No. 766,889. PATENTED AUG. 9, 1904.

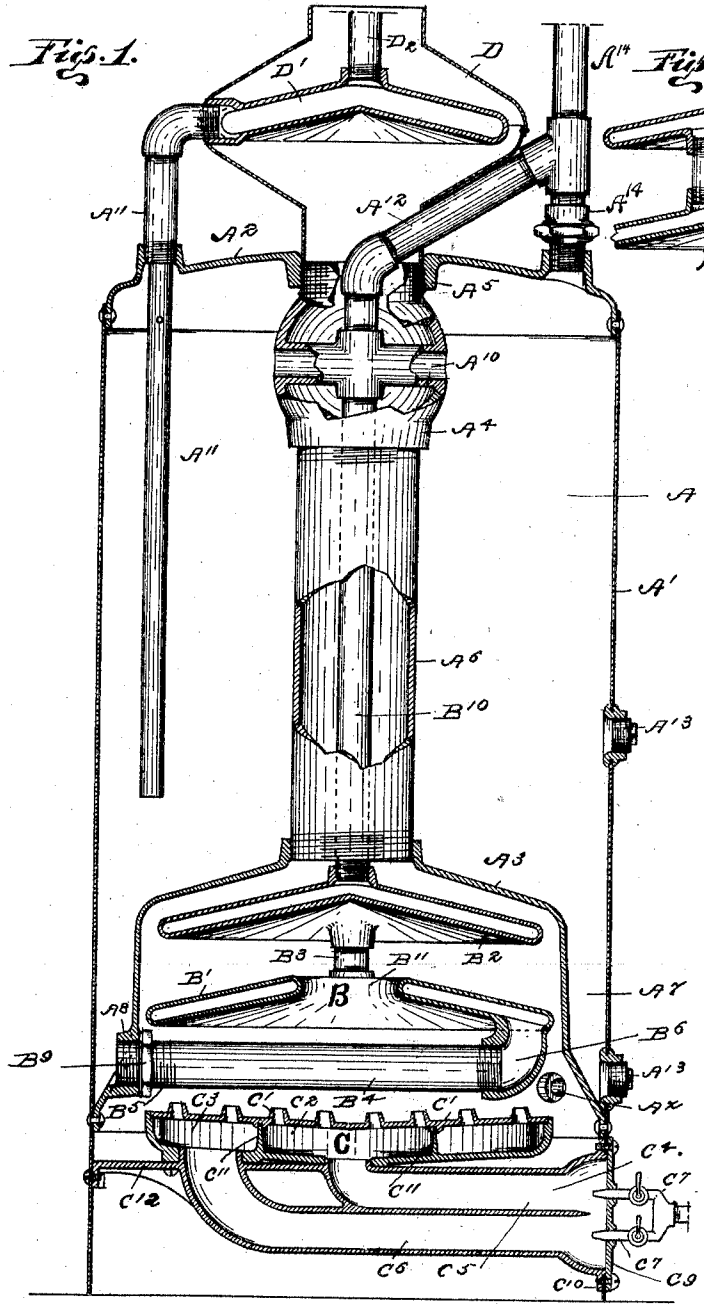
J. McCARTNEY.

WATER HEATER.

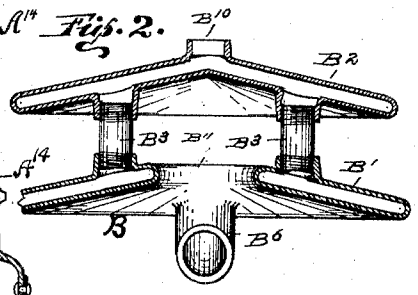
APPLICATION FILED MAR. 23, 1901.

NO MODEL.

Figs. 1.



Figs. 2.



Figs. 3.

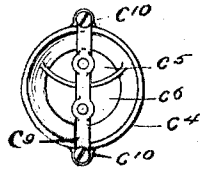
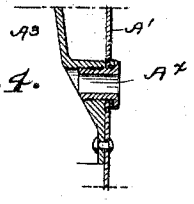


Fig. 4.



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No. 766,889. Patented August 9, 1904.

UNITED STATES PATENT OFFICE.

JAMES McCARTNEY, OF SAN FRANCISCO, CALIFORNIA.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 766,889, dated August 9, 1904.

Application filed March 23, 1901. Serial No. 52,618. (No model.)

To all whom it may concern:

Be it known that I, JAMES McCARTNEY, a citizen of the United States, residing at 4034 Seventeenth street, in the city and county of San Francisco 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 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 particularly to the construction and arrangement of the parts.

The object sought to be accomplished is to directly combine the heating-surface and heat-generator within the shell of the boiler or reservoir in such a manner that the water within the boiler will circulate through the heating-chambers before being drawn into the main circulating system.

The advantages gained by such a combination as shown in the accompanying drawings are, first, economy of heat; second, rapidity of action; third, economy of space; fourth, sightliness, and, fifth, ease and economy in manufacture.

In the drawings, Figure 1 is a vertical cross-section of a heater constructed in accordance with this invention, certain parts being only in partial section to better illustrate this form. Fig. 2 is a vertical cross-section of the heating chambers or disks, taken on a line axially at right angles to the line of section, Fig. 1. Fig. 3 is a front elevation looking into the throat of the double burner for supplying heat to this apparatus. Fig. 4 is a cross-sectional view showing lug on heater-dome for pilot-hole construction.

In the description, with reference to the drawings, the major parts will be designated by a reference-letter; the secondary parts of those groups by this common letter strengthened by the addition of a numeral, thus: The water-containing parts, such as the boiler, will be designated by the letter A; the heating mechanisms by the letter B; the heat-generating mechanisms by the letter C; the auxiliary attachment by the letter D.

It is calculated in practice to construct the heater to withstand two hundred pounds maximum hydraulic pressure. With this and economy in view, such parts where it is practicable are malleable castings. The apparatus is given an outside diameter of approximately fifteen inches, varying in height to contain any desired water capacity, preferably fifteen to thirty gallons.

The outer shell A′ is a sheet-iron cylinder with its upper end closed by the crown-head (malleable cast) A^2, the lower end being closed by the inwardly-extending truncated conical heater-dome (malleable cast) A^3. The globe-fitting A^4 is screwed into the lug A^5 on the crown-head. The pipe A^6 is screwed into the globe-fitting, and the dome A^3 is screwed onto the pipe A^6 and riveted to the shell A′. Thus a reservoir with an attenuated water-jacket A^7, formed by the shell A′ and dome A^3, having a central tabular passage for the escape of products of combustion, is formed.

The heating members consist of the disks (malleable cast) B′ and B^2, connected in series by the nipples B^3 (right and left threaded) between. The disk B′ is connected with the water-jacket A^7 by the pipe B^4, having running thread B^5, by means of which the pipe B^4 is backed into the lug A^8 on the dome A^3 until it can be screwed directly into the lug B^6 on the disk B′. After the disks are in place the running thread is jammed by the set-nut B^9. The disk B^2 is connected by the pipe B^{10} with the water-bridge A^{10} in the globe-fitting A^4.

The heat-generating mechanisms C consist of the twyer-cover C′ over the spreading-chambers C^2 C^3, fed by the throat C^4, having passages C^5 C^6 leading to their respective chambers C^2 C^3. The mouth of the throat C^4 is slightly bell-shaped to facilitate the admixture of air with the gas injected by the injectors C^7, secured in the bar C^9 across the mouth of throat C^4. The burner C is held centrally under the disk B′ by means of the extension C^{12} on the throat C^4, screwed to the shell A′. A circular hole is provided in the shell, slightly less in diameter than the mouth of the burner, the shell extending between the lug C^{10} and bar C^9. The circular cover C′ covers both of the spreading-chambers C^2

C^3, which are formed by said cover and the annular division-wall C^{11}. A Bunsen burner is thus formed capable of generating heat in large or small quantity by using one injector at a time or both simultaneously, all parts of the heater except the burner C being galvanized inside and out for obvious reasons.

Operation: The water is led into the tank through the pipe A^{11} in the manner usual in kitchen-boilers. Presuming the apparatus to be under water-pressure and cold, the first step would be to light the burner by a pilot-light, as usual with large burners, the opening $A^{\times}$ being provided therefor. The heat rising against the disk B′ would rapidly heat the attenuated sheet of water therein, causing it to expand and rise through the pipe B^{10}. The outside or house circulation being closed, the heated water flows from the bridge A^{10} back into the body A, causing an internal circulation, drawing water into the disk B′ through the pipe B^4 until the whole body of water gradually rises in temperature. Should a tap be opened at a bath or washstand in the house circulating system, it would be fed directly from the disks, through the pipe A^{12}, to the house system until the water from the disks and that of the top of the boiler were of the same temperature, when the supply would draw from both sources, the latter through pipe A^{14} direct. The water passing up from the disks would pass the bridge A^{10}, because of the house circulation being the more direct outlet. The products of combustion from the burner C play against the bottom of the disk B′, pass up through the center opening B^{11} therein, striking the center of the disk B^2, spread and curl up around the edge, (in the meantime reacting on the top of the disk B′,) striking the top of the dome A^3, are concentrated thereby, (reacting on the top of the disk B^2,) passing up the pipe A^6, through the globe-fitting A^4, into the outlet flue or vent. Tracing the passage of the heat upward, it is apparent that all parts subjected thereto are covered or filled with water. In figuring the heating-surface both sides of the disks, the inside of the heater-dome, and the central passage through the body of the boiler should be taken into consideration. Should it be found that more heat than is necessary to a proper draft is escaping, the chamber D can be inserted in the vent-pipe. Within this chamber a disk D′, identical or similar to B^2, can be placed, the service-pipe D^2, connected therewith, supplying water to the disk D′, through which it flows on its way to the boiler-supply A^{11}. This additional heat-absorbent prevents absolutely any waste of heat.

The plugs A^{13} are provided to accommodate water-back connection with the kitchen-range when desirable.

The invention has been described with particular reference to use in households. Obviously its uses are varied whether the water be under pressure or not.

Having thus described this invention, it is claimed—

1. In a water-heater, the combination with a tank and heating means therein, of a flue leading from said heating means through said tank, a tube extending within said flue, lengthwise thereof, means of communication between the lower end of said tube and said tank, means of communication between the upper end of said tube and the tank, supplying means for said tank, and means within said flue above the upper end of said tube for heating the water introduced through said supplying means.

2. In a water-heater, the combination with a tank and heating means therein, of a flue leading from said heating means upwardly throughout the length of the tank, a tube extending longitudinally of the flue within the same, means of communication between the lower end of said tube and the lower end of said tank, and a cross-tube communicating with said tank near the upper end thereof, extending transversely of said flue and communicating with the tube therein.

3. A water-heater, comprising a water-containing tank, a dome arranged in the lower end of the tank to form a heating-chamber, the walls of the said dome being surrounded by a portion of the water in the lower end of the tank, an air-passage leading from the top of the dome through the greater part of the water-tank to the top thereof, a heat-generating burner arranged in the heating-dome, thin hollow water-spreading disks arranged within the said dome above the burner and connected by a pipe with the lower end of the water-tank said pipe also passing over said burner, a pipe leading from the upper spreading-disk centrally through the air-pipe, the said pipe being connected with a water-outlet, means for connecting the water-outlet pipe directly with the water-tank, and means for permitting the water in the pipe which passes through the air passage-way to enter the top of the tank before passing into the water-outlet pipe, substantially as described.

4. In a water-heater, a tank having a water-jacket forming an internal chamber near the bottom of said tank, and an air-passage leading from said internal chamber; through the crown-head of said tank; a globe-fitting interposed in said central passage having an internal water-passage across said central passage, having communication with the water-tank; in combination with a heat-generator beneath said internal chamber; and a series of hollow attenuated heating-disks, connected with each other, arranged in said internal chamber; and means for leading water from the water-jacket to the bottom disk and from the top disk, up the central passage to the water-passage in aforesaid

globe-fitting, thence out of the central passage, and a water-outlet from the water-tank to receive the water passing through the center of the air-passage and conduct it to a suitable point, substantially as described.

5. A water-heater comprising a water-containing tank, a heat-generating chamber in the lower end thereof formed with a water-jacket about it, a burner in said chamber, an air passage-way leading from the top of the chamber through the water-tank to the upper end thereof for forming a flue for the products of combustion, water-spreading hollow disks arranged one above the other within the heating-chamber, the lower disk being provided with a central aperture so that the heat from the burner may pass upwardly through the same against the center of the disk above, a pipe leading from the top of the upper disk through the air passage-way to the upper end of the tank, lateral pipes connected therewith at the upper end of the tank for permitting the water to enter the tank again from said pipe and a branch pipe for leading water to a water-outlet pipe, and a water-outlet pipe leading directly from the said tank and arranged to receive water also from the branch pipe, substantially as described.

6. A water-heater, comprising a tank formed with a water-jacketed heating-chamber in its lower end, a combustion flue or passage-way leading from the top of the said chamber through the water-tank to the crown thereof, means located within the water-chamber for heating thin films of water, means for conducting the heated water to the top of the tank where it may enter the same again, an enlargement of said flue on the crown of the tank adapted to receive the products of combustion from the passage-way within the tank, means for receiving feed-water for the tank and spreading it in a comparatively thin layer within said auxiliary passage-way, and means for leading the water therefrom into the water-tank, substantially as described.

7. A water-heater, comprising a water-tank, a water-heating chamber in the lower end thereof, an air passage-way or tube leading from the heater through the water-tank to the top or crown thereof, means for heating the water of the tank in the form of thin sheets or films within the said heating-chamber, an enlarged pipe or passage-way mounted on the top of the tank and forming an extension of the passage-way within the tank, the said auxiliary pipe being formed with a central enlargement, a conical hollow disk mounted in said enlargement and adapted to receive feed-water for the tank whereby said feed-water will be heated by the products of combustion passing through the pipes from the heating-chamber, before it is introduced into the water-tank, and a pipe leading from said conical disk into the water-tank for delivering the water therein, substantially as described.

8. In a water-heater, comprising a water-tank having an internal chamber in its lower end with inverted conical top, a hollow disk of inverted conical form in said chamber just below the top thereof with marginal spaces between its outer edge and the wall of the chamber, a second hollow disk of similar form below the first, the latter having a central opening, a water-pipe leading from the tank into the opposite side of the lower disk and extending substantially across the chamber, a pipe communicating between the two disks at a point near their peripheries and at a distance from the entrance of the water-pipe, a combustion-flue leading upward from the apex of the chamber, a burner below the disks the products of combustion from which pass principally through the central opening of the lower dome and in a zigzag course in contact with the top and bottom of the upper disk and the top of the chamber, and a water-pipe leading up from the apex of the upper cone through the flue and communicating with the chamber near the top thereof, substantially as described.

9. A water-heater, comprising a tank, means for supplying a heating medium thereto, a tube conducting said medium beyond the tank, an enlargement being formed in said tube outside the tank, a water-spreading disk within said enlargement, means for supplying water thereto, and means for conducting water therefrom into said tank, substantially as described.

10. A water-heater, comprising a tank, means for supplying a heating medium thereto, a tube conducting said medium beyond the tank, an enlargement being formed in said tube outside the tank, a water-spreading disk within said enlargement, means for supplying water thereto, and means for conducting water therefrom into said tank, and delivering the same near the base of said tank, substantially as described.

In testimony whereof I have hereunto set my hand this 14th day of March, 1901.

JAMES McCARTNEY.

Witnesses:
BALDWIN VALE,
M. M. NOBLE.