# H. M. Wightman,

## Steam Pump.

No. 106525. Patented. Aug. 16. 1870.

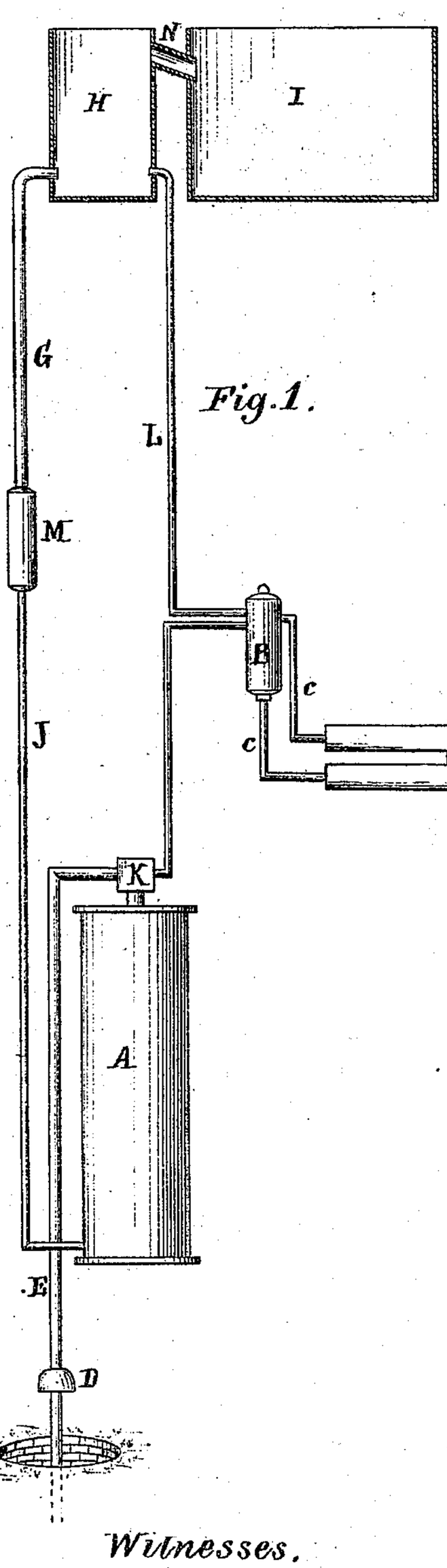


Fig. 1.

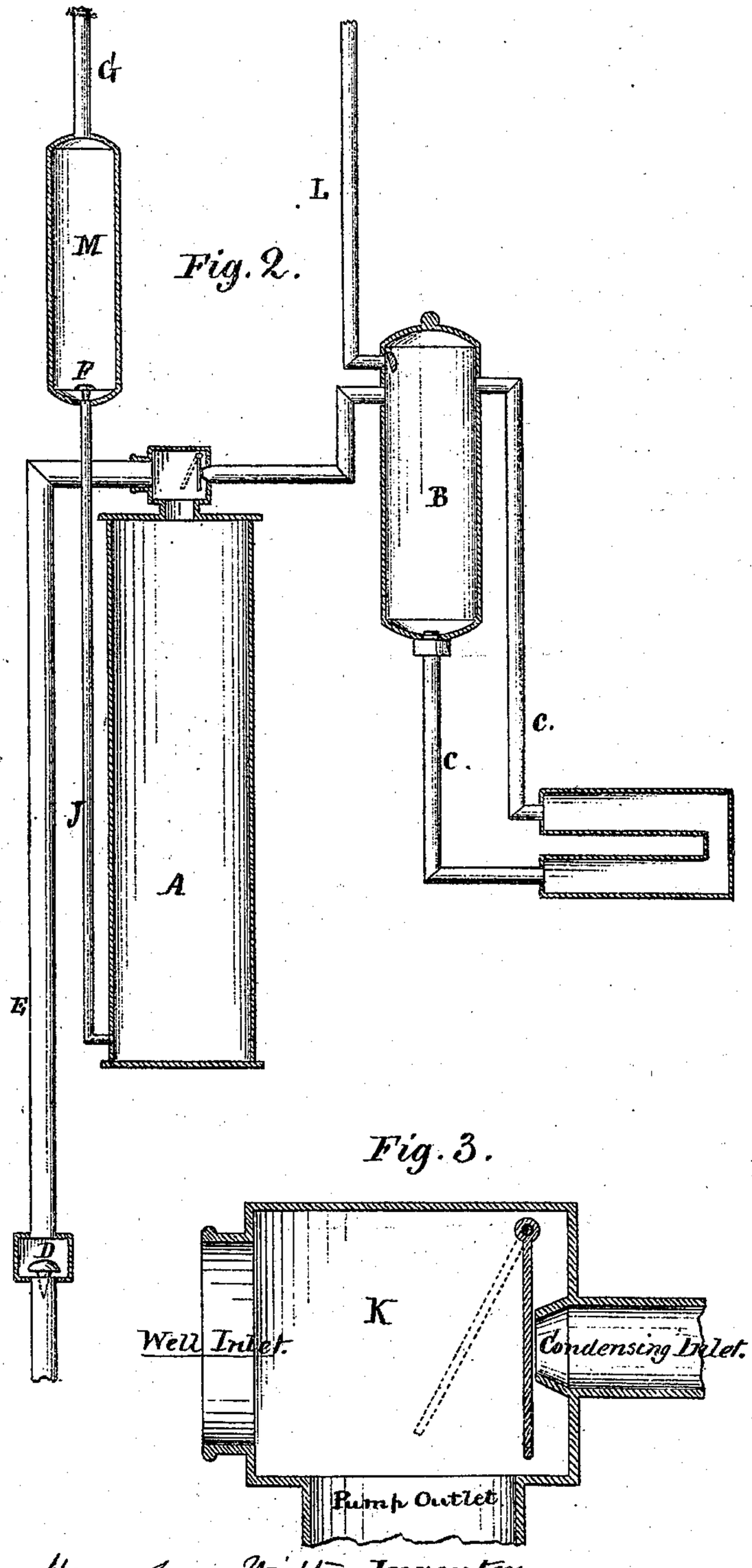


Fig. 2.

Fig. 3.




Witnesses.

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# UNITED STATES PATENT OFFICE.

HENRY MORSE WIGHTMAN, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN STEAM WATER-ELEVATORS.

Specification forming part of Letters Patent No. **106,525,** dated August 16, 1870.

I, HENRY MORSE WIGHTMAN, of Boston, Suffolk county, State of Massachusetts, have invented certain Improvements in Steam Water-Elevators, of which the following is a specification:

The improvements herein described relate entirely to an apparatus where, without the intervention of any machinery, the steam acts directly upon the water to be raised, the condensation of said steam producing a vacuum as the power for raising the water from source of supply to the apparatus. The improvements are expressly intended to be used in connection with the water-back or other water-heating apparatus in common use with stoves or ranges, and more especially relate to the overcoming of the difficulties incident to the automatic action of such apparatus when used for raising water for domestic purposes, and when the heat for the generation of steam depends upon the fuel consumed in the stove or other cooking apparatus, as also to relieving the pressure of steam when the apparatus has been emptied of water in its proper action.

The improvements particularly apply to the supply-chamber and its condensing arrangements and connections, the mode of preventing the flow of the condensing column of water when not required, and the ending of the discharge of water from the apparatus, and the producing of a vacuum by such discharge and action.

The following drawing, hereto annexed, is referred to in this specification.

Figure 1 is a view in detail of the apparatus with its connections, and shows the water-back and tanks. Fig. 2 is a sectional view of the apparatus. Fig. 3 is a sectional view of the valve hereafter designated by the letter K.

The parts represented by this drawing are lettered and described as follows: A, the main chamber or barrel of the apparatus, containing alternately water and steam, and from which the water to be raised is forced out by steam, and refilled by vacuum with water; B, the supply-chamber, containing and regulating the quantity of water turned into steam, and connected with water-back by pipes C C, and with the main chamber A by pipes shown in the drawing; C C, pipes connecting the supply-chamber with the water-back of stove or range; D, inlet-valve from well or source of supply; E, inlet-pipe from source of supply; F, outlet-valve from apparatus, opening pipes to tank above; G, outlet-tube; H, small tank insuring water for condensation; I, large tank or cistern from which the house is supplied by drawing water through pipes connected therewith. This tank is supplied by overflow from small tank, H. J, the contracted tube as part of the outlet-pipe *g*, and operating as hereafter described; K, valve operating by the condensing column and steam, and also reversing its action from the inlet water from well; L, condensing tube and valve entering the supply-chamber, and connected with the small tank, H; M, enlarged pipe, operating as condenser for surplus steam passing into it; N, overflow-pipe from small tank, H, to large tank, I.

The operation of the apparatus is as follows: It is assumed that the whole apparatus is firmly connected together as nearly air-tight as possible, and, for convenience, occupying in its parts the position shown in the drawing. The position of its parts is not essential to its proper action, provided that the supply-chamber B is placed both above the water-back and main chamber A. The apparatus, being thus secured and connected, is to be filled with water, including the water-back. A fire being lighted in the stove will heat the water in the water-back, which water will rise in the higher of the connecting-pipes C C, and its place, supplied by water falling in the lower tube, will induce circulation. All the water contained in the water-back and supply-chamber and pipes connecting them will soon arrive at a temperature where steam is evolved at sufficient pressure to overcome the weight of the column of water in the outlet-pipes J and *g*. The steam will also close the valve in the pipe L, and find an outlet from the supply-chamber B by way of the supply-chamber pipe connected with the main chamber A, through which it will pass, opening in its passage the valve K as it enters the main chamber A. Here it will heat a sufficient amount of the surface water to prevent further condensation, and, as the

generation of steam and consequent pressure continue, will force the water out of the barrel A through the pipes J and G, outlet-valve F, and outlet-condenser M into the small tank, H.

If water has been left in this small tank, which, with the water thrown in from the apparatus, is more than the capacity of the small tank, it will overflow through the pipe N into the large cistern, I, where, so far as the operation of the water-elevator is concerned, it will remain, and each discharge from the apparatus is designed to leave in the main tank, I, the overflow from the small tank, H. This will always leave in the small tank, H, a sufficient quantity of water to produce condensation and feeding of water to be turned into steam; and as the capacity of this tank H should always be somewhat greater than the water-elevator and its pipes, it will, in case of leak or accident, insure water to the water-back so long as the entire contents of the apparatus and the small tank, H, are not turned into steam by the action of passing the water back and forth from the small tank to the water-back in the stove or range.

The constant generation of steam will finally force all the water contained in the main chamber A up to the small tank, and as the steam continues generating it will pass the small tube J. The contracting of this tube reduces the contents to so small a quantity that, in place of the steam passing through the water contained in the tube or condensing in the water, as it would in a tube of ordinary capacity, it speedily converts the water in the contracted tube J into steam. When this is done it will be seen that the steam is not being generated under the same column of pressure as before, for, whereas before the column of pressure was entirely of water, it is now composed of a column of which a part is steam, which is many times lighter than water, which before filled the tube. Under these conditions the surplus pressure, as expressed by the steam, will find vent through the outlet-valve F in the same manner as the water did, but will then pass into the body of water contained in the outlet-condenser M, and be condensed, preventing its farther passage up the pipes. The valve in the condensing-pipe L, having been kept closed by the superior pressure of the steam acting to overcome the weight of a full column of water in the outlet-pipes J and G, is at this point relieved of this pressure, and the column of water contained in the condensing-pipe L being supplied from the small tank, H, becomes superior in weight to the force of the steam, and, opening the valve, will flow into the supply-chamber B. The injection of this water will so reduce the temperature of the water contained in the supply-chamber B as to prevent, for the time being, the further generation of steam; and, as the pressure of steam continues overcome by the condensing column of water, the water will continue flowing from the supply-chamber B through the pipe connecting it with the main chamber A, the condensing column in its passage keeping open the valve K.

When a sufficient amount of water has passed into the main chamber A to complete the condensation therein and create a vacuum, the water from the well will flow up the pipe E, opening the inlet-valve D in its passage, and, pressing against the valve K, close it, from which point the water will fall into the main chamber or barrel A.

The heat will quite shortly again raise the water in the supply-chamber and water-back to the point where steam will be generated, as before, when the steam will pass through the pipe connecting the supply-chamber B and barrel A, opening in its passage the valve K, and, having previously closed the inlet-valve D and the valve in the condensing-pipe L, the operation will be the same as before described.

Upon the fire being extinguished the pump will fill as described, and remain full until fire is again applied to the water-back. The purposes of the small tank may be fulfilled by separating a portion of the main tank or cistern by partition or otherwise, or by raising the ends of the draft-pipes leading from the large tank, so that there shall always remain in the bottom of the main tank a quantity of water which can never be drawn out under ordinary circumstances, except for condensation, in which case the condensing-pipe L must enter the lowest point of the tank.

It will be seen that the action of this steam water-elevator is twofold—first, supplying directly to the supply-chamber B, from a column of water-pressure distinct from any supplied by vacuum to the main chamber A by the well, all the water necessary to produce steam and a condensation throughout the whole apparatus at each desired interval; second, the filling of the main barrel or chamber A from a low source of supply to be raised to an elevated position.

It will also be seen that no action of the apparatus can take place without leaving it in a condition that insures its continued operation, for the small tank, H, is always full of water, ready to produce a condensation and supply water for steam, or, these results produced, the apparatus is charged ready for the application of heat, and the first effort of the apparatus is to replenish the small tank, H, with water for condensation and steam.

*Claims.*

I claim—

1. The condensing pipe and valve, in combination with the supply-chamber B, when operating substantially as described.

2. The interposition of a valve between the main chamber or barrel A and the supply-chamber B, when constructed and operating substantially as described.

3. The small tank H, when used for the pur-

poses and operating substantially as described.

4. The contraction of the outlet-pipe J to such a size and for such a height as to insure its operation, substantially as described.

5. The combination, in an apparatus substantially such as described, of the supply-chamber B with the tubes C C and a water-back or other device for heating water in the fire-box of a stove or range, said parts being arranged and operating substantially as herein set forth.

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Witnesses:

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