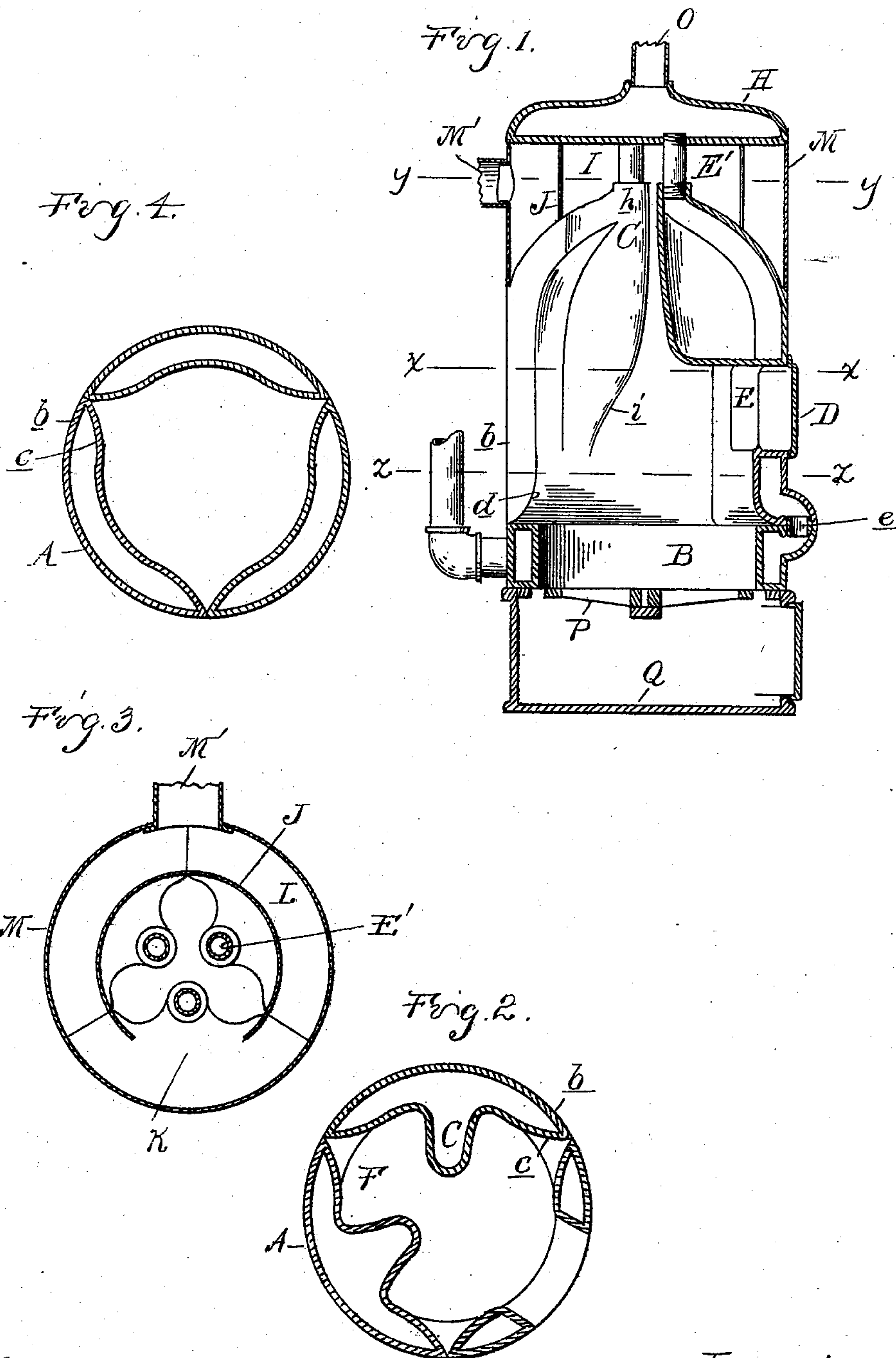


(No Model.)

J. A. RATHBONE.
WATER HEATER.

No. 603,409.

Patented May 3, 1898.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN A. RATHBONE, OF DETROIT, MICHIGAN, ASSIGNOR TO THE UNITED STATES HEATER COMPANY, OF SAME PLACE.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 603,409, dated May 3, 1898.

Application filed July 6, 1897. Serial No. 643,626. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. RATHBONE, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The invention consists in the construction of a water-heater or steam-generator especially intended for heating purposes. As the difference between the two devices relates simply to the size of the upper water or steam
15 chamber and as in both cases the device is a water-heater, I will refer to it herein as a water-heater, understanding that its uses may as well embrace steam generation.

20 The invention consists in the construction of a sectional heater adapted to form a round or substantially round fire-pot; and it consists particularly in the construction of the sections whereby when they are assembled the circulating body of water moves with the least
25 possible resistance through the heater, so that a rapid circulation may be obtained and so that the products of combustion and the heat from the fire travel with the water, the heater being so constructed as to get the most efficient results from the heat.

30 The invention consists in the construction of the sections whereby this quick and undisturbed circulation is obtained with large heating-surface, with the best shape to resist internal strains, with perfect provision to take
35 care of the expansion and contraction, and with the utmost economy in the cost of manufacture, and, further, in the construction, arrangement, and combination of the various
40 parts, all as more fully hereinafter described.

In the drawings, Figure 1 is a vertical central section through my improved heater. Fig. 2 is a cross-section thereof on line $x x$. Fig. 3 is a cross-section on line $y y$. Fig. 4
45 is a cross-section on line $z z$.

My heater I build up from a series of sections of like size. I have shown in the drawings a heater made of three like sections. Each section A is in the shape (in cross-section) of
50 a segment of a ring, as shown in Fig. 4, the

inner walls near the edges of each section having the curved faces c , which curve outwardly to the outer wall b , and making a minimum point of contact between the sections, at the same time permitting the heat to contact the inner walls to the extreme edges without any dead material or spacing at the contacting-points of the sections, thereby increasing the heating effect with a minimum of material. At the bottom the inner walls of the sections have the curved faces d , which likewise curve to the outer wall, making a minimum of contacting surface between the sections and the ring B, upon which they are supported and to which they are connected
55 in any suitable manner, such as by the nipple e . These sections at the points near the top have their inner and outer walls curved in concentrically, or nearly so, thereby contracting the water-space therein toward the top, and thus carrying the water which rises there-
60 toward the center of the fire.

I stop the sections short of contacting centrally at the top, as plainly shown in Fig. 3. Centrally of the upper part of each section is the inward-projecting lobe C, which continues up or has an extension h to the top of the outer wall of the section. The lobes at the lower end have the inclined face i , which gradually merges into the inner wall of the section, as shown, the sides being connected and merging into that wall by curved connecting-faces, as illustrated in Fig. 2.

Of course in that section which has the door D the lobe is cut away, as shown at E in Fig. 1, to permit of feeding the coal into the furnace in the usual way.

From the construction described it will be observed that the uprising water from the ring B will pass up the ring-segments of the sections, and as these sections contract toward the top the lobes C swell out, and thus permit the water to flow through the sections with practically no internal resistance and without any sharp bends or elbows at any point. The decided advantage in this construction is the employment of the inclined faces i on the lobes, against which the fire can strike, and the corresponding inclined faces on the under faces of the contracted or in-
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ward portions of the sections, against the under side of which the fire may strike, without impeding the water circulation or deflecting it laterally to any material extent from its continuous upward course—that is, such water as enters the lower part of the section and is deflected into the lobe C may take a gradually-rising course through that lobe and without any sharp bends or angles or without any angles or without encountering any partitions or diaphragms will flow to the top and find exit upwardly through the exit-pipes or nipples E', which are at the meeting-points of the sections and lobes.

The construction of sections and lobes described forms a series of contracted flues F for the heat and products of combustion, which at the top form smoke flues or exits G between the ends or inner faces of the sections and beside the lobes, as plainly shown in Fig. 3. The nipples E' connect into and support the drum or dome H, leaving between a smoke-chamber I. In this smoke-chamber and extending between the end faces of the drum or dome H and the upper faces of the heater-body is the ring J, being apertured or broken away in front, as shown at K, so that the products of combustion rising through the flues G into the smoke-chamber will pass through the opening K and around through the passage-way L between the outer casing M and the ring J to the rear of the heater to the smoke-pipe M'. The uptake-pipes O may be extended from the drum H at any desired point.

P are the grates, and Q is a base upon which the heater is supported over an ash-chamber beneath the heater in the usual manner.

The construction described forms a substantially round sectional heater, each section of which comprises a ring-shaped double shell contracting at the top, a lobe projecting from the inner face of this section, forming in effect another waterway from the base of the section out over the fire and terminating at the same point, from which point the uptake-pipe extends. This section and its lobe form a water-shell, with a series of gradually-contracting passages merging into a common discharge, combined with correspondingly-contracting smoke-passages centrally of the heater. The object and advantage of this is that I concentrate the greatest heat at the point in the circulation where I obtain and desire the greatest speed in the circulation, and I find that the results in wa-

ter circulating and heating effects with minimum of fuel are excellent.

What I claim as my invention is—

1. A water-heater composed of a series of vertical sections, each section comprising a segmental water-shell having converging walls whereby it contracts toward the top, lobes overhanging the fire on the inner face of the shell and having free communication with the interior of the shell, the shells and lobes converging to a common point, uptake-pipes from this point, this arrangement of shell and lobes forming corresponding converging smoke-flues whereby the heat is concentrated at the point of greatest speed of the circulation of the heater and the products of combustion move along with the direction of the circulation.

2. In a water-heater, a series of vertical segmental sections, each comprising a water-shell contracting and overhanging at the top separated at the inner ends to form a smoke flue or flues, a series of lobes springing (with inclined lower walls) from the shell-sections and merging into a discharge common to the discharge from the contracted end of the shell-sections, thereby forming a series of contracting flues between the lobes, a series of uptake-pipes from the upper inner ends of the sections, a common dome, or chamber into which they connect, and a smoke-chamber between this dome and the heater-body.

3. In a water-heater comprising sections each segmental ring-shaped, contracting into a dome shape at the top, the inner wall of the section having the curved faces *c d*, at the sides and bottom to the outside wall, the central lobes C, having the lower inclined walls *x x* and the extensions *h*, into which the contracting ends of the shell-sections merge, and the exit-pipes E' from these extensions.

4. In a water-heater, the combination of sections forming ring-segments curved inward at the top both outside and in and with converging sides, inwardly-projecting lobes at the upper part of each section terminating at the inner edge of the top of the section, the water-exit for the sections at the top of the lobes and smoke-flues formed through the tops of the sections between and beside the lobes.

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

JOHN A. RATHBONE.

Witnesses:

M. B. O'DOHERTY,
OTTO F. BARTHEL.