

J. C. Wightman.
Steam Pump.

N^o 89534.

Patented Apr 27. 1869.

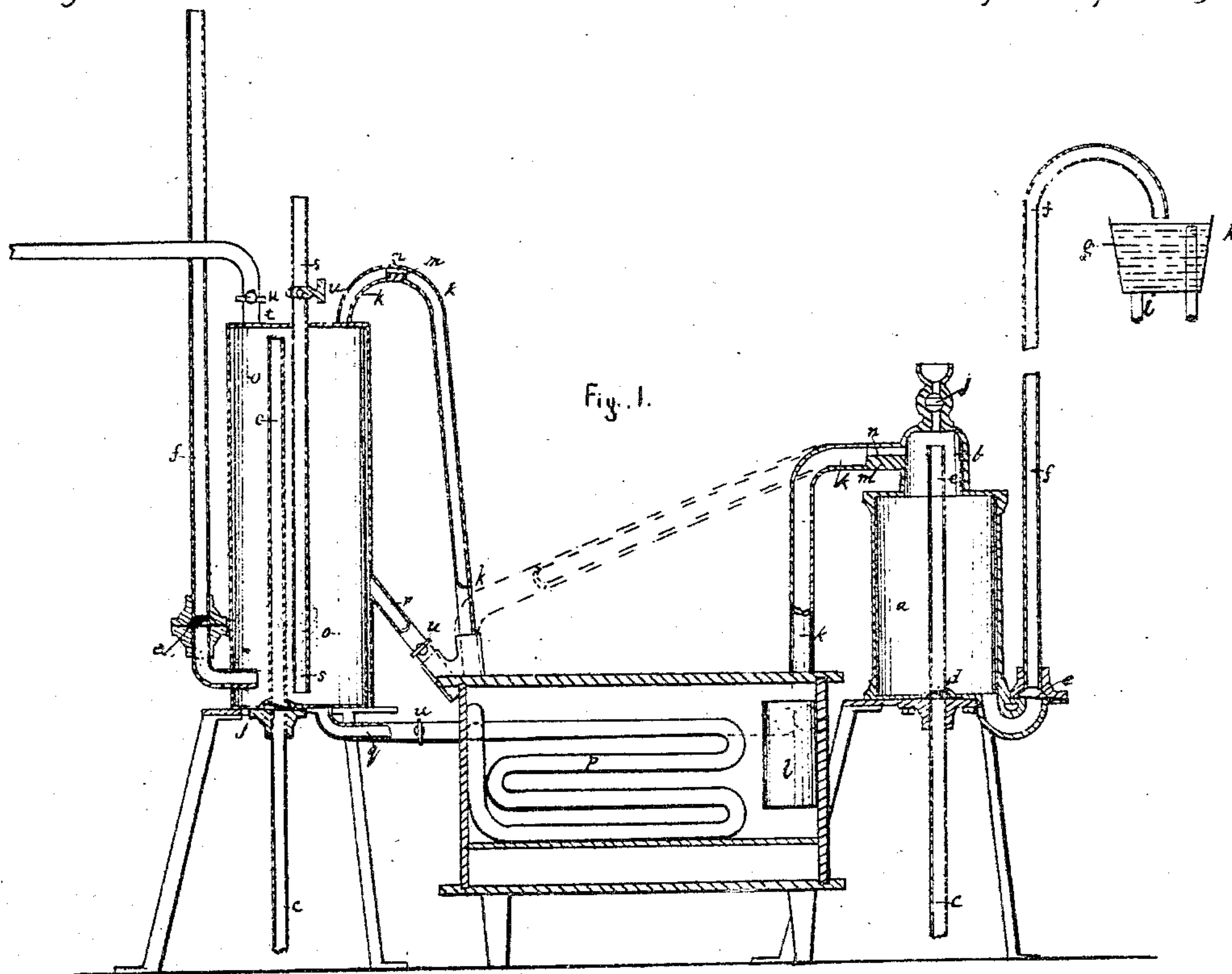
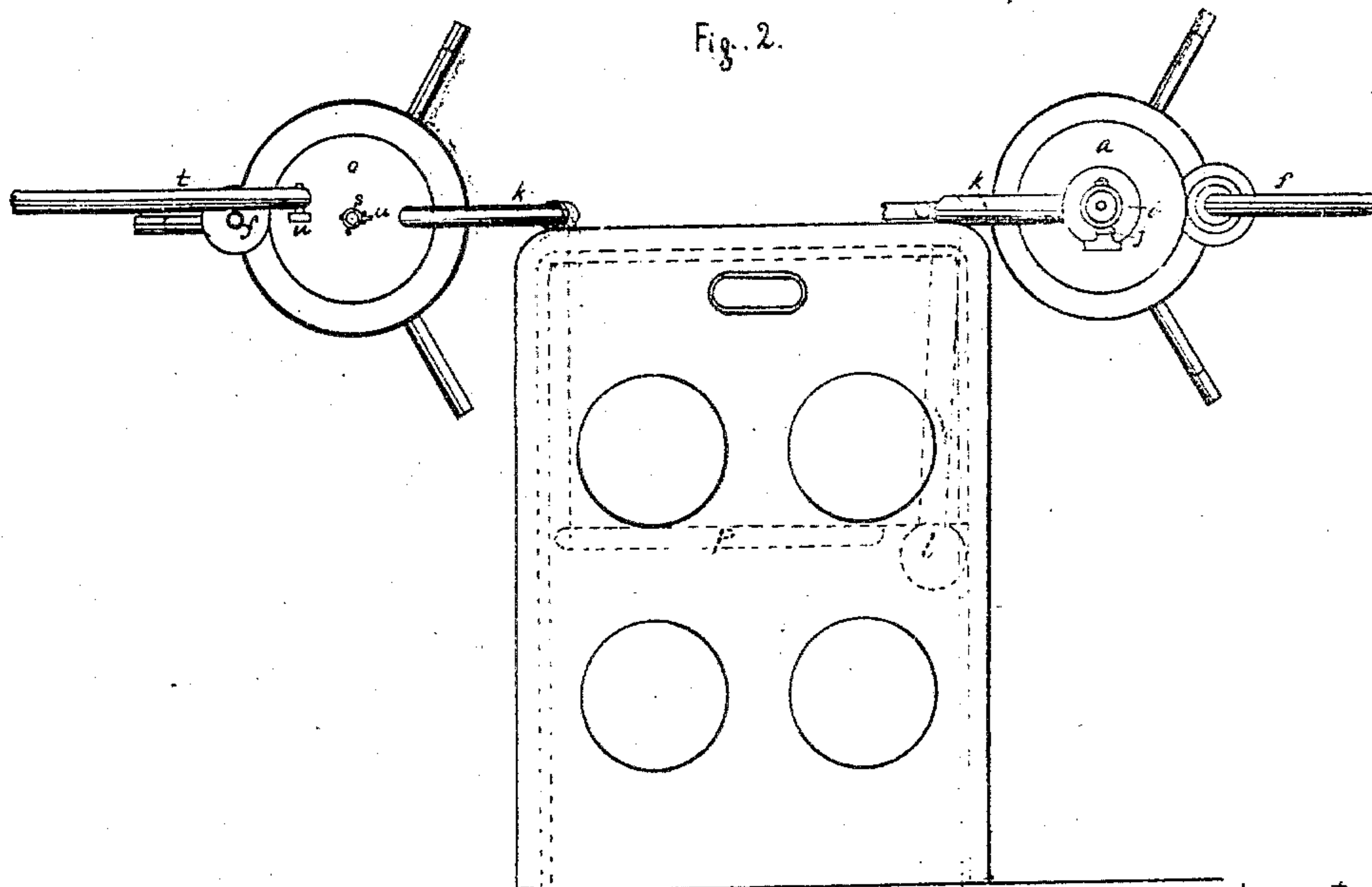


Fig. 2.



Witnesses

E. H. Phillips

Edwin J. McLean.

Inventor.

J. C. Wightman
by Crosby, Hill & Gould
his Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH C. WIGHTMAN, OF NEWTON, ASSIGNOR TO CHAS. HOUGHTON,
(TRUSTEE,) OF ROXBURY, MASSACHUSETTS.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. 89,534, dated April 27, 1869.

To all whom it may concern:

Be it known that I, JOSEPH C. WIGHTMAN, of Newton, in the county of Middlesex and State of Massachusetts, have invented an Improved Steam-Pump for Raising Water; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

The prime object of my invention is the utilization of the heat developed by fires in stoves, ranges, furnaces, or other heating apparatus, in dwellings and elsewhere, by means of an apparatus operating automatically to lift and force water from wells and other sources of supply, and transfer it to elevated tanks, from which, by gravity, it will flow through service or distributing pipes to sinks, bath-tubs, water-closets, &c., located below the water-level maintained in the elevated tanks, without the intervention of what may be termed machinery, such as piston, rotary, or other pumps.

The apparatus in which my invention is embodied differs from other apparatus heretofore known and used, in which heat supplies directly, through the medium of steam generated thereby, the power for raising water, (and of which Thomas Savery's apparatus, known about the year 1700, is one example,) in that my apparatus is automatic in its operation so long as heat is applied, and requires no manipulation of valves or cocks, as did Savery's, and other preceding apparatus for a similar purpose.

The drawings show—in Figure 1 in sectional elevation, and in Fig. 2 in plan—my improved water-raising apparatus, and some modifications thereof.

Referring first to that portion of the apparatus shown at the right of the sheet of drawings, there may be seen a closed vessel, *a*, surmounted with a dome, *b*, the vessel *a* being provided with a suction-pipe, *c*, which reaches beneath the surface of the water to be elevated. In any convenient location in said pipe is placed a check-valve, *d*, and the pipe is made to extend nearly to the top of the space inclosed by the dome *b*. From the bottom of the vessel *a* is an egress-passage, in which is a check-valve, *e*, which permits flow

of the water from chamber *a*, through the pipe *f*, to the elevated tank *g*, which has an overflow or waste pipe, *h*, which returns any surplus of water to the well or cistern from which pipe *c* takes its supply, said tank having also a service-pipe, *i*, through which various lavatories and drafts, &c., are supplied. In the top of the dome is an opening controlled by the cock *j*, through which opening the parts beneath can be supplied with water, when the apparatus is first set up, and whenever afterward it is lacking from any cause, and through which, after the first condensation of steam in vessel *a* and dome *b*, and the supply of the vacuum therein, the air between the valve *d* in pipe *c*, and above the surface of the water in the well, which enters the apparatus with the first water rising from the well, is expelled by steam flowing from the generator.

The dome is connected, at a point as near its top as is practicable, by a pipe, *k*, with a generator of steam, which may be the end of the pipe *k*, enlarged, if desired, as seen at *l*, said end forming the generator or closed retort or boiler. In the highest part of pipe *k* is placed an obstruction, *m*, which is pierced with a small hole, *n*, so that communication between the pipe *k* and the dome *b* and chamber *a* is at the highest point in the pipe. In dwellings the steam-generator is introduced preferably into the fire-pot of the range or cooking-stove, or into any combustion-chamber where a fire is usually kept, or where one can easily be made, if occasional use of the apparatus will answer the necessities of the case.

In the drawings, the steam-generator *l* is shown as introduced into the fire-pot of an ordinary cooking-stove. This apparatus operates as follows: After it is filled with water, and the cock *j* closed, and heat applied to the generator *l*, the water contained in the generator begins to be converted into steam, which, rising through the water in pipe *k*, enters the dome *b* through aperture *n*, and displaces the water from the dome and vessel *a*, causing it to flow to the tank *g*, past valve *e*, through pipe *f*. The steam, in passing to and into the dome, enters through so small a body of water that it soon heats it to its own temperature, and overcomes its condensing power, which it would not do, or would do with a greater expenditure of time and heat, if passed

directly into the large body of water contained in the vessel *a*. The steam soon exerts its pressure on the heated water beneath it in the dome, and forces it downward to the vessel *a*, where it spreads over the water therein, and the steam, continuing to flow under pressure from the generator, acts as an elastic piston with a hot-water facing, and forces the water out of vessel *a* into tank *g*, at which time, if the parts are properly proportioned, the water will be exhausted from the generator, which, and the pipe *k*, dome *b*, and vessel *a*, will be filled with steam.

Now, as no more steam is supplied, its heat is dissipated by conduction and radiation from the surfaces of *a*, *b*, and *k*, until by condensation of the steam therein the pressure of the atmosphere in the well causes flow of water from the well up pipe *c*, and over its top, and said water, then acting as a spray-condenser, rapidly completes the vacuum within *a*, *b*, *k*, and *l*. The vacuum in *a* and *b* fills rapidly with water from the well, it being, of course, understood that the aperture *n* is within the height at which atmospheric pressure will maintain a column of water. Now, as there is also a vacuum in *k* and *l*, the water continues rising from the well to fill it, and as soon as the water reaches the hot surface of the generator *l*, the first portion of water is converted instantly into steam, and shoots back the superincumbent column of water in the pipe *k*. If this pipe had not therein the obstruction *m*, the column of water would be forced back into the dome *b*, which would simply displace its equivalent volume of water and force it out of the outlet-pipe *f*, and, this emptying the generator of water, the apparatus would cease to work. But the presence of the diaphragm or obstruction *m* prevents this, and the water which is driven upward in pipe *k* is forced against a solid wall, having only a small aperture, *n*, therein, and that at the highest point in the conduit. The steam, being lighter than water, rises through the water in pipe *k*, in its efforts to find an outlet, and passes to the aperture *n*. At or about this time the cock *j* should be carefully opened to let the steam expel from the apparatus the air which entered it with the first flow of water from the well, which cock should be shut as soon as steam issues from it. The steam, proceeding from the generator and holding up the water in pipe *k* from freely entering therein, as it works up through said water into the dome *b*, soon heats the water in the pipe *k*, the dome *b*, and the small surface of water therein, so that the pressure of the steam becomes at the top of pipe *k* so nearly equal to the pressure within the generator that the gravity of the column of water in pipe *k* turns the scale, or more than makes up the difference of the pressures, and then the column of water in pipe *k* suddenly drops into the generator, and is converted into steam, which rushes through the aperture *n*. The water in the dome and chamber *a* is expelled, and after a time the steam

is condensed as before, and the vacuum filled from the well this time, and thereafter, without the presence of air, and the operation of again converting water into steam, emptying the apparatus, in whole or in part, of water, and filling it with steam, and again condensing the steam and filling the vacuum with water, goes on continuously, but irregularly, until such time as there is no heat applied to the generator, when condensation takes place throughout the whole apparatus, and it fills entirely with water, ready to start automatically on application of heat again to the generator, and to continue to work automatically so long as heat is applied thereto.

I will now describe some modifications in the arrangement of my apparatus.

A water-heating and circulating apparatus dependent on a head of water for its operation is now commonly used in dwellings, the head being obtained in some large cities and towns from the elevated source of general supply, and in other places, as in private country residences, from an elevated tank, into which water is pumped by hand, horse-power, wind-mills, &c.

What is commonly known as the boiler of this last-named apparatus is seen at the left of the sheet of drawings, and is marked *o*, and is connected with a water-back or coil, *p*, located in or forming one boundary of the fire-space in a cooking stove or range, by means of the circulating-pipes *q* and *r*, through the former of which cool water flows from the bottom of *o* into *p*, and, when heated, then rises and flows into *o* through pipe *r*. The boiler, or, more properly, the tank, *o*, receives cold water at its bottom from the source of supply through pipe *s*, and discharges hot water at its top through pipe *t*. Now, where this apparatus exists, and where there is no public supply of water under pressure, it may be well to utilize it by some additions, so as to transfer it into my improved apparatus, by which it will interchangeably perform the function of raising water to an elevated tank to supply that which is used and allowed to run to waste, and its original function of heating and circulating the water after it is raised.

To effect this purpose the four pipes *q r s t* are provided with cocks *u*, as shown, so that when the cocks are open the tank *o* will perform its function as a simple heater and circulator; but when the cocks are closed the tank *o* will be merely a closed vessel, corresponding to the vessel *a*, to which I add pipes *c*, *f*, and *k*, and valves *d* and *e*, these serving the same functions as before described.

A special dome might be attached to the top of tank *o*, into which the end of the pipe *c* in tank *o* might enter, as in the first-described example; but where such dome is not used it answers nearly as well to bend the pipe *k*, as seen in connection with tank *o*, the obstruction *m* and aperture *n* therein being at the highest position in pipe *k*, as seen. The pipe *k*, which connects with tank *o*, also con-

nects with the regular water-back *p*, the connection being made between the water-back and the cock which controls the pipe *r*. When the cocks *n* are closed, the operation of the tank *o*, in connection with the water-back *p*, and the pipes *k*, *c*, and *f*, and the valves *e* and *d*, will be like that of the apparatus seen at the right of the sheet of drawings, and before described, while, when the cocks *n* are open, circulation will be resumed through pipes *s*, *q*, *r*, and *t*, and the pipes *c*, *f*, and *k*, and the valves *e* and *d* will be simply inoperative.

Instead of using a special generator, *l*, for the apparatus used solely for raising water, as shown at the right of the sheet of drawings, the pipe *k* might, as shown, lead to an ordinary coil or water-back, used in connection with the ordinary water heating and circulating apparatus, in which case cocks *n* would be introduced into the circulating-pipes *q* and *r*, which, when closed, would cause the apparatus, connected by the pipe shown, to operate

to raise water, and when open would cause it to cease such operation, and would allow the circulation to be resumed through the pipes *q* and *r*.

I claim—

1. The apparatus, substantially as herein first described, for raising and forcing water, substantially as set forth.

2. The construction of the main water and steam chamber *a* with a dome or supplemental chamber, *b*, substantially as shown and described.

3. The plug or obstruction *m*, when pierced with the aperture *n*, and arranged in the pipe *k*, to operate substantially as described.

4. The arrangement of the pipes *c*, *f*, and *k*, valves *e* *d*, and cocks *u* with the common water-back or coil, and its connected tank and pipes, substantially as described.

JOSEPH C. WIGHTMAN.

Witnesses:

FRANCIS GOULD,
S. B. KIDDER.