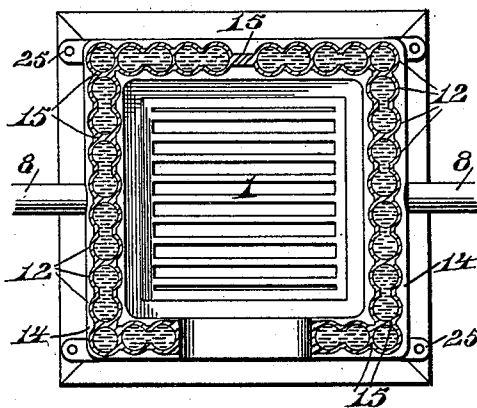
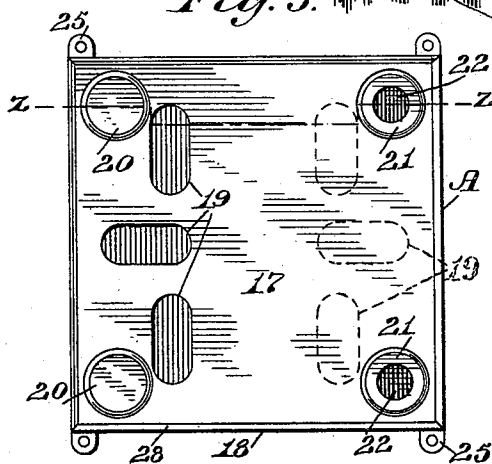
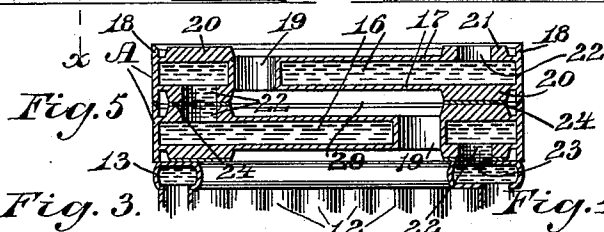
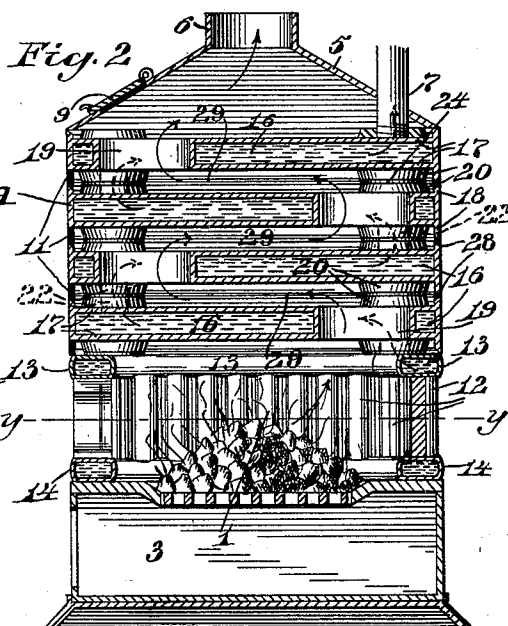
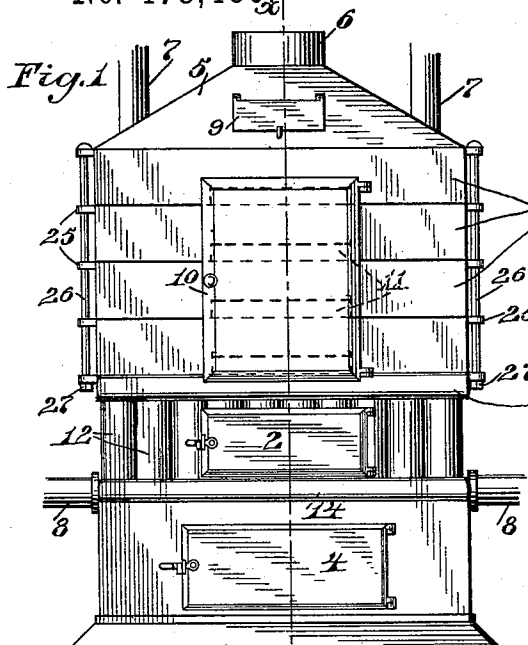


(No Model.)

G. W. WASHBURN.
WATER HEATER.

No. 478,486

Patented July 5, 1892.



WITNESSES

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GEORGE W. WASHBURN, OF DANBURY, CONNECTICUT.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 478,486, dated July 5, 1892.

Application filed September 9, 1891. Serial No. 405,183. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. WASHBURN, a citizen of the United States, residing at Danbury, in the county of Fairfield and State of Connecticut, 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 invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to produce a simple and inexpensive water-heater which shall be especially adapted for use in warming houses, the important feature of construction being that the greater portion of the heating-surface consists of independent sections, secured together in a simple manner, so that in putting up a heater as many sections may be used as in the judgment of the builder is required to furnish the necessary amount of heating surface. With this end in view I have devised the simple and novel heater which I will now describe, in connection with the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of my novel heater complete; Fig. 2, a vertical section on the line *xx* in Fig. 1; Fig. 3, a plan view of the heater with the dome removed; Fig. 4, a horizontal section on the line *yy* in Fig. 2; and Fig. 5 is a partial section on the line indicated by *zz* in Fig. 3.

1 denotes the fire-box; 2, the fire-box door; 3, the ash-pit; 4, the ash-pit door; 5, the dome; 6, the smoke-pipe; 7, water-feed pipes; 8, return-pipes; 9, a check-door in the dome, and 10 a door covering flue-cleaning openings 11. (See Fig 2 in connection with Fig. 1) The walls of the fire-box consist of a series of vertical pipes 12, which may be cast in a single piece, as shown in the drawings, or may consist of independent pipes placed close together. The vertical pipes connect with upper and lower horizontal pipes 13 and 14. The return-pipes connect with the lower horizontal pipe, as indicated in Fig. 1.

In order to give great strength to the walls of the fire-box, which are compelled to support the entire weight of the superstructure, I provide solid walls 15 between certain of the pipes, when they are formed in single casting, as in Fig. 4.

A denotes the sections as a whole, any number of which may be used in building a heater, four being shown in the drawings. These sections consist of water-spaces 16, surrounded by walls 17. Around both the upper and lower edges of the sections are flanges 18.

19 denotes openings through the water-spaces for the passage of the products of combustion. The flanges 18, which extend below the edges of the sections, nearly touch each other and serve to form heating-chambers 29 between the sections, the joints between the flanges being filled with putty or stopped in any suitable manner. In practice the edges of the flanges are preferably beveled, as at 28, so as to hold the packing in place and insure perfectly-tight joints that will prevent the escape of gas from the heater.

Upon both the upper and lower sides of the sections are two or more solid hubs 20 and two or more hubs 21, having openings 22 through them, said openings leading into the water-spaces, as clearly shown in Fig. 5. In practice two hubs 20 and two hubs 21, upon each side of the sections will be found quite sufficient, said hubs 20 and 21 being placed opposite to each other. Suppose, for instance, that a section is provided on the lower left-hand side with solid hubs 20 and on the lower right-hand side with hubs 21, having openings through them, the same sections will have on the upper right-hand side solid hubs 20 and on the upper left-hand side hubs 21, with openings through them. The upper horizontal pipe 13 is provided on one side with openings 23. In assembling the first section is laid upon the fire-box in such a position that openings 22 in hubs 21 register with openings 23 in the upper horizontal pipe, as clearly shown in Fig. 5, a packing-washer 24 being placed between the hub and the pipe and a similar washer being placed between the solid hubs on the left to retain the section in a horizontal position. The water circulation therefore will be through openings 23 and 22 into the lower section, as shown in the drawings. The hubs 21 on the lower side of the section being on the right, the hubs 21 on the upper side will be on the left, as is clearly shown in Fig. 5. The next section will be placed over the first section in such a manner that the hubs 21 on the lower side will be on the left, so as to reg-

ister with the hubs 21 on the upper side of the lower section. Any number of sections that may be required are placed one above the other in this manner, so that the water
5 circulation will enter each section on one side, pass across it, and then pass therefrom on the opposite side into the next section above, then across that section, entering the section above, then across again, entering the
10 section above that, and so on, no matter how many sections may be used.

The openings 19 through the sections which connect the heating-chambers are placed alternately at opposite sides thereof, as clearly
15 shown in drawings. The products of combustion pass from the fire-box through the openings 19 in the lower section, then across through the heating-chambers between the sections, and through the openings 19 in the
20 second section, so that the products of combustion must pass across between two water-spaces each time before they can pass upward through another section. I thus obtain the greatest amount of heating-surface that is
25 possible in a simple construction and insure that both sides of the water-spaces are directly exposed to the heating action of the products of combustion, it being of course understood that in heaters of this class a large proportion of the gaseous products distilled from
30 the fuel in the fire-box pass out of the fire-box in an unconsumed condition and are consumed in the heating-chambers or flues before passing out into the chimney, so that in
35 fact the upper sections, as well as the lower ones, are exposed to intense heat with a minimum consumption of fuel.

The water-feed pipes 7 are connected directly to the hubs 21 of the upper section, as
40 clearly shown in Fig. 2. The several sections and pipe 13 are provided with ears 25, and said parts are secured firmly together by long bolts 26, which pass down through the several sets of ears, the sections being clamped together and to the upper horizontal pipe by
45 nuts 27 on the bolts.

In practice the entire weight of the sections is supported by the hubs, packing-washers being placed between the hubs, having
50 openings 22, so as to insure tight joints, and similar washers being placed between the solid hubs on the opposite side to maintain the sections in a horizontal position. The edges of the flanges are beveled, as at 28, (see
55 Fig. 2,) and the joints between said flanges are packed with putty or in any suitable manner to produce a tight joint which will prevent the escape of gas from the heater.

Having thus described my invention, I
60 claim—

1. A water-heater consisting, essentially, of

sections having water-spaces with openings through them near one end for the products of combustion and at each end on one side solid
65 hubs 20 and on the opposite side in line therewith hubs 21, having openings through which the water circulation is established, and flanges 18, surrounding said sections, by which heating-chambers are formed between them, said sections being so assembled that
70 openings 19 are alternately at opposite sides of the heater, the solid hubs register, and the hubs having openings register, whereby the products of combustion are compelled to pass
75 across each heating-chamber before passing to the next heating-chamber, the water in each water-space likewise having to pass from side to side before passing into the next section.

2. A water-heater consisting of a fire-box
80 having its walls formed of water-pipes, sections above the fire-box, having water-spaces with openings through them near one end for the products of combustion and at each end on one side solid hubs 20 and on the opposite
85 side in line therewith hubs 21, having openings through which the water circulation is established, and flanges 18 surrounding said sections, by which heating-chambers are formed between them, said sections being so
90 assembled that openings 19 are alternately at opposite sides of the heater, the solid hubs register, and the hubs having openings register, whereby the products of combustion are compelled to pass across each heating-chamber
95 before passing to the next heating-chamber, the water in each water-space likewise having to pass from side to side before passing into the next section.

3. A water-heater consisting of a fire-box
100 having its walls formed of water-pipes, sections above the fire-box, having water-spaces with openings through them near one end for the products of combustion and at each end on one side solid hubs 20 and on the opposite
105 side in line therewith hubs 21, having openings through which the water circulation is established, flanges 18, surrounding said sections, by which heating-chambers are formed between them, and a dome above the
110 upper section, through which the products of combustion pass and which is provided with a check-door to regulate the draft, ears 25 upon the fire-box, sections, and dome, and bolts engaging the ears by which said parts are se-
115 cured together.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. WASHBURN.

Witnesses:

WILLIAM A. GORDON,
J. A. PULLING.