

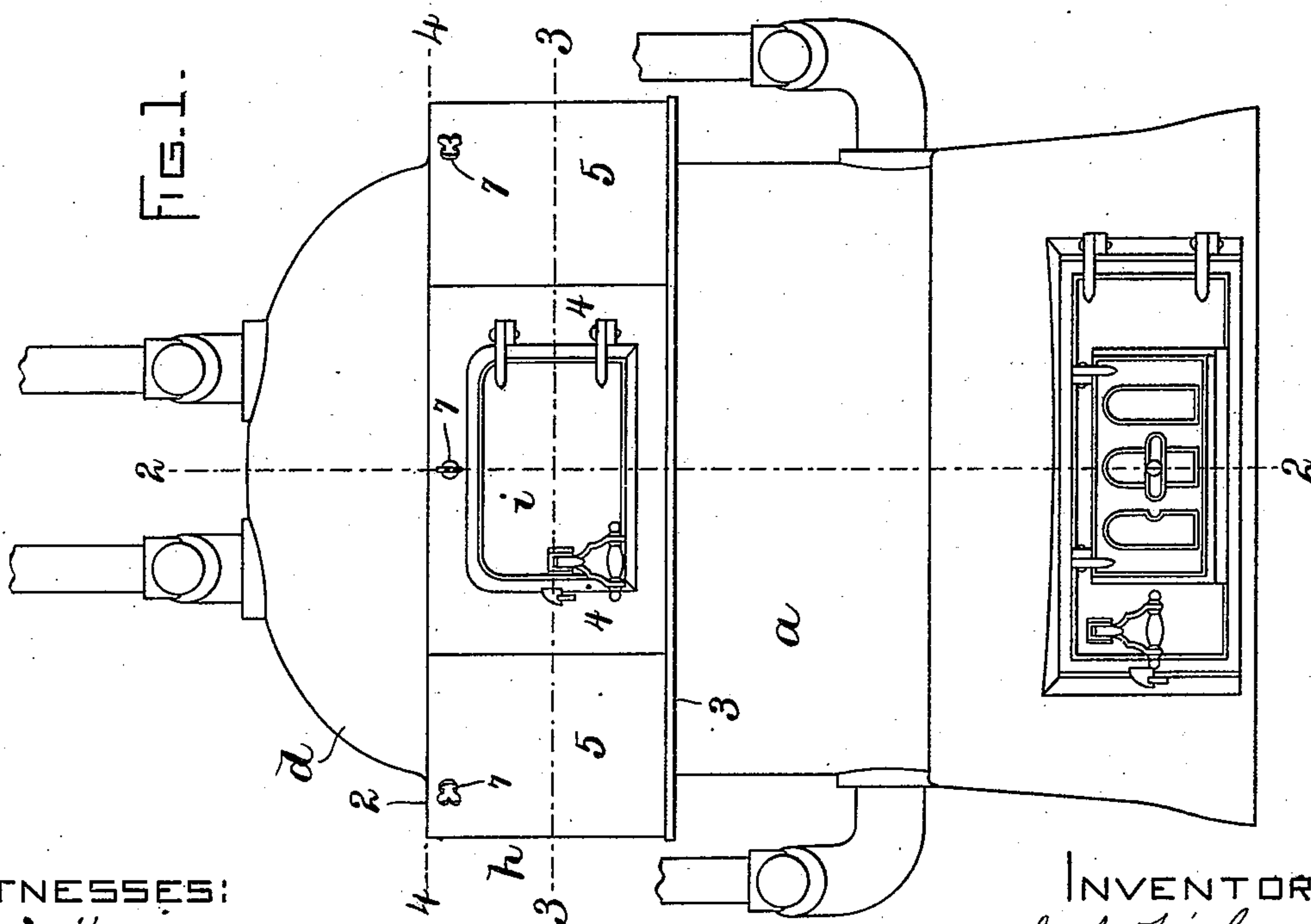
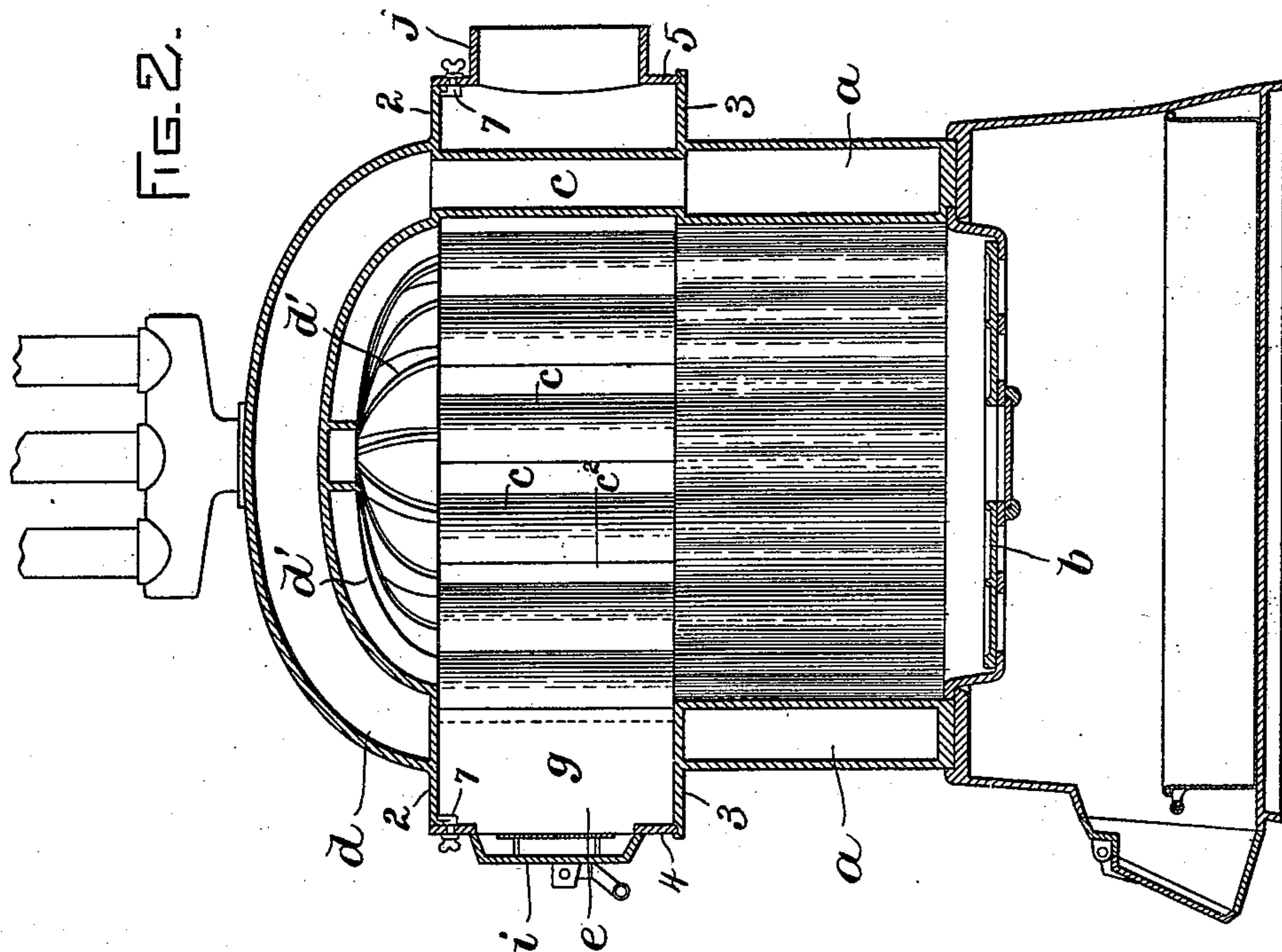
(No Model.)

2 Sheets—Sheet 1.

J. A. FISH.  
HOT WATER OR STEAM BOILER.

No. 553,644.

Patented Jan. 28, 1896.



WITNESSES:  
A. D. Haman  
Rollin Abell.

INVENTOR:  
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by Knight Brown Quinby  
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(No Model.)

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FIG. 3.

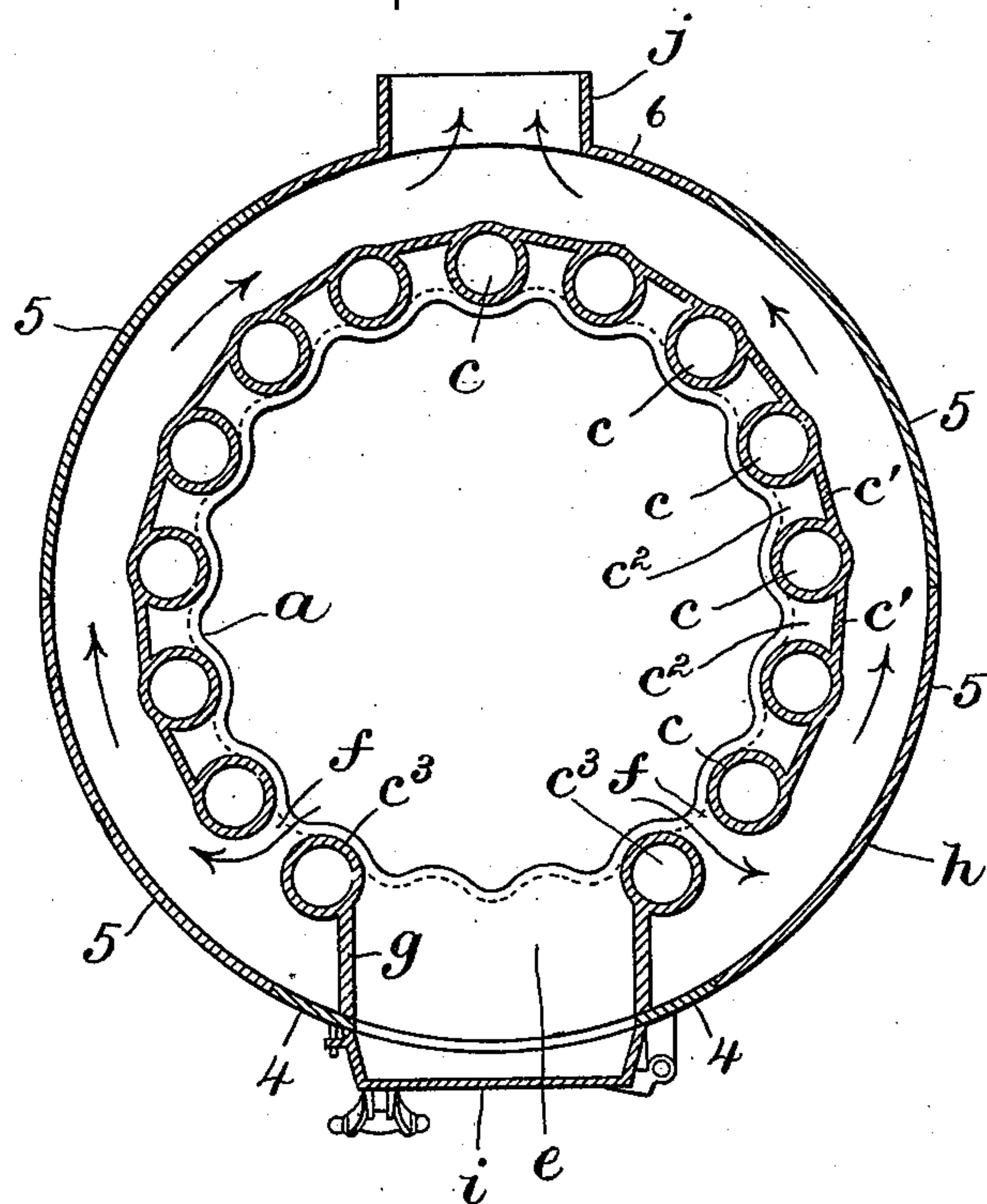
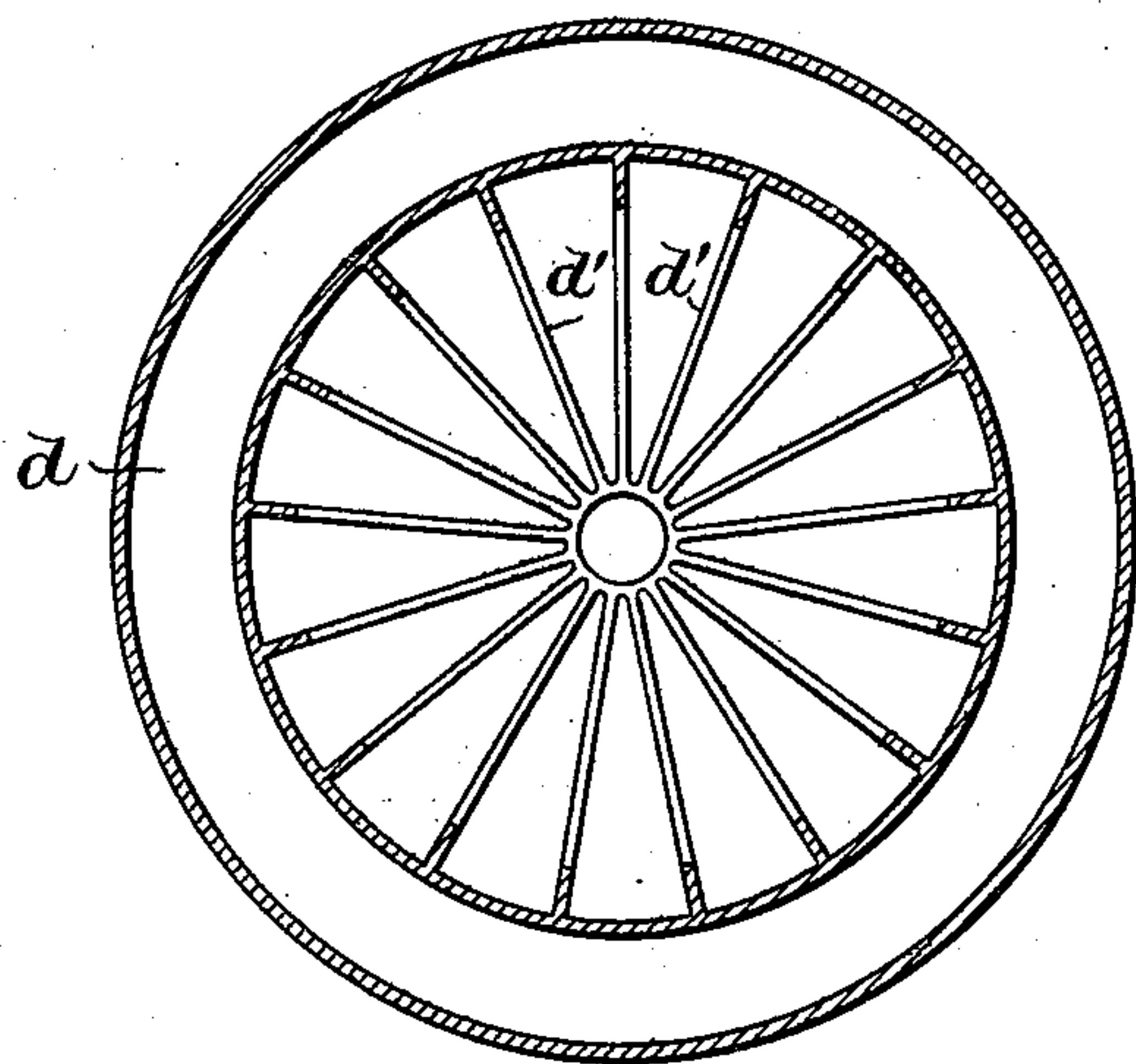


FIG. 4.



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# UNITED STATES PATENT OFFICE.

JOHN ALBERT FISH, OF MELROSE, MASSACHUSETTS.

## HOT-WATER OR STEAM BOILER.

SPECIFICATION forming part of Letters Patent No. 553,644, dated January 28, 1896.

Application filed November 16, 1895. Serial No. 559,129. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN ALBERT FISH, of Melrose, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Hot-Water or Steam Boilers, of which the following is a specification.

This invention has for its object to provide a simple and economically-constructed heating apparatus adapted to heat and circulate water or to generate steam.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of my improved apparatus. Fig. 2 represents a section on line 2 2 of Fig. 1. Fig. 3 represents a section on line 3 3 of Fig. 1. Fig. 4 represents a section on line 4 4 of Fig. 1.

In the drawings, *a* represents a double-walled water-chamber, which surrounds a fire-box having at its bottom a grate *b* of any suitable construction.

*c c* represent a series of vertical tubes communicating with the upper end of the chamber *a* and extending upwardly therefrom, the upper ends of said tubes communicating with a hollow dome *d*. The tubes *c* are separated from each other by spaces *c*<sup>2</sup>, as shown in Fig. 3, across which extend inter-tube webs or partitions *c'* extending across said spaces. The tubes *c* and partitions *c'* extend continuously from a point at one side of the opening *e* for the introduction of fuel, partially around the fire-box, to a point at the opposite side of said opening, the said tubes and partitions constituting a wall extending nearly around the upper portion of the fire-box and arranged so that the products of combustion from the fire-box will pass outwardly therefrom at points adjacent to the opening *e*, which is at the front side of the apparatus. I prefer to provide additional tubes *c*<sup>3</sup> *c*<sup>3</sup> at opposite sides of the opening *e*, said tubes being separated from the adjacent tubes *c* by inter-tube passages *f f* through which the products of combustion pass, as indicated by the arrows in Fig. 3. A casing *g* surrounding the opening *e* is connected with the tubes *c*<sup>3</sup> *c*<sup>3</sup>.

Surrounding the series of tubes *c* and *c*<sup>3</sup> is

a casing *h*, which is provided at one side with a door *i* coinciding with the opening *e*, and at the other side with an escape opening or flue *j* adapted to be connected with a chimney. The casing *h* co-operates with the tubes *c* and partitions *c'* in forming a flue-space extending from the passages *f f* to the outlet *j*, the products of combustion passing through said flue, as shown in Fig. 3. The casing *h* is preferably composed of the horizontal top and bottom flanges 2 3, Fig. 2, and curved plates or sections 4 5 6 detachably secured to the flanges 2 3 by any suitable means, preferably by the insertion of their lower edges into grooves in the flange 3 and by means of pivoted latches 7 connecting their upper edges with the flange 2, as shown in Fig. 2.

It will be seen by reference to Fig. 3 that the tubes separated by the spaces *c*<sup>2</sup> present large areas of surface to the products of combustion in the upper portion of the fire-box and absorb heat therefrom, the outer portions of said tubes also absorbing heat from the products of combustion passing through the casing *h*. The partitions *c'* are protected by being formed upon the tubes *c*, the water in said tubes rapidly absorbing heat from said partitions, so that the partitions are not liable to be quickly burned out.

It will also be seen that the inner tube webs or partitions are interposed between the fire-box and the outlet *j*, so that the products of combustion are prevented from taking a direct course to the outlet and are caused to pass over large areas of heat-absorbing surface.

The inner wall of the chamber *a* is preferably corrugated, as shown in Figs. 2 and 3, the area of its heat-absorbing surface being thus increased.

The bottom surface of the dome *d* is preferably provided with ribs *d'* arranged in any suitable way, the radial arrangement shown in Fig. 4 being preferred. These ribs strengthen the dome and increase the heat-absorbing area of its under side.

When the apparatus is used for heating by the circulation of hot water, the dome *d* will be comparatively shallow, as shown in Figs. 1 and 2; but when the apparatus is used to generate steam the dome should be higher.

I claim—



1. An apparatus of the character specified, comprising a double-walled water chamber surrounding a fire-box, a plurality of vertical tubes extending upwardly from said chamber and partially surrounding the upper portion of the fire-box, two of said tubes being separated by a space which is wider than the spaces between the other tubes and constitutes a fuel-receiving opening at one side of the fire-box, a casing surrounding said tubes and provided with a door for said fuel opening, said casing being separated from the tube by a flue-space, inter-tube passages through which the products of combustion pass from the fire-box to said flue-space, an outlet communicating with said flue for the escape of the products of combustion, and inter-tube webs or partitions interposed between said outlet and the fire-box and co-operating with said inter-tube passages in preventing the products of combustion from passing directly from the fire-box to the outlet.

2. An apparatus of the character specified, comprising a double-walled water chamber surrounding a fire-box, a plurality of vertical tubes extending upwardly from said chamber and partially surrounding the upper portion of the fire-box, two of said tubes being separated by a space which is wider than the spaces between the other tubes and constitutes a fuel-receiving opening at one side of the fire-box, a casing surrounding said tubes and separated therefrom by a flue-space which receives the products of combustion through inter-tube spaces, an outlet communicating with said flue, inter-tube webs or partitions interposed between said outlet and the fire-box, a casing surrounding the fuel opening and separating it from said flue-space, and a door fitted to said casing.

3. An apparatus of the character specified,

comprising a double-walled water chamber surrounding a fire-box, a plurality of vertical tubes extending upwardly from said chamber and connected in a series by webs or partitions, said tubes and partitions partially surrounding the upper portion of the fire-box, the end tubes of the series being separated to form an opening, tubes within said opening separated from each other by a central fuel supply opening and from the end tubes of the series by side openings, a dome surmounting said tubes, and a casing surrounding the tubes and provided at one side with a door coinciding with the said central opening and at the opposite side with an outlet, the said casing and connected tubes forming a flue which communicates with the fire-box through said side openings and with the chimney through said outlet.

4. An apparatus of the character specified, comprising a double-walled water chamber surrounding a fire-box, a series of vertical tubes extending upwardly from said chamber and connected by webs or partitions extending across the spaces between the tubes, said tubes being interrupted by an opening at one side of the fire-box, a hollow dome above the said tubes, said dome having a series of heat-absorbing ribs or projections on its underside, and a casing co-operating with the tubes and partitions in forming a flue which conducts the products of combustion along the outer sides of said tubes.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of November, A. D. 1895.

JOHN ALBERT FISH.

Witnesses:

C. F. BROWN,

A. D. HARRISON.