NATHANIEL C. LOCKE.

Witnesses:

EDWARD S. BEACH,

A. I. CRAWFORD.