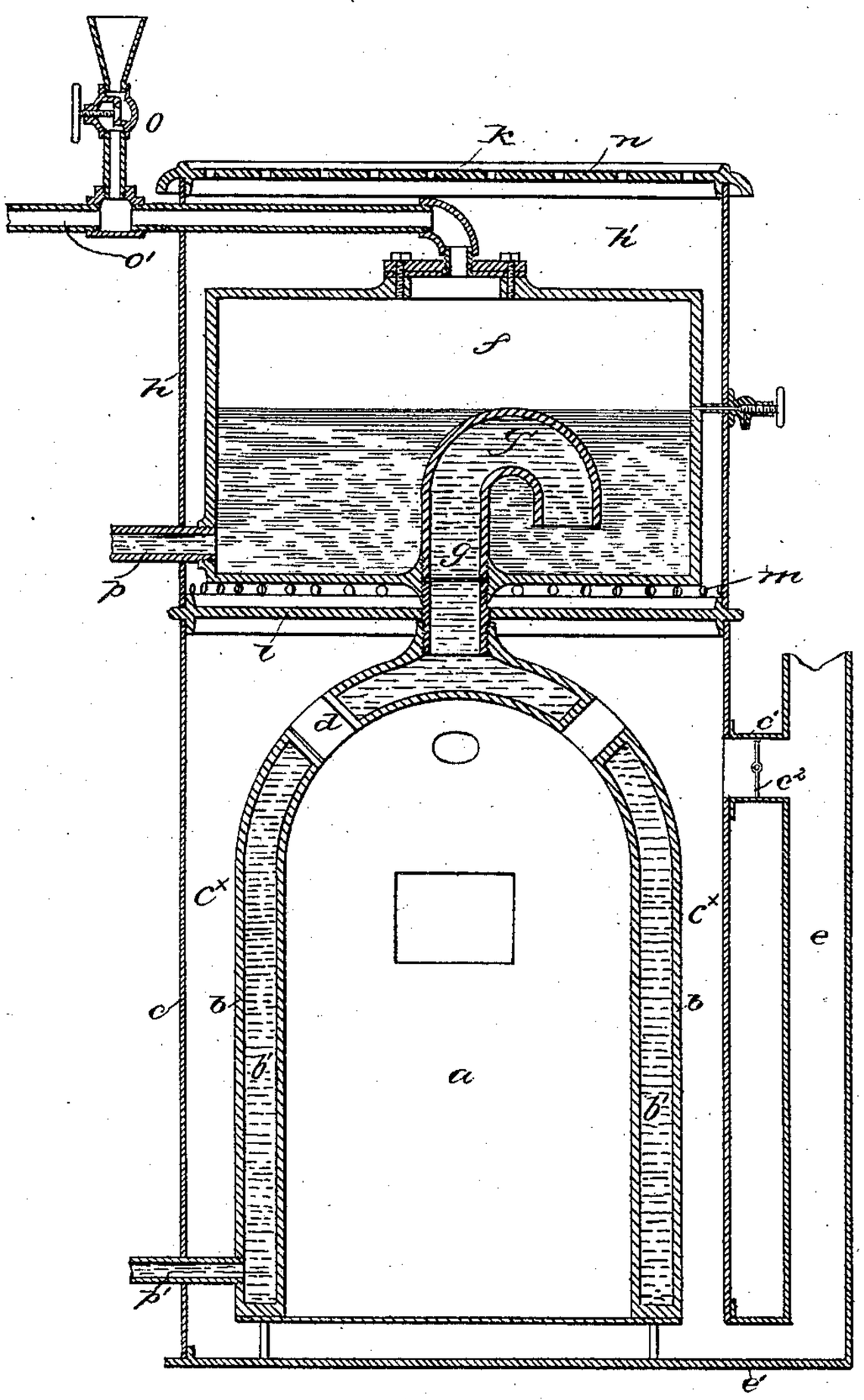
(No Model.)

J. M. THAYER.

HEATER.

No. 361,380. Patented Apr. 19, 1887.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES M. THAYER, OF RANDOLPH, MASSACHUSETTS.

HEATER.

SPECIFICATION forming part of Letters Patent No. 361,380, dated April 19, 1887.

Application filed March 24, 1886. Serial No. 196,345. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. THAYER, of Randolph, county of Norfolk, and State of Massachusetts, have invented an Improvement in Heaters, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention has for its object to construct an improved heating apparatus which may be used economically to heat a large area with perfect safety.

In accordance with this invention the combustion-chamber is surrounded by a jacket containing water, and the jacketed combustion-chamber thus formed is inclosed by the outside wall or case of the heater to form an intervening flue-chamber, through which the products of combustion pass. A water tank or reservoir is supplied, which is connected with the water-chamber surrounding the combustion-chamber, by a suitable pipe.

Circulation-pipes or radiators may be employed in connection with the heater, the supply-pipe leading thereto extending from the water tank or reservoir of the heater, while the return-pipe connects the lower end of the water-chamber surrounding the combustion-chamber. The water tank or reservoir is also inclosed within a casing located above and of similar size and shape to the flue-chamber, a plate or diaphragm being interposed at the junction of the two casings, to thus form independent compartments.

The usual flue to carry off the products of combustion is connected with the flue-chamber surrounding the jacketed combustion-chamber, to thus create a constant circulation, while the compartment containing the water-tank is also provided with holes for the passage of air to create a continuous circulation of air about the water-tank.

The drawing shows in vertical section a heater embodying this invention.

The combustion-chamber *a*, containing any usual or suitable grate and other usual appurtenances, is preferably dome-shaped at the top portion. A jacket, *b*, incloses the combustion-chamber *a*, to form a dome-shaped chamber, *b'*, about the said combustion-chamber, which is filled with water. The jacketed combustion-chamber thus formed is inclosed by a wall or casing, *c*, to form a chamber, $c^{\times}$, into which the products of the combustion-chamber *a* enter, passing through the orifices *d*, extending through the hot-air chamber *b'*, there being in this instance four such orifices.

The usual flue, *e*, is connected with the top portion of the hot-air or flue chamber $c^{\times}$ by a pipe, *c'*, containing a damper, c^{2}, and with the lower end of the said hot-air or flue chamber by a pipe, *e'*.

A tank or reservoir, *f*, to contain any supply of water, is located adjacent to and preferably above the jacketed combustion-chamber *a*, and has communication with the water-chamber *b'* by a pipe, *g*, preferably extending upward into the tank or reservoir *f*, and having its inlet end U-shaped, as at *g'*, so that free circulation of water is permitted from the hot-water chamber *b'* to the tank *f*.

At a low temperature the vapor rising from the chamber *b'* and carrying with it some water, if allowed to enter the tank *f* by a straight vertical pipe, would not effect any practically-useful movement of the water in the tank; but, escaping into the water, or being directed into the body of water by the curved pipe, it effects sufficient movement of the water to insure a gentle flow or circulation of the same. I have also demonstrated by tests that if the boiler be overheated vapor will collect in large pockets, and if escaping through a straight pipe into the water in the tank will throw the water to the top of the reservoir, and as the pockets of vapor or steam expand gradually drive off or expel the air from the reservoir through the vent-pipe, thereby forming a partial vacuum for the water to enter, and thereby completely fill the reservoir and stop up the vent or steam pipe and materially retard the circulation, whereas with a curved pipe, as shown by me, the pockets of vapor discharged therefrom are submerged and suppressed in the volume of water contained in the tank, and are thoroughly diffused through such volume of water.

The tank *f* is a sort of auxiliary boiler, and it is also the source of supply to the hot-water chamber or boiler proper, *b'*. It is filled through the pipe *o* to the gage-cock line, and when filled need not be replenished till the

supply is nearly exhausted, it being understood that hot water and not steam is the heating agent circulated.

The water-tank *f* is inclosed by a wall or case, *h*, forming an extension of the wall or case *c*, and a plate or diaphragm, *i*, is interposed at the junction of the said walls *h* and *c*, to thus form two independent compartments, so that all products of combustion entering the chamber $c^{\times}$ are caused to pass outward through either the pipe *c'* or *e'* to the flue *e*.

The wall or shell *h*, inclosing the tank *f*, is provided at its lower end with a series of holes, *m*, for the entrance of air, and the top plate, *k*, surmounting the said shell *h*, is provided with a series of holes, *n*, for the exit of the air contained within the chamber, so that a continuous circulation is produced within the chamber *h'*, formed by the wall *h*, top plate, *k*, and diaphragm *i*.

The water is supplied to the tank *f* by a valvular supply-pipe, *o*, which has a branch pipe, *o'*, serving as a vent-pipe should the water become overheated, said vent-pipe having a suitable valve (not shown) for closing it while the tank is being filled with water.

A supply-pipe, *p*, leads from the lower end of the tank *f* to any suitable radiator or circulation-pipe employed, while the return-pipe *p'* is connected with the lower end of the hot-water chamber *b'*.

It will thus be seen that a continuous circulation of water is maintained from the tank *f*, pipe *p*, pipe *p'*, chamber *b'*, pipe *g g'* to the tank *f*, and that the water while passing through the chamber *b'* becomes heated to perform its work. The tank *f*, which is in this instance the fountain-head, being inclosed within the chamber *h'*, it is surrounded by a continuous circulation of air, while the water contained within the chamber *b'* is subjected both to the heat of the combustion-chamber *a* and to the heat contained within the chamber $c^{\times}$, thus utilizing in a most thorough manner the heat from the fuel.

The object in providing for the circulation of air in and around the reservoir is to carry away the heat from the top of the heater and reservoir into the room or car to be heated, it being understood that the apparatus is designed to heat the apartment in which it is placed. There would be no useful purpose subserved in connection with my apparatus if the reservoir were kept at a high heat, nothing more being required than sufficient heat to prevent the chilling of the water.

The vent-pipe *o'* of the tank *f* being always open, the temperature of the water contained therein cannot rise above boiling-point, thereby avoiding all danger in the employment of the heater.

I do not desire to limit myself to the exact position of the tank or reservoir *f*, as it is obvious that the same may be placed at the side of as well as before the combustion-chamber.

I claim—

1. The combustion-chamber *a*, the jacket *b*, surrounding it and forming the water-heating space or chamber *b'*, the shell *c*, surrounding the jacketed combustion-chamber and forming the flue-chamber $c^{\times}$, and the flue *e* and connections with the flue-chamber, combined with a water-tank, *f*, a separating-diaphragm, *i*, and connections between the water-heating chamber and tank, substantially as described.

2. The water-heating apparatus, the tank *f*, U-pipe connecting them, the outer casing divided by a diaphragm located between the heater and tank and a perforated top for the casing above said diaphragm, and a system of supply and return pipes, substantially as described.

3. The combustion-chamber and its water-jacket formed by the shell *b*, the flue-chamber $c^{\times}$, formed by the shell *c*, surrounding the jacketed combustion-chamber, the tank *f*, located above the combustion-chamber, the shell *h*, forming an air-chamber, *h'*, surrounding the tank, the diaphragm *i*, separating the chambers $c^{\times}$ and *h'*, the vent-pipe *o'*, supply-pipe *p*, and return-pipe *p'*, combined and arranged substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES M. THAYER.

Witnesses:
C. M. CONE,
F. L. EMORY.