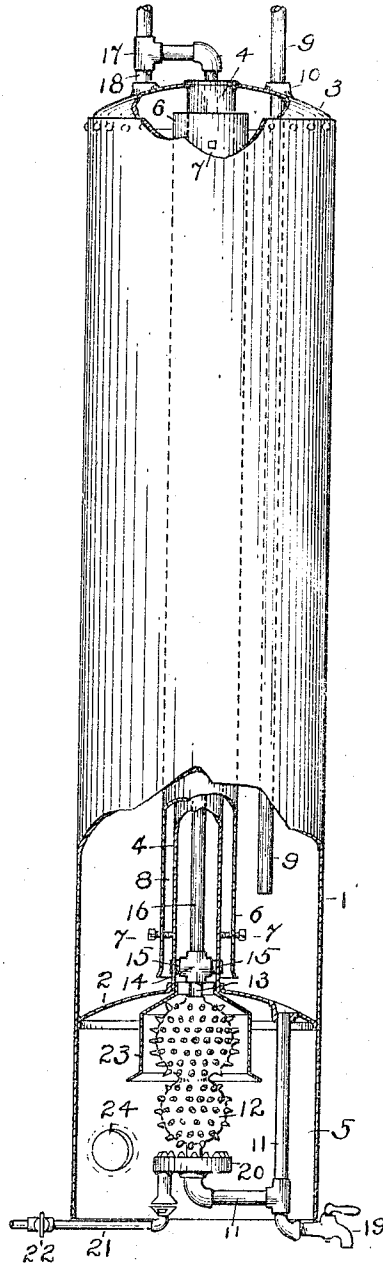


C. A. BOREIN.
WATER HEATER.
APPLICATION FILED DEC. 3 1910

1,000,367.

Patented Aug. 15, 1911.



WITNESSES:

Jan. L. Hamilton
L. L. Price

INVENTOR.

Charles A. Borein.
BY
Baldwin Hale
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES A. BOREIN, OF OAKLAND, CALIFORNIA.

WATER-HEATER.

1,000,367.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed December 3, 1909. Serial No. 531,174.

To all whom it may concern:

Be it known that I, CHARLES A. BOREIN, a citizen of the United States, and residing at and whose post-office address is 2019 West street, in the city of Oakland, county of Alameda, and State of California, have invented certain new and useful Improvements in Water-Heaters; and I do hereby declare the following to be a full, clear, and exact description of the said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to improvements in water heaters, and more particularly to the combination of boiler and water heater, and consists in the novel construction and arrangement of the parts as hereinafter described.

The objects sought to be accomplished are to combine a gas burner and water heater within the shell of a boiler or reservoir, whereby the water within the boiler is caused to circulate through the heater; and to cause the heated water to rise to the top of the boiler without intermingling with the water of lower temperature contained within the boiler; and to prevent the condensation of the gas flame on the boiler surface.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

The drawing represents a side elevation of a combination boiler and heater constructed in accordance with this invention, partly in cross-section to disclose the internal construction and arrangement of the parts.

In detail the construction consists of the boiler shell 1, having the bottom 2, and the top 3 fixed therein. The vent tube 4 is centrally fixed between the said top and bottom of the boiler. The bottom 2 is fixed within the shell of the boiler a suitable distance from the lower edge thereof, to form a hollow chamber 5, to receive the heating mechanism. The circulation tube 6 inclosing the vent tube 4 is secured thereto by the set screws 7, or any other suitable means, leaving the annular space 8 between the two tubes. The circulation tube 6 begins

at a point near the bottom of the boiler and terminates, at a point near the top thereof. The bottom 2, the vent tube 4, and the circulation tube 6, are assembled in their proper relations to each other before being fixed within the shell of the boiler; which is accomplished by riveting, "oxy-acetylene" welding or any other suitable manner. The inlet service pipe 9, passes into the boiler through the spud 10 in the usual manner.

The water heater consists of a plurality of superimposed globular chambers having projecting spines on their outer surface to increase the heat absorbing area. This form of heater is preferable because of its efficiency, simplicity and cheapness, but it is obvious, that other forms of heaters may be substituted therefor, without departing from the spirit of this invention.

The feed pipe 11 is connected to the bottom of the boiler, and the bottom of the heater 12. The outlet 13 of the heater is screwed into the T 14, having the lateral nipples 15 extending through the walls of the vent tube, and adapted to discharge into the boiler between the vent tube and the circulation tube. The discharge pipe 16 continues from the T 14 upwardly through the vent tube and is connected to the outlet service pipe 17, which is screwed into the spud 18, in the top of the boiler. The pipe 11 connected to the lowest points of the water containing mechanism is provided with the sediment cock 19.

The heat producing mechanism consists of the Bunsen burner 20, connected to the gas service pipe 21, controlled by the stop cock 22. The flames issuing from the burner are directed against the surface of the heater 12, which absorbs the heat and transmits it to the water. The products pass upward within the canopy sheath 23, by which they are directed into the vent tube 4, which absorbs the remaining heat transmitting it to the water surrounding the vent tube. It is at this point that the circulation tube 6 performs its function, by confining the heat given off from the vent pipe, directing it upward to the top of the boiler, and preventing a lateral circulation of the heat into the main body of water;

which would take place if the circulation tube 6 was omitted. The discharge pipe 16 conducts the hot water directly into the service pipe, accomplishing a quick delivery from the heater into the service. When, however, the water is not being drawn off through pipe 17, the hot water is delivered through the nipples 15 into the circulation tube 6 and will pass over the top of the latter, the colder water leaving through pipe 11 and passing to the heater. In this manner a circulation is maintained which insures a maximum heating of the water in the shortest period of time. If the burner has been operating for any considerable period the vent tube 4 is heated and imparts its heat to the surrounding water and when the flow is again started through pipe 17 the heated water will be drawn through nipples 15 into pipe 16 and will pass from thence to pipe 17.

In the art of heating water for domestic purposes, immediate results are essential. To this end it is desirable to deliver the hot water to the top of the boiler with as little radiation as possible. It would be manifestly needless to raise the temperature of the whole body of the water merely to obtain a few quarts or gallons of very hot water, when the desired results can be accomplished by insulating the hot water discharged from the heating mechanism, from the heat absorbing main body of water within the tank, and by increasing the velocity of the hot water in its natural rise to the top of the tank. A further advantage resulting from the discharge through the lateral nipples 15 is the fact that the heated water is permitted to expand and relieve the heater of back pressure, causing more rapid circulation therethrough, with its attendant advantages.

The process of combustion in a Bunsen burner utilizing manufactured, or impure gas gives off by-products containing corrosive sulfurous, and other acids which in the condensation of the flame attack the metal parts of the boiler, setting up an electrolytic action between the steel of the boiler and the zinc with which it is coated resulting in the pitting and ultimate perforation of the boiler walls. By the interposition of the canopy sheath which confines the heat to the heater 12, the flames are prevented from striking the cold bottom of the boiler and condensing thereon; in this manner the drip of condensation, or sweating is avoided and the life of the mechanism is lengthened. The flame will not condense on the hot canopy, or the attenuated surfaces of the heater 12. This canopy also prevents overheating of the walls of the

chamber 5. The heated water passing up through the space 8 is delivered, and remains at the top of the boiler in accordance with natural laws. The burner may be lighted from below, or through the opening 24 in the wall of the chamber 5.

Having thus described this invention, what is claimed and desired to secure by Letters Patent is:

1. A water heater, a boiler having its bottom set above the lower edge of the shell thereof, a vent tube extending between the said bottom and the top of the boiler, a circulation tube inclosing said vent tube and extending from near the bottom to near the top of said boiler, an annular space being formed between said circulation tube and said vent tube; a heating mechanism connected to the bottom of the boiler, and having a discharge pipe connected to the top of the boiler, said discharge pipe having lateral branches leading into the space between the said vent tube and the said circulation tube; and a suitable burner.

2. In a water heater a boiler, a vent tube extending between the bottom and the top of said boiler, a circular tube inclosing said vent tube, and extending from near the bottom to near the top of the boiler, an annular space being formed between said circular tube and said vent tube, a heating mechanism connected to the bottom of the boiler and having a discharge pipe connected to the top of the boiler, said discharge pipe having lateral nipples near the bottom of the boiler and leading through the vent tube into said annular space, a burner, and a canopy sheath inclosing said heating mechanism and connected with said vent tube.

3. In a water heater, a boiler, a vent tube extending between the bottom and the top of the said boiler; a circulation tube inclosing said vent tube and extending from near the bottom to near the top of said boiler, an annular space being formed between said circulation tube and said vent tube; a heating mechanism connected to the bottom of said boiler and having a discharge pipe provided with lateral branches opening into the space between the said vent tube and said circulating tube.

4. In a water heater, a boiler, a vent tube extending between the bottom and the top of said boiler, a circulation tube inclosing said vent tube and extending from near the bottom to near the top of said boiler; and a heating mechanism connected to the bottom and to the top of said boiler.

5. In a water heater, a boiler, having its bottom set above the lower edge of the shell thereof, a vent tube extending between the said bottom and the top of the boiler, a cir-

culatation tube inclosing said vent tube, a
heating mechanism connected with the top
and the bottom of said boiler; a canopy
sheath connected with the said vent tube and
5 partially inclosing the said heating mech-
anism.

In testimony whereof, I have hereunto

set my hand this 20th day of September,
1909.

CHARLES A. BOREIN.

Witnesses:

BALDWIN VALE,
JAMES C. HAMILTON.