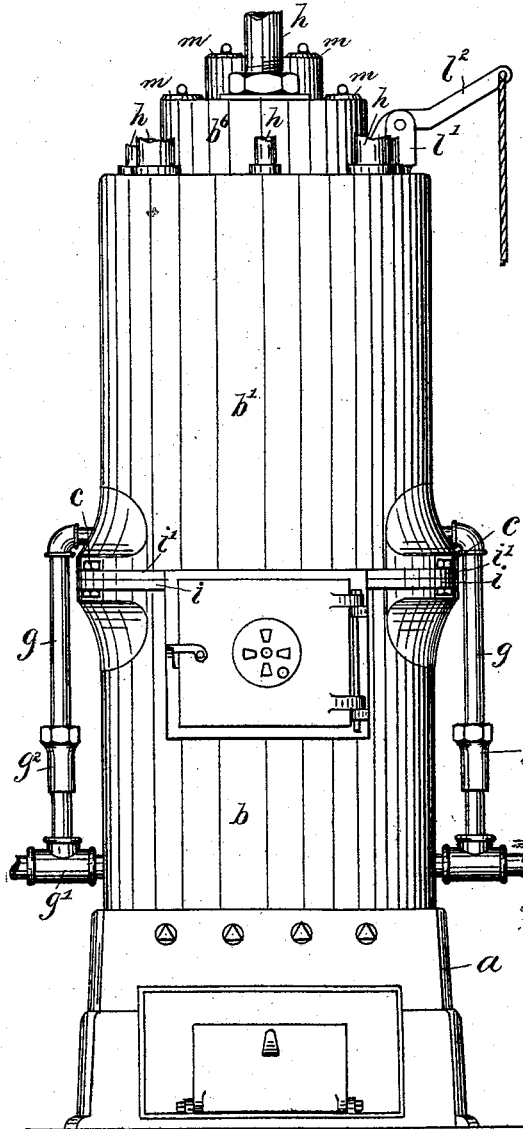


W. VANDERMAN.  
HOT WATER HEATER.

No. 522,499.

Patented July 3, 1894.

*Fig: 1.*



*Fig: 2.*

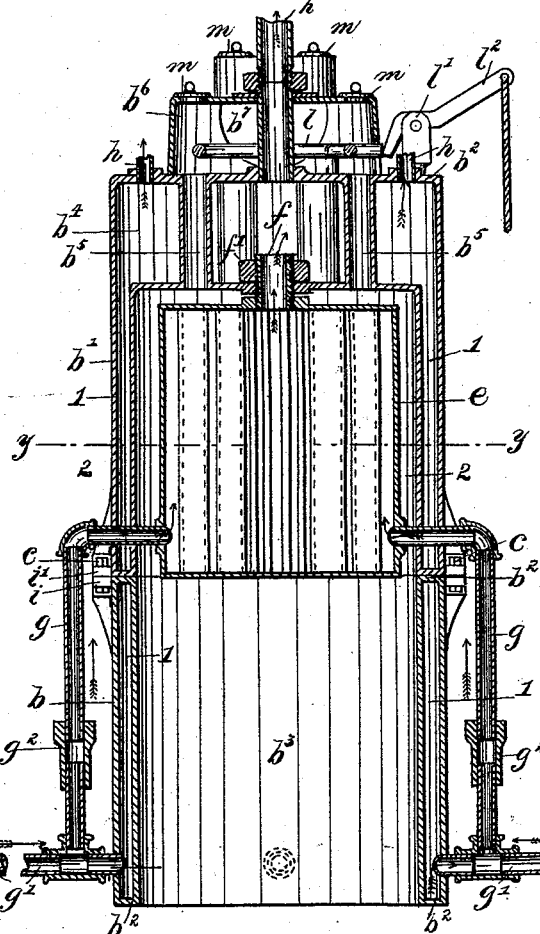
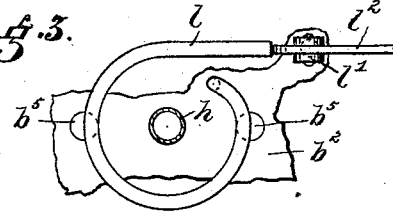


Fig. 3.



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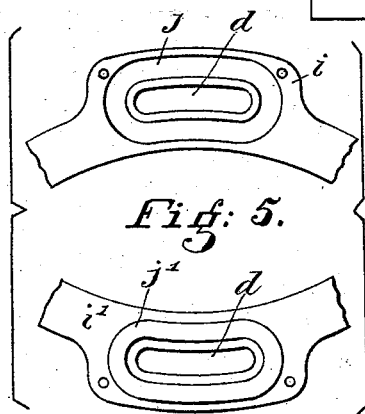
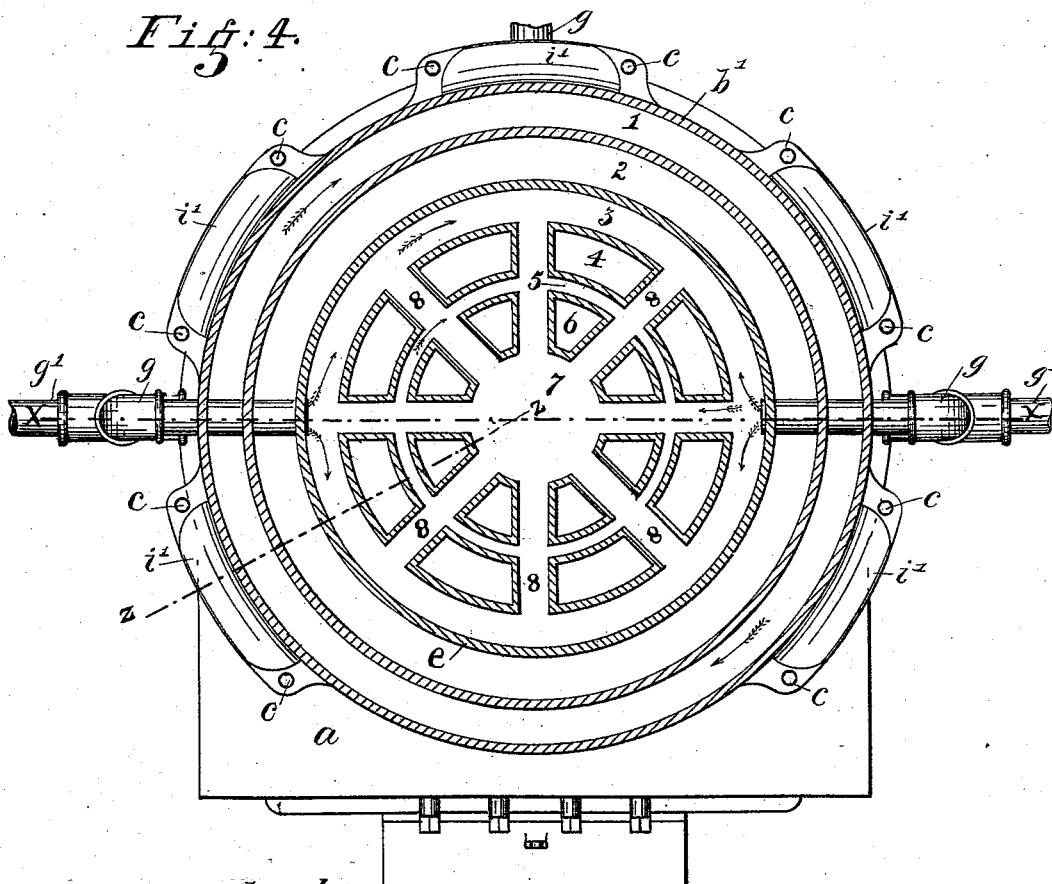
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HOT WATER HEATER.

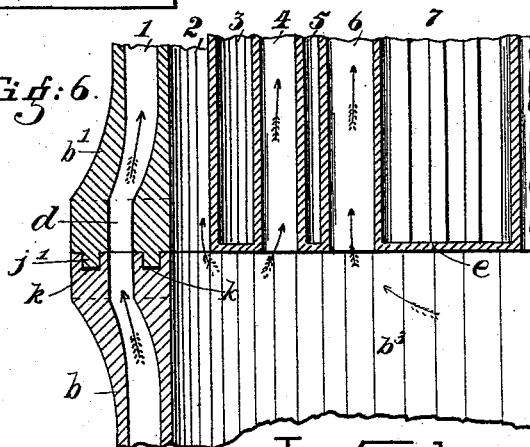
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*Fig: 4.*



*Fig: 6.*



Witnesses:

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# UNITED STATES PATENT OFFICE.

WILLIAM VANDERMAN, OF WILLIMANTIC, CONNECTICUT.

## HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 522,499, dated July 3, 1894.

Application filed March 10, 1893. Serial No. 465,449. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM VANDERMAN, of Willimantic, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Hot-Water Heaters, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

10 This invention relates to improvements in hot water heaters; the object of the invention being to provide a combined boiler and furnace adapted to supply hot water for heating dwelling houses and public buildings, and to  
15 construct the same in sections and provide means whereby absolutely water tight joints are secured, and to so arrange the parts that the maximum amount and a uniform radiation of heat is secured with the minimum  
20 quantity of fuel.

To this end my invention consists in the special construction and in the combination and arrangement of the several parts making up the device as a whole as more particularly hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 represents in front elevation a hot water heater embodying my improvements; Fig. 2 a central longitudinal section of the same (on dotted line *x x*, Fig. 4) the base being removed; Fig. 3 a detail in plan view of the device for operating the draft door; Fig. 4 a cross-section on enlarged scale taken on dotted line *y y*,  
30 Fig. 2; Fig. 5 details of portions of the upper and lower boiler sections showing plan views of the joints between water-ways, and Fig. 6 is a vertical section of a portion of the boilers taken on dotted line *z z*, Fig. 4.

40 My improved hot water heater comprises a furnace and an outer boiler made up in sections having specially constructed joints secured together by bolts, as hereinafter more particularly described, and an inner or supplemental boiler having passages between it and the outer boiler and also having water compartments or ways for the circulation of water and flues for the circulation of flame, hot air and the gases of combustion.

50 In the accompanying drawings the letter *a* denotes the hollow base which forms the ash-

pit and supports the grate base, said base being of any suitable construction.

Upon the base *a* is supported the outer boiler which preferably comprises two sections *b, b'*, bolted together at *c* as hereinafter described. These sections of the outer boiler are each made as hollow tubes with a water compartment *l, l*, between their outer and inner walls, as clearly shown in Fig. 2, said compartments being closed at the upper and lower ends, as at *b<sup>2</sup>*. Water-ways *d* are formed through the adjacent end plates of the boiler sections *b, b'*, to establish communication between the water compartments *l, l*, of the said sections, which water ways are formed at certain intervals around said sections, as will be hereinafter described.

The lower section *b* contains the fire-pot *b<sup>3</sup>* and the upper section *b'* has a dome *b<sup>4</sup>* to form a water compartment of large area, a series of smoke flues *b<sup>5</sup>* being extended through the top and bottom plates of said dome and communicating with the combustion chamber 2 of the boiler to conduct the smoke arising from the combustion of fuel in the fire-pot directly to the smoke-bonnet *b<sup>6</sup>* whence it passes into the smoke stack or chimney through the outlet *b<sup>7</sup>*, see Fig. 2.

As shown in the drawings the outer boiler is made in two sections, this however is optional, as the same might be practically made in two or more sections, as circumstances might require.

Suspended within the outer-boiler, as shown clearly in Fig. 2, is an inner or supplemental boiler *e*, having a series of circumferentially arranged water compartments 3, 5, and 7, with radially arranged water-ways 8 in communication therewith, and alternating hot air conduits or flues 4, 6. All of the water compartments of the inner boiler are closed at the upper and lower ends with the exception of the central one 7 which is open at the upper end and communicates with the dome of the outer boiler through the medium of a pipe *f* which preferably is screw-threaded at its lower end and screwed into the opening in the top of the inner boiler as shown. This pipe *f* acts as a central support for the inner or supplemental boiler, it preferably being provided with a nut *f'* at its upper end.

Communication is established between the water compartments of the inner and outer boilers by a series of circulating pipes *g*, which extend through the outer plate of the inner boiler near its lower end, out through the outer boiler, as shown in Fig. 2, and thence down where they connect with return pipes *g'*, one end of each return pipe being extended through the lower section and terminating in the water compartment *l*, near the lower end of the outer boiler, and the opposite end being connected with the outlet pipes or returns from the radiator or heater (not shown) in any part of the building. A series of risers *h* opening into the dome *b'* of the outer boiler and connecting with the inlet pipes of the radiator (not shown) conduct the hot water from said boiler through the radiators whence it is returned through the return pipes up through the circulating pipes and into the inner boiler where it is heated in its circulation through the water compartments of the said boiler and afterward allowed to rise through the central pipe *f* into the dome of the outer boiler where it is again carried through the risers, and so on indefinitely. The course of circulation is denoted by arrows in Fig. 2.

The lower section *b* of the boiler has outwardly projected flanges *i* having, preferably, an elliptical groove *j* formed therein as shown in Figs. 5 and 6, which receives a depending flange *j'* of the upper section. These flanges form the attaching plates of the sections, bolts *c* being extended through said plates or flanges, as shown. A packing *k* of cement or fibrous material will preferably be interposed between the flanges as shown in Fig. 6, to secure a water tight joint when the sections *b*, *b'* are secured together.

Located above the outer-boiler within the smoke-bonnet is a circulating coil *l* consisting preferably of a spirally bent tube in communication with the water compartment of the outer boiler, and fulcrumed upon a standard *l'* is a lever *l''* one end of which is in contact with the end of the coil *l* and is provided with a rope or chain at its opposite end, which is connected, through the medium of suitable pulleys or other devices (not shown), to the draft door or damper whereby the expansion and contraction of the coil *l* will regulate the draft as desired. A series of openings is provided in the smoke bonnet aligned with the smoke flues *b'* for convenience in cleaning said flues, said openings being provided with removable caps *m* as shown.

The vertical circulating pipes *g* will be provided with expansion joints *g* to allow for variation in compactness between the joints of the boiler sections.

I claim as my invention—

1. In a hot water heater in combination, a sectional outer boiler having a continuous water chamber located between its inner and outer walls on side and top, the smoke flues extending through the water compartment in

the dome, the inner boiler suspended within the outer boiler and forming a water compartment, the tubular interior water connection between the bottom wall of the dome and the top wall of the inner boiler, the smoke flues extending through the inner boiler, the combustion chamber located between the inner and outer boilers, a riser extending from the outer boiler, and the circulating pipes communicating between the lower part of the water compartments of the two boilers, all substantially as described.

2. In a hot water heater, in combination, the sectional outer boiler including an upper and lower section, the water compartment located between the inner and outer walls of the lower section, the fire pot located within the inner walls of the lower section, the upper section having the water compartment between its inner and outer walls on side and top, the water ways extending between the two sections, the smoke flues extending through the dome of the upper section, the inner boiler suspended within the outer boiler and forming a water compartment, the interior tubular connection between the inner and outer boilers the flues extending through the inner boiler, the combustion chamber located between the inner and outer boilers, the risers extending from the upper section of the outer boiler, and the water-ways communicating between the two boilers, all substantially as described.

3. In a hot water heater, in combination, the sectional outer boiler having the continuous water compartments located between its inner and outer walls, and in the dome located in the upper part of the boiler, the flues extending through the dome into the smoke bonnet, the smoke bonnet located above the dome, the inner boiler suspended within the outer boiler by an interior tubular connection and forming a water compartment, the flues extending through the inner boiler, the combustion chamber located between the inner and outer boilers, the risers extending from the outer boiler, and the circulating pipes connecting the two boilers, all substantially as described.

4. In a hot water heater in combination, a sectional outer boiler having a continuous water chamber located between its inner and outer walls above the base, the smoke flues extending through the water compartment, the inner boiler suspended within the outer boiler by a tubular joint forming a connection between the water compartments of the inner and outer boiler, the smoke flues extending through the inner boiler, the combustion chamber located between the inner and outer boilers, risers extending from the outer boiler, and the circulating pipes communicating between the water compartments of the two boilers, all substantially as described.

5. In a hot water heater in combination, a sectional outer boiler having a water cham-

ber located between its inner and outer walls, and a dome formed in the upper part of the upper section of the boiler, the smoke flues extending through the dome and water compartment of the outer boiler, the inner boiler 5 suspended within the outer boiler and forming a water compartment, the smoke flues extending through the inner boiler, the combustion chamber located between the inner 10 and outer boilers, a smoke drum located on the upper part of the outer boiler and communicating with the smoke flues therein, a coil of expanding pipes located within the smoke drum and having one end projecting through an opening in the wall thereof and 15 connecting with a damper operating lever, the damper operating lever, the circulating pipes extending from the upper part of the inner boiler to the water compartment of the outer boiler, and circulating pipes communi- 20 cating between the water compartments of the two boilers, all substantially as described.

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Witnesses:

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