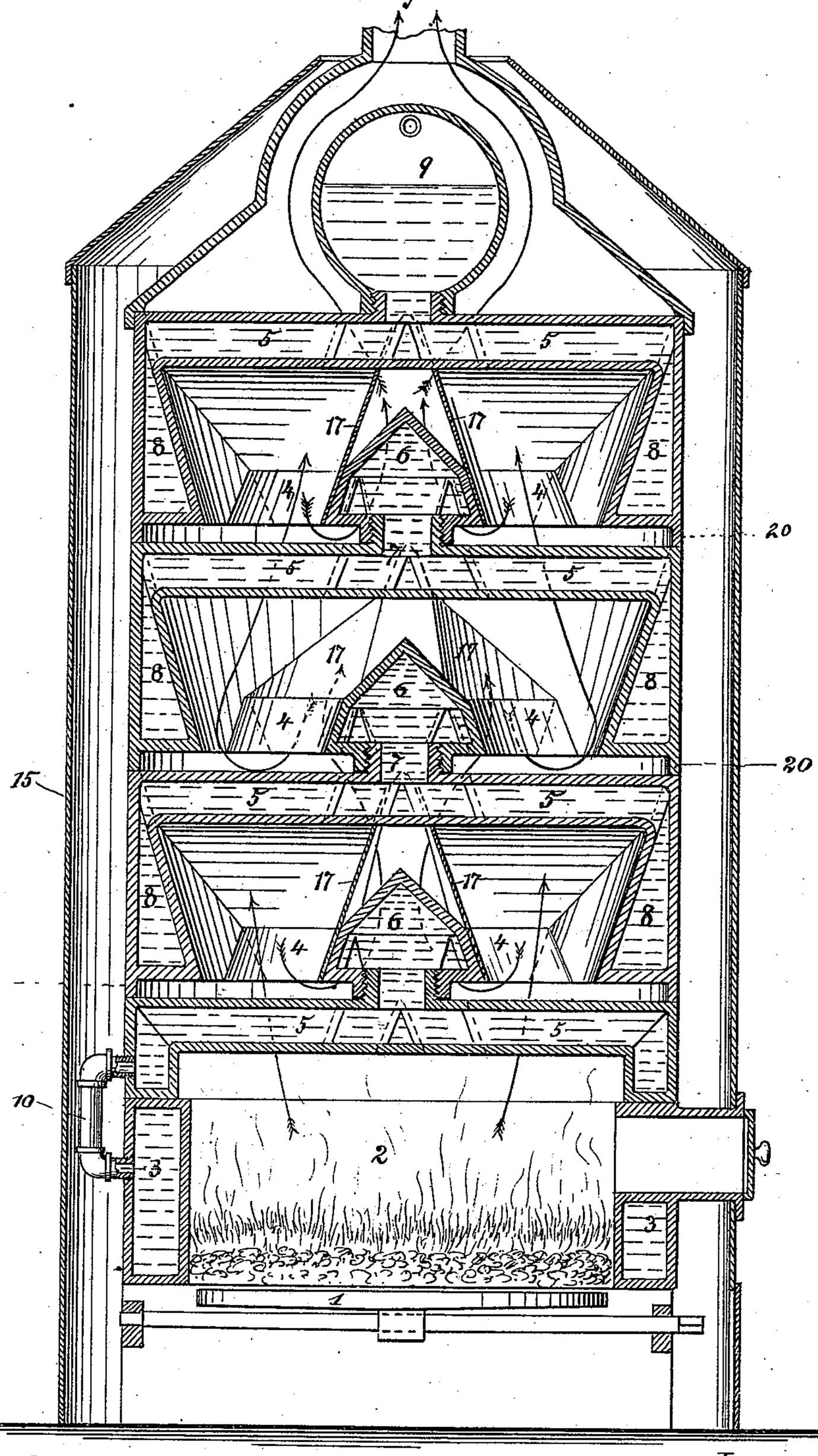
(No Model.) 2 Sheets—Sheet 1.

# J. MASON.

## STEAM AND HOT WATER BOILER.

No. 355,699. Patented Jan. 11, 1887.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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## STEAM AND HOT WATER BOILER.

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*Fig. 2.*

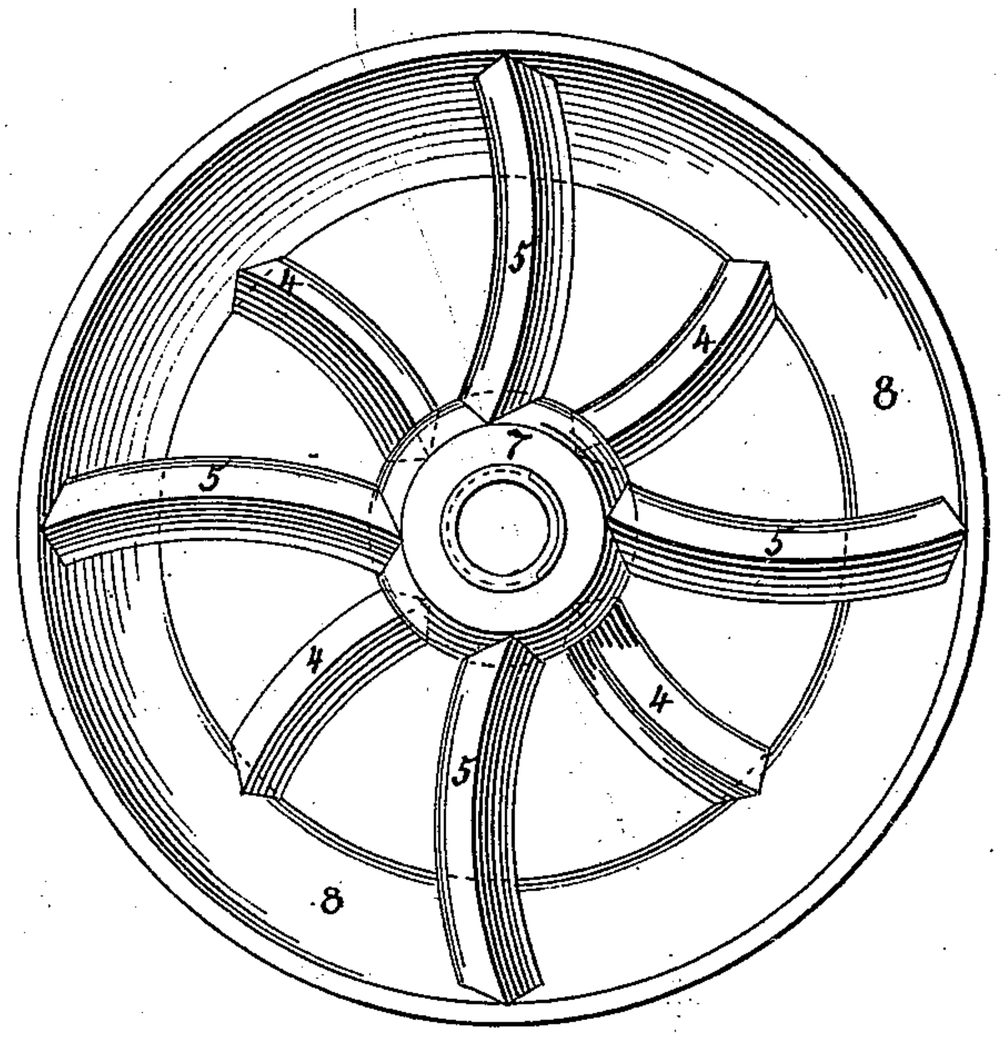
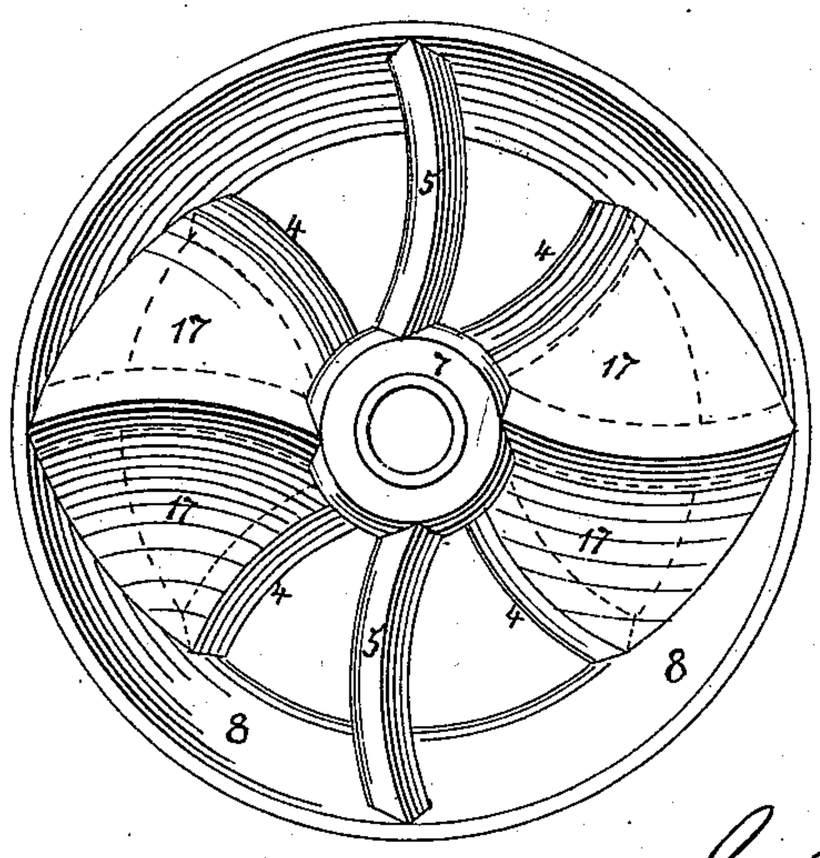



*Fig. 3.*

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# UNITED STATES PATENT OFFICE.

JOSHUA MASON, OF PATERSON, NEW JERSEY.

## STEAM AND HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 355,699, dated January 11, 1887.

Application filed May 13, 1886. Serial No. 202,092. (No model.)

*To all whom it may concern:*

Be it known that I, JOSHUA MASON, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Steam and Hot-Water Boiler, of which the following is a specification.

My invention relates to that class of steam or hot-water boilers which are vertical or upright and made in sections; and the objects I have in view are, first, to make a boiler which shall unite the elements of strength, durability, simplicity in construction, and economy in manufacture; second, to make a boiler in which there shall be a large area of heating-surface and which shall not require cleaning; and, third, to make a sectional boiler the sections of which can be put together without the use of rods, bars, bolts, packing material, or, in fact, any devices or materials other than the sections themselves. I attain these objects by the particular form of section which I use in the construction of my improved boiler, as shown in the accompanying drawings, in which the same numerals refer to like parts.

Figure 1 is a sectional view of my improved boiler, showing the sections placed one upon the other. Fig. 2 is a plan of one of the sections. Fig. 3 is a plan of one of the sections, showing baffle-plates, hereinafter referred to.

1 is the grate. 2 is the fire-box. 3 is the annular space, filled with water, or water-leg around the fire-box. 4 4 are the lower set of arms in each section. 5 5 are the upper set of arms in each section. 6 is the lower hub of each section. 7 is the upper hub of each section. 8 is the hollow ring of each section. 9 is the steam-dome. 10 is the tube connecting the water-leg 3 with the ring 8, as shown in Fig. 1. 15 is the usual jacket which is placed around boilers. 20 is a narrow ring cast upon the under surface of the ring 8, for the purposes hereinafter explained.

Each section of the boiler consists of a hollow ring connected by two sets of hollow arms to hollow hubs, and is similar in shape to a wheel having two sets of spokes or arms, an upper set and an under set, and so arranged with reference to each other that the upper set of arms is staggered over the lower set of arms, as shown in Figs. 2 and 3. I prefer to make the ring 8 beveled, as shown in Fig. 1, as by so doing the under surface of each ring will be exposed to the action of the heat and the area of the heating-surface will be thereby greatly increased. Each arm is similar in shape to a triangular prism, the edge of which, formed by the intersection of two of its sides, is uppermost, as shown in Figs. 2 and 3. The arms are preferably made curved, as shown in Figs. 2 and 3. The arms 4 5, ring 8, and hubs 6 and 7 are hollow, through which the water freely circulates.

The hub 6 projects below the plane containing the lower surfaces of the ring 8, and the lower set of arms, 4, and likewise the hub 7, is extended above the plane in which lie the upper edges of the arms 5 and the ring 8, as shown in Fig. 1. These hollow extensions of the hubs 6 and 7 are provided with screw-threads, so that the several sections may be screwed the one upon the other. Thus, referring to Fig. 1, the extension of hub 6 has a female thread cut upon its interior to receive the male threaded extension of hub 7 of the section immediately beneath, and the extension of the hub 7 is provided with a male thread upon its exterior and is adapted to be screwed into the extension of hub 6 of the next section above; hence, by screwing sections together the boiler may be built up to any desired height.

I find it desirable in the manufacture of my improved boiler to cast a ring, 20, upon the lower outside edge of the hollow ring 8, as shown in Fig. 1. The ring 20 should extend below the under surface of the ring 8 as far as, but no farther than, does the extension of the hub 6. The object of this ring is to allow of the extension of the hub 6 for the purpose of cutting a thread upon its interior, as above described, and also to avoid the necessity of turning the entire lower surface of the hollow ring 8, it being necessary to turn only the lower face of the ring 20, so that it will fit accurately upon the turned upper edge of the hollow ring 8 of the section immediately beneath.

The lower surface of the ring 20 and the upper edge of the hollow ring 8 are turned so that when any two sections are screwed together these two surfaces will fit against each

other perfectly and prevent the escape of smoke or other vapors. The joints formed by screwing the sections together make tight and permanent connections, through which the water circulates from one section to another.

In my improved boiler the fire-box 2 and water-leg 3 are of the usual construction. The upper half of a section is placed above the fire-box, as shown in Fig. 1, the water-communication between the hollow ring 8 of the section and the water-leg 3 being through the tube 10.

The manner in which the boiler is put together will be apparent from the foregoing description. The sections are simply screwed one upon the other, no bolts, rods, bars, or other devices being necessary to hold the sections together. Each section is made of iron, and is cast in one piece.

I prefer to make the upper surface of the hub 6 conical in shape, as shown in Fig. 1, in order to prevent the lodgment thereon of soot, dirt, or ashes.

The steam-drum 9 is of the usual construction, and is placed on the top of the sections, as in other sectional upright boilers, as shown in Fig. 1, or in any other suitable manner. The safety-valve and all the other usual appliances of steam-boilers may be used with my improved boiler; but they are not shown here, as they do not form any part of this invention.

In a boiler constructed according to my improvements the spaces between the rings 8, arms 4 5, and hubs 6 7 constitute the heat-flues, and the products of combustion, after leaving the fire-box, impinge first against the bottom surfaces of the arms 5 of the half-section, immediately above the fire-box; then, being deflected to either side of each arm, pass on upward and come into contact with the lower surfaces of the lower set of arms and the hollow ring 8 of the section next above, and being again deflected pass on upward to the bottom surfaces of the upper set of arms, which are staggered over the lower set, as above stated, and are again deflected, passing upward to the arms and hollow ring of the next section, as before, so that the heat and gases of combustion before reaching the chimney-flue strike in succession all the arms and the water-ring and the hollow hubs of each section of the boiler. Owing to the peculiar shape of the arms and hollow ring, as above described, ashes and dirt are not permitted to lodge upon them, but fall back into the fire-box, so that the boiler will seldom, if ever, need cleaning. The circulation of the water in my improved boiler is positive, and is from the water-leg 3 through the tube 10 to the ring 8, thence through the arms 5 to the hollow hub 7, thence up through the connection formed by screwing together the two hubs, as above described, to the lower set of arms of the next section above, through them to the ring 8 and back through the upper set of arms to the hub 7, and so on. Thus it will be seen that there are no counter currents in the circulation of the water, but that there is a continuous, active, and steady flow in one and the same general direction.

If it be desired, the sections, when they have been put together, may be covered with a cement or other boiler-covering, in the usual manner; or the sections may be surrounded by a jacket, 15, as shown in Fig. 1.

Should it be desired to change the direction of the heat as it passes upward, or to retain it longer within the boiler and prevent its too rapid passage to the chimney, baffle-plates may be used. Such baffle-plates are shown in Figs. 1 and 3. These plates should rest upon the upper edges of two arms and incline up to the base of the arm staggered above, as shown in the drawings. The plates being thus inclined, ashes and dirt will not accumulate upon them, but will fall back into the fire-box.

For the sake of convenience I have shown but four arms or spokes in each set of arms; but it is obvious that any convenient number may be used. So, also, with other details of construction, variations may be made in them without affecting the principle involved in my invention.

It will be observed that the boiler, as described herein, can be entirely emptied of water.

I do not claim anything new in the construction of the fire-box, grate, steam-drum, or any of the other parts of a steam-boiler, except the peculiar shape of the sections and the manner of putting them together.

What I claim, therefore, as new, and desire to secure by Letters Patent, is—

1. In a sectional steam or hot-water boiler, a section consisting of a hollow ring connected with two hollow hubs by two sets of hollow arms, forming a continuous passage for the circulation of water, one set of arms being staggered over the other, as described, said section being cast in one piece and adapted to be screwed upon a similar section, substantially as and for the purposes set forth and described.

2. In a sectional steam or hot-water boiler, a section consisting of a hollow ring having its inner wall beveled, as shown and described, connected with hollow hubs by two sets of hollow curved arms, forming one continuous passage for the circulation of water, one set of arms being staggered over the other, as described, said section being adapted to be screwed upon a similar section, substantially as described and set forth.

3. In a sectional steam or hot-water boiler, a section consisting of a hollow ring having its inner wall beveled, connected with hollow hubs by two sets of curved prism-shaped arms, one set being staggered above the other, as described, said arms being hollow and affording direct communication for the circulation of water between the hubs and the hollow ring, said section being adapted to be screwed upon a similar section, substantially as and for the purposes set forth and described.

4. A sectional steam or hot-water boiler composed of a series of wheel-shaped sections, each section consisting of a hollow ring connected with hollow hubs by two sets of hollow arms, as described, said sections being screwed one upon the other, as described, in combination with a fire-box, water-leg, and steam-drum, all constructed and arranged substantially as described, and for the purposes set forth.

5. A sectional steam or hot-water boiler composed of a series of wheel-shaped sections, each section consisting of a hollow ring connected with hollow hubs by two sets of hollow arms, one set being staggered over the other, as described, said sections being screwed one upon the other, and when so screwed together forming channels through their hubs for the circulation of water from one section to another, in combination with suitable fire-box, water-leg, and steam-drum, all combined and arranged substantially as described and set forth.

6. A sectional steam or hot-water boiler composed of a series of sections screwed one upon the other, each section consisting of a hollow ring joined to hollow hubs by two sets of hollow arms and being provided with baffle-plates, as described, all combined with suitable fire-box, water-leg, and steam-drum, substantially as and for the purposes set forth and described.

7. The sectional steam or hot-water boiler composed of a series of wheel-shaped sections screwed one upon the other, each section consisting of the ring 8, arms 4 5, and hubs 6 7, with or without the baffle-plates 17, all combined and arranged with suitable fire-box, water-leg, and steam-drum, substantially as described, and for the purposes set forth.

JOSHUA MASON.

Witnesses:
W. J. CARSHORE,
R. H. MILLER.