

T. WHEATLEY.
STEAM AND HOT WATER BOILER.
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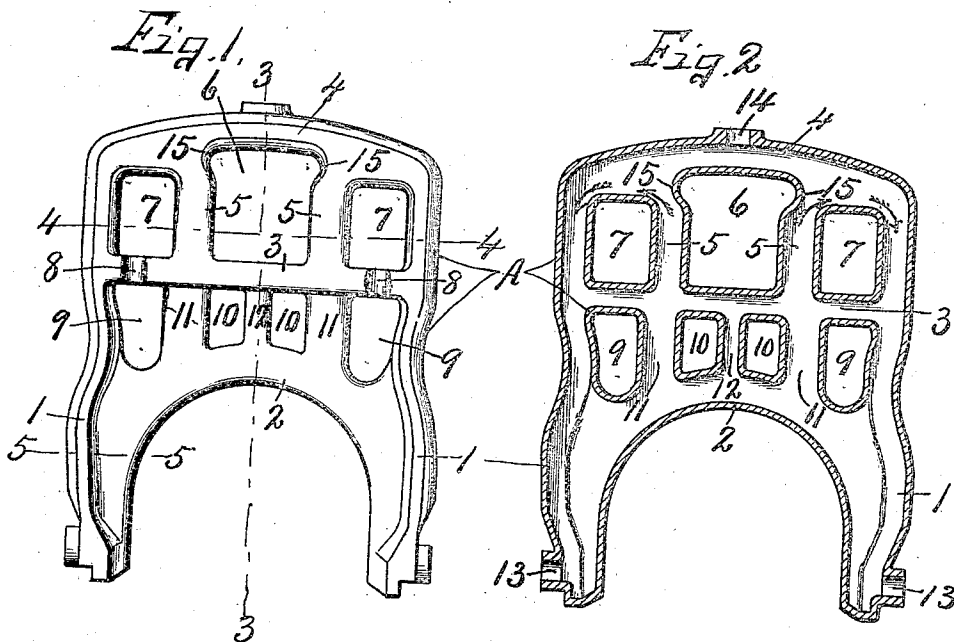


Fig. 3.

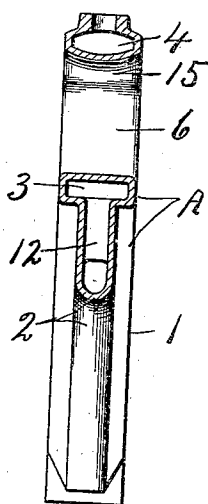


Fig. 4.

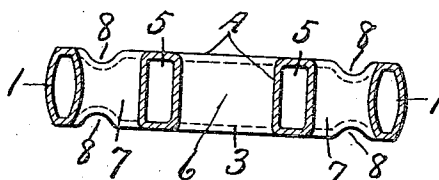
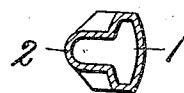


Fig. 5.



Witnesses.

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STEAM AND HOT-WATER BOILER.

943,761.

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To all whom it may concern:

Be it known that I, THOMAS WHEATLEY, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Steam and Hot-Water Boilers, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in steam and hot water boilers of the upright sectional type, in which the sections are usually made of cast metal mounted side by side, in close juxtaposition and connected by intercommunicating passages for the circulation of hot water and steam there-through, each section being usually provided with a series of comparatively shallow water channels, running vertically and transversely and spaced apart to form intervening fire passages. The steam generated from these sections is usually taken from the center of the top of each into a suitable distributing head, from which it is conducted through the several radiators of the building through suitable distributing pipes. I find that in many of these steam heaters, the suction incidental to the up-flow of steam tends to carry more or less water into the piping system, which is, of course, objectionable by reason of the fact that it interferes materially with the free circulation of steam and produces more or less "hammering" in the pipes.

My main object is to construct the boiler sections in such manner as to reduce this up-flow of the water into the piping system to a minimum and at the same time to augment the circulation of water in and through each section. In other words, I have sought to insure a more rapid and positive circulation of the water within each boiler section, and to establish a more definite line of demarcation between the water line and steam chamber, so as to effect a more speedy separation of the steam from the water without liability of drawing the water into the steam distributing pipes.

Other objects in use will be brought out in the following description.

In the drawings—Figure 1 is a front elevation of a boiler section embodying the features of my invention. Fig. 2 is a longitudinal vertical sectional view of the same section. Figs. 3 and 4 are vertical and horizontal sectional views, taken respectively on

lines 3—3 and 4—4, Fig. 1. Fig. 5 is a sectional view taken on line 5—5, Fig. 1.

These sectional boilers are usually made of similar end and intermediate sections except that the front and rear faces of the intermediate sections are substantially identical or of the same contour and inasmuch as the present invention is common to each of the sections, I have shown one of the intermediate sections —A— in order to more clearly define the elements of novelty. This boiler section preferably consists of a hollow cast metal body comprising hollow upright water legs —1—, an upwardly arched hollow web or conduit —2—, an intermediate horizontal conduit —3— and an upwardly arched top conduit —4—, the latter connecting the upper ends of the water legs while the conduit —3— connects the intermediate portion of the water legs, and the web —2— connects the lower portions of the water legs below the conduit —3—. The conduits —3— and —4— are connected by a series of, in this instance two, vertical conduits —5— spaced apart from each other and from the water legs forming a central fire passage —6— and additional fire passages —7— at opposite sides of the central passage 6.

The upright water legs —1— and conduits —3—, —4— and —5— are of substantially uniform depth from front to rear so that corresponding opposite faces lie in substantially the same plane except that the opposite faces of the horizontal conduit —3— are formed with narrow vertical depressions or channels —8— extending from top to bottom thereof to allow the heated products of combustion to pass therethrough for the purpose of igniting and facilitating the combustion of the gases which may accumulate or pass through the fire passages —7— thereby increasing the heating ability of the products of combustion.

The web —2— is of somewhat less depth from front to rear than that of the water legs and superposed portion of the section so that the lower sides of the horizontal conduit —3— form a portion of the crown sheet and receive the impact of the products of combustion as they escape upwardly from the fire box or combustion chamber thus producing a more or less intense heat in the upper portion of the section some distance above the fire box. The web —2— is pro-

vided with a series of, in this instance four, fire passages —9— and —10— extending therethrough from front to rear just below the horizontal conduit —3— and spaced
 5 some distance apart to form intervening upright water conduits —11— and —12— connecting the web with the horizontal conduit —3— as best seen in Fig. 2. These fire passages divide the entire section —1— into
 10 comparatively shallow water passages which are practically enveloped by the products of combustion thereby establishing a rapid circulation of the water and quickly converting such water into steam, it being understood
 15 that the web —2— as well as several horizontal and vertical conduits are in communication with each other and with the water legs as clearly shown in Fig. 2.

The bases of the water legs are provided
 20 with return flow passages —13— for the cold or cooler water while the central portion of the upper side of the conduit —4— at the top of the section is provided with an upflow passage —14—.

25 As stated in the preamble to the specification, one of the objects of my present invention is to prevent as far as practicable suction or drawing of the water from the water section into the steam conduits through the
 30 passage —14— or in other words to more perfectly separate the water from the steam chamber, and in order to accomplish this, the upper ends of the conduits —5— at opposite sides of the fire passage —6— are deflected laterally toward the upper ends of
 35 the water legs —1— and above the upper sides of the fire openings —7—, that is the inner sides of the upright conduits —5— adjacent to the fire passage —6— are extended laterally and outwardly some distance above
 40 the upper sides of the fire passages —7— forming what may be termed lateral separators —15—. In other words, the upper end of the fire passage —6— is extended some distance
 45 above the plane of the upper sides of the fire passages —7—, the upper end of said fire passage —6— being enlarged laterally in a plane above the upper sides of the passages —7— so as to deflect the upflowing water
 50 through the conduits —5— laterally toward the water legs thereby facilitating the return flow of the water downwardly through said legs where the water is cooled more or less by being more exposed to the atmosphere
 55 and at the same time establishing a water level below the upper side of the central fire opening —6— leaving the superposed portion of the conduit —5— for the reception of steam and thereby more evenly separating the steam from the water and reducing the liability of the water being drawn into
 60 the steam conduit —14— by suction.

When the water sections are assembled
 65 side by side in the manner well known, the webs —2— will be held spaced some distance

apart by reason of the fact that they are of less depth from front to rear than the superposed portion of the sections and at the same time the lower faces of the horizontal
 70 intermediate conduits —3— will constitute baffle plates or crown sheets to deflect the products of combustion through the fire passages —9— and —10— except as they escape through the vertical passages —8—
 75 for igniting any gases which may accumulate in the return flues or passages —7—. It will be observed that these vertical passages —8— are in direct communication with the combustion chamber without any intervening baffle plates or crown sheets thereby
 80 causing the products of combustion to act directly upon any live gases which may pass through the flues —7— for the purpose of expediting the combustion and intensifying the heat in the upper portion of the
 85 boiler section.

In operation, the inflowing water through the return passages —13— is heated and expanded and thereby caused to rise in the section until it reaches the level of the upper
 90 sides of the fire passages —7—, it being understood that the more rapid circulation is toward the center of the boiler section where the heat is most intense, and therefore the rising water is concentrated toward the
 95 sides of the fire passage —6— where it is deflected laterally and outwardly by the separator —15— above the passages —7— and toward the cooler outer sides of the water legs through which the cooler water
 100 returns to the lower portions of said legs and mingles with the inflowing hot water thus continuing the circulation and ebullition leaving the portion of the section above the fire passage —6— where the steam outlet
 105 —14— is located entirely free and separate for the collection and upflow of the steam, the circulation of water being maintained below the steam chamber.

What I claim is:

1. A section for upright sectional boilers, comprising upright water legs, an upwardly arched conduit connecting the upper ends of said legs, a horizontal conduit also connecting said legs some distance below the first
 110 named conduit, upright conduits spaced apart from each other and from the water legs and connecting the upper and lower conduits, the upper ends of the upright conduits adjacent the upper arched conduit being
 115 deflected laterally toward the water legs.
2. A section for upright sectional boilers, comprising upright water legs, cross conduits connecting the upper portions of said legs and spaced some distance apart, the
 120 portions of said section between the cross conduits being provided with a central fire passage and additional fire passages at opposite sides of the central passage, the upper end of the central fire passage being en-
 125

larged laterally in a plane above the upper sides of the opposite fire passages.

3. A section for sectional boilers, comprising upright water legs, a cross conduit connecting the upper ends of the water legs, an additional cross conduit connecting said water legs some distance below the first named conduit, upright water conduits connecting the intermediate portions of the cross conduits and spaced apart to form an intervening fire passage, the upper ends of the inner sides of the upright water conduits adjacent to the upper cross conduits being deflected laterally toward the water legs.

4. A hollow section for sectional boilers, comprising upright water legs, a conduit connecting the upper ends of said legs, an additional conduit connecting said water legs some distance below the first named conduit and having its opposite faces provided with narrow vertical fire passages, and a hollow web connecting the water legs below the second named conduit and of less depth from front to rear than the corresponding depth of the legs and conduits, said web and portion of the section between the conduits being provided with fire passages therethrough.

5. A hollow section for sectional boilers, comprising upright water legs, a water conduit connecting the upper ends of said legs, a second conduit connecting said legs some

distance below the upper conduit and provided with narrow vertical channels in at least one of its opposite faces, upright conduits connecting the intermediate portions of the first named conduits and having their upper ends deflected laterally toward the water legs, said upright conduits being spaced apart from each other and from the water legs forming intervening fire passages, and a hollow web connecting the water legs below the second named conduit and provided with fire passages therethrough.

6. A section for upright sectional boilers comprising upright water legs, a hollow web connecting the lower portions of said legs, a conduit connecting the upper ends of said legs, a horizontal conduit connecting the intermediate portions of the water legs, the upper conduit having a central steam outlet, upright conduits connecting the upper conduit at opposite sides of the vertical plane of the outlet and having their upper ends deflected toward the water legs for diverting the water from the steam outlet toward the water legs, said web being of less depth from front to rear than the superposed portion and water legs of the section.

In witness whereof I have hereunto set my hand this 21st day of July 1908.

THOMAS WHEATLEY.

Witnesses:

H. E. CHASE,
CAROLINE McCORMACK.