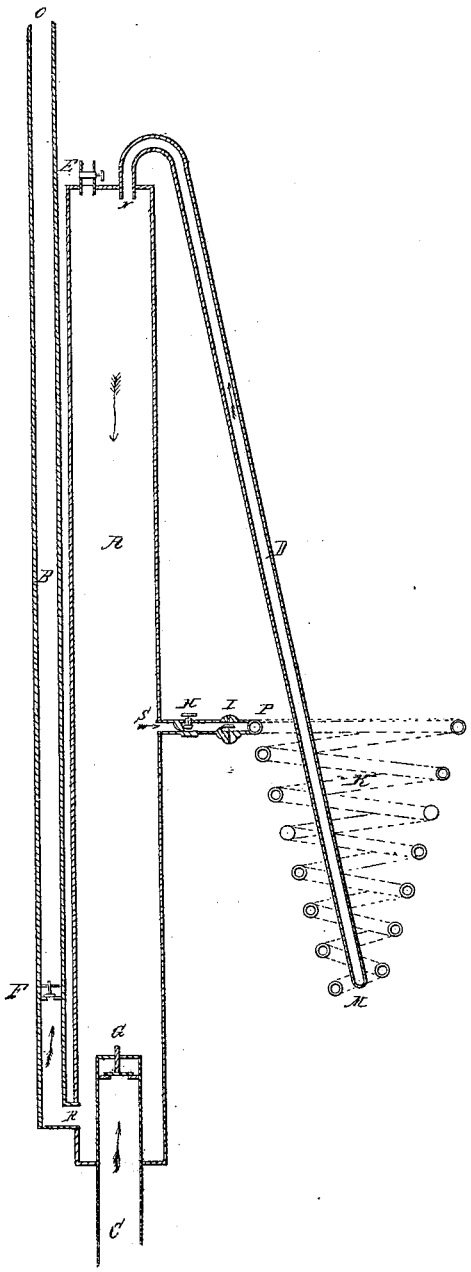
E. Thayer,

Steam Pump.

No. 47,051. Patented Mar. 28, 1865.



Witnesses.
B. Franklin Clark
C. H. Thayer

Inventor.
E. Thayer

UNITED STATES PATENT OFFICE.

ELI THAYER, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN AUTOMATIC STEAM-PUMPS.

Specification forming part of Letters Patent No. 47,051, dated March 28, 1865.

To all whom it may concern:

Be it known that I, ELI THAYER, of the city and county of Worcester, in the State of Massachusetts, have invented a new Self-Acting Steam-Pump; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

The nature of my invention consists in so connecting a coil of pipe or other vessel which may be used for generating steam with a hollow cylinder or tube that both together become a self-acting machine for raising water, being alternately a force-pump and a suction-pump.

In the accompanying drawing, which is a vertical section, A represents the tube or hollow cylinder; C, the pipe that furnishes water to the tube A from a well or cistern; B, the discharge-pipe, which carries the water to any required point. F and G are vertical check-valves. E is a vent-cock.

S P and M N represent the parts of the pipe outside of the coil or steam generator, of which they are continuations.

K represents the coil.

H represents a globe-valve.

I represents an inverted horizontal check-valve. This valve may be used in the ordinary way, but it works better for this purpose inverted.

To enable others skilled in the art to make and use my invention, I proceed to give a full description of its construction and operation.

The size of the machine must be determined by the amount of work it will be required to perform. I will only describe the smallest size likely to be of practical utility. The tube A should be made of sheet metal, (I prefer copper,) and should be about three feet in length and about four inches in diameter. The supply-tube may be of ordinary iron or lead pipe, and should be one inch or an inch and a half in diameter, and of a length to be determined by the location. The tube B should be not less than half of an inch in diameter, and may be of the same material as the pipe C. If the pump be portable, hose should be used in lieu of the pipes last named. The pipe from S to N, of which the coil is a part, should not be less than one-fourth of an inch in diameter, and may be either iron or copper. In the above dimensions internal measurement is intended. The length of the pipe constituting the coil should be fifteen or twenty feet. The form of the heater may be that or other.

I will now describe the operation of the machine so that the uses of the several parts above named will become apparent. I first fill the tube A with water to some point above S, and place the coil K over a fire. If the pump be made stationary, provision would of course be made for making a fire under the coil. I next open the globe-valve H sufficiently to let water into the coil in a very small stream. This water passes through the inverted valve I into the coil, when it is immediately converted into steam. The force of this expansion acts equally toward the two extremities S and N; but that portion of the steam which passes back toward the point S, when it or the water forming it entered the heater, closes the inverted valve I, and is compelled to change the direction of its force toward the point N, when it enters the tube A and presses upon the surface of the water. Meantime the valve I, no longer lifted by the pressure of the steam in the coil, is pressed down by its own weight and that of the water above it, and a new supply of water is furnished to the coil K, which acts in the same manner as just described. The vent-cock E should now be opened to allow the steam to drive out the atmospheric air from the tube A, and should then be immediately closed. The steam, continuing to be formed in the coil K and to be discharged into the tube A, presses more and more upon the surface of the water, and forces a portion of it through the vertical check-valve F in the discharge-pipe B. The same operation continuing, the water in the main cylinder is soon forced down below the point S, so that no further supply is furnished to the coil K; consequently as the water falls below the point S in the main tube the force of the steam is diminishing, while the condensing-surface to which it is exposed is constantly increasing; but when the steam has driven the water down to the check-valve G on the upper end of the supply-pipe C it comes in contact with a surface at the temperature of the water in the well or cistern from which it is taken. This contact is usually sufficient to cause an immediate condensation of all the steam in the tube A; but if at any time it should not do that, that result is sure to be effected by the

increasing cold surface below, and especially by the stratum of cold water always remaining in the tube A below the aperture for the discharge-pipe. As soon as this condensation of steam in the main tube begins there is caused a vacuum, which is immediately filled by water from the supply-pipe C. Perhaps, however, at first the supply-pipe may contain a portion of air. If so, it will be drawn or pressed into the main pipe and must be driven off at the vent-cock E. When the water again arises above S, a portion of it enters the coil, and the same effects already described are again produced.

The mode of operation which I have thus far described is to be made use of only when it is desired to elevate water without raising its temperature. Any degree of temperature, however, between that of the source and the boiling-point can be imparted to it at the will of the operator during the process of pumping.

In the method already described I supposed the globe-valve H was opened only far enough to admit of the passage of so much water as was needed to form sufficient steam to press the water in the main tube into the discharge-pipe, and that all the water admitted into the heater was used for this purpose. In that case the only portion of the water heated in the main tube is that directly in contact with the steam. This quantity is so small as scarcely to change the temperature of the whole discharged; but if a higher temperature is required the globe-valve H should be opened still further, and then only a portion of the water entering the coil will be converted into steam, while the remainder at a high temperature will be forced into the main tube to mingle with and raise the heat of that already there. Should the valve H be opened to the capacity of the coil, all the water above the point S would pass through it before being discharged and be raised to the boiling-point.

In case it is required to heat all the water discharged to the boiling-point, the pipe S P, leading into the coil, should be inserted near the bottom of the main tube or on a level with the insertion of the discharge-pipe B.

Having thus fully described my self-acting steam-pump, its construction and mode of operation, what I claim as my invention, and desire to secure by Letters Patent, is—

The combination of the coil or heater K, including the globe-valve H and the check-valve I, with the main tube A and the other valves and the pipes connected with it, for the purposes and in the manner above described.

ELI THAYER.

Witnesses:

ALEX. OSTRANDER,

B. FRANKLIN CLARK.