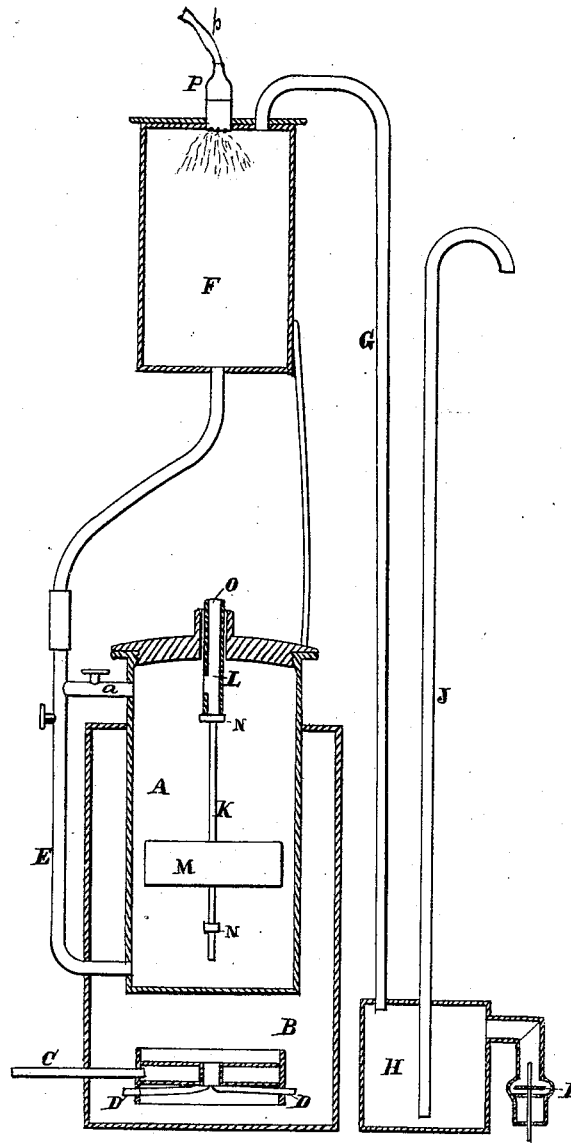


L. B. LAWRENCE & A. G. STRAWBRIDGE.  
Water-Lifter.

No. 215,639.

Patented May 20, 1879.



Witnesses

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# UNITED STATES PATENT OFFICE.

LORENZO B. LAWRENCE, OF OAKLAND, CALIFORNIA, AND ALFRED G. STRAWBRIDGE, OF SHARON, PENNSYLVANIA.

## IMPROVEMENT IN WATER-LIFTERS.

Specification forming part of Letters Patent No. **215,639**, dated May 20, 1879; application filed February 26, 1879.

### *To all whom it may concern:*

Be it known that we, LORENZO B. LAWRENCE, of Oakland, county of Alameda, and State of California, and ALFRED G. STRAWBRIDGE, of Sharon, State of Pennsylvania, have invented a Water-Lifter; and we hereby declare the following to be a full, clear, and exact description thereof, reference being made to the accompanying drawings.

Our invention relates to a novel construction for a water-lifting apparatus; and it consists of a boiler or receiver, which is set into a heating-furnace, and has a pipe leading from near the bottom to a tank situated above it.

A float situated in the boiler operates a valve, which closes an opening in the upper part of the boiler, so that the pressure of the steam generated within the boiler will force the water into the upper tank, thus driving out the air from this tank into the water-lifting tank below.

When the water in the boiler is lowered to a certain point the float will open the valve and allow the steam to escape, thus relieving the pressure and allowing the water to flow back from the upper tank into the boiler. A jet of water enters the upper tank and cools it sufficiently to relieve the water-tank from pressure and allow it to fill again through a valve in one side.

A is a receiver or boiler, which is set over a furnace, B, by which it is heated. This furnace consists of a suitably-shaped disk having a rim around it, so that it can be filled with sand or other granulated refractory material. A pipe, C, brings petroleum or other inflammable substance from a reservoir into this disk, and the sand acts as a wick, upon which it burns. Through the bottom of this disk a number of draft-pipes, D, pass and supply air from below to the center for the purposes of combustion. By feeding the oil into the sand wick slowly we can regulate the heat, so as to operate the machine at whatever rate may be desired.

The boiler has a pipe, E, which opens into it about one-third the distance from the bottom, and leads thence upward into the tank F. This tank is lined with wood or other non-conducting substance, and has a pipe, G, lead-

ing from the top down to the lifting-tank H, which is situated below the source of the water-supply, and has an ingress-valve, I, and a discharge-pipe, J.

Within the boiler is a stem, K, having a valve, L, upon its upper end, which may be of any suitable form, and a float, M, moves loosely up and down this stem. Adjustable stops N upon the stem limit the movement of the float, so that when it strikes the upper stop it raises the stem K and closes the valve L.

The steam which thus forms within the boiler will force the water out through the pipe E and up into the tank F, displacing the air therein, and forcing it down to act upon the water in the tank H, and force it out through the discharge-pipe J.

When the water in the boiler has fallen to a point as low as is desirable or safe the float will strike the lever of the adjustable stops, and thus open the valve L to allow the accumulated steam to escape by means of the pipe O. This relieves the pressure within the boiler and allows the water to flow back from the upper tank, F, and again fill the boiler until the float has risen so as to strike the upper stop and close the valve again, when the action is repeated.

When the water flows out of the tank F a pipe, P, at the top admits a small quantity of water, which, cooling the interior of this tank, brings the air back from the tank H and relieves the pressure therein, so that it may again fill with water; or, in some cases, check-valves may be used and a new charge of air admitted to the cylinder.

The action of the apparatus is thus made automatic, and similar to that of a hydraulic ram. The escaping steam from the boiler may be utilized to heat water for various uses.

The whole forms an economical automatic water-lifting apparatus.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The boiler A, with its float M and automatically-operating valve L and the discharge-pipe E, in combination with the tank F, pipe G, tank H, and pipe J, substantially as and for the purpose herein described.

2. The boiler A, with its valve L, operating rod and float, and the water or steam discharge pipes E and *a*, in combination with the tank F and pressure-pipe G and the water-jet pipes P, substantially as herein described.

3. The automatic water-lifting apparatus consisting of the heating-furnace and the boiler A, with its valve L, float M, and the operating rod and stops, as shown, in combination with the tank F, connected with the

boiler by the pipes E and *a*, and the water-tank H, with its pipes G and J, and the ingress-valve, the whole operating substantially as and for the purpose herein described.

In witness whereof we have hereunto set our hands.

LORENZO B. LAWRENCE.

ALFRED G. STRAWBRIDGE.

Witnesses:

R. K. EVANS,

FRANK A. BROOKS.