

W. S. HAWLEY.

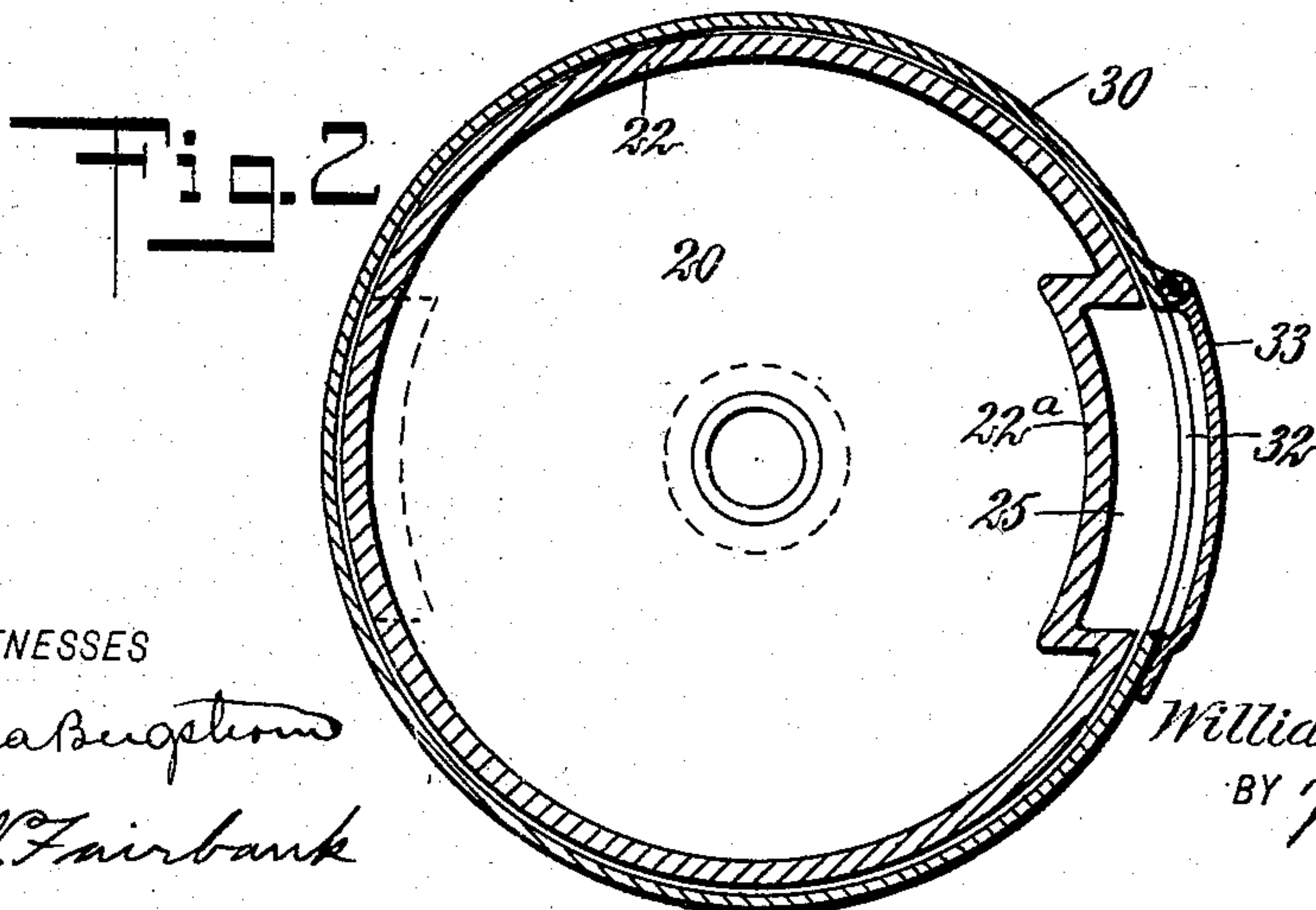
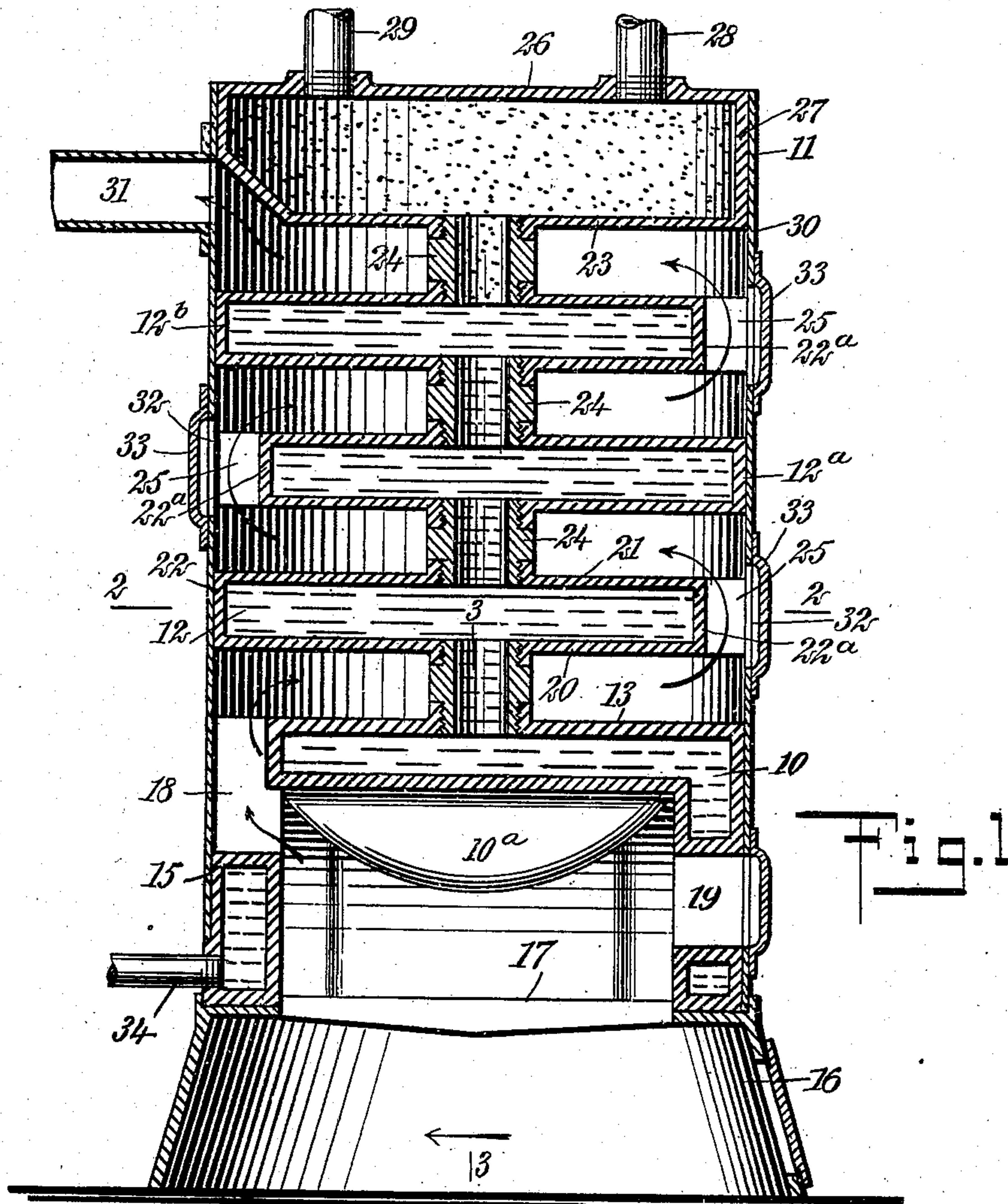
BOILER.

APPLICATION FILED JAN. 7, 1908.

899,299.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.



WITNESSES

*John A. Bugstone*  
*C. W. Fairbank*

INVENTOR

*William S. Hawley*

BY *Miner*

ATTORNEYS

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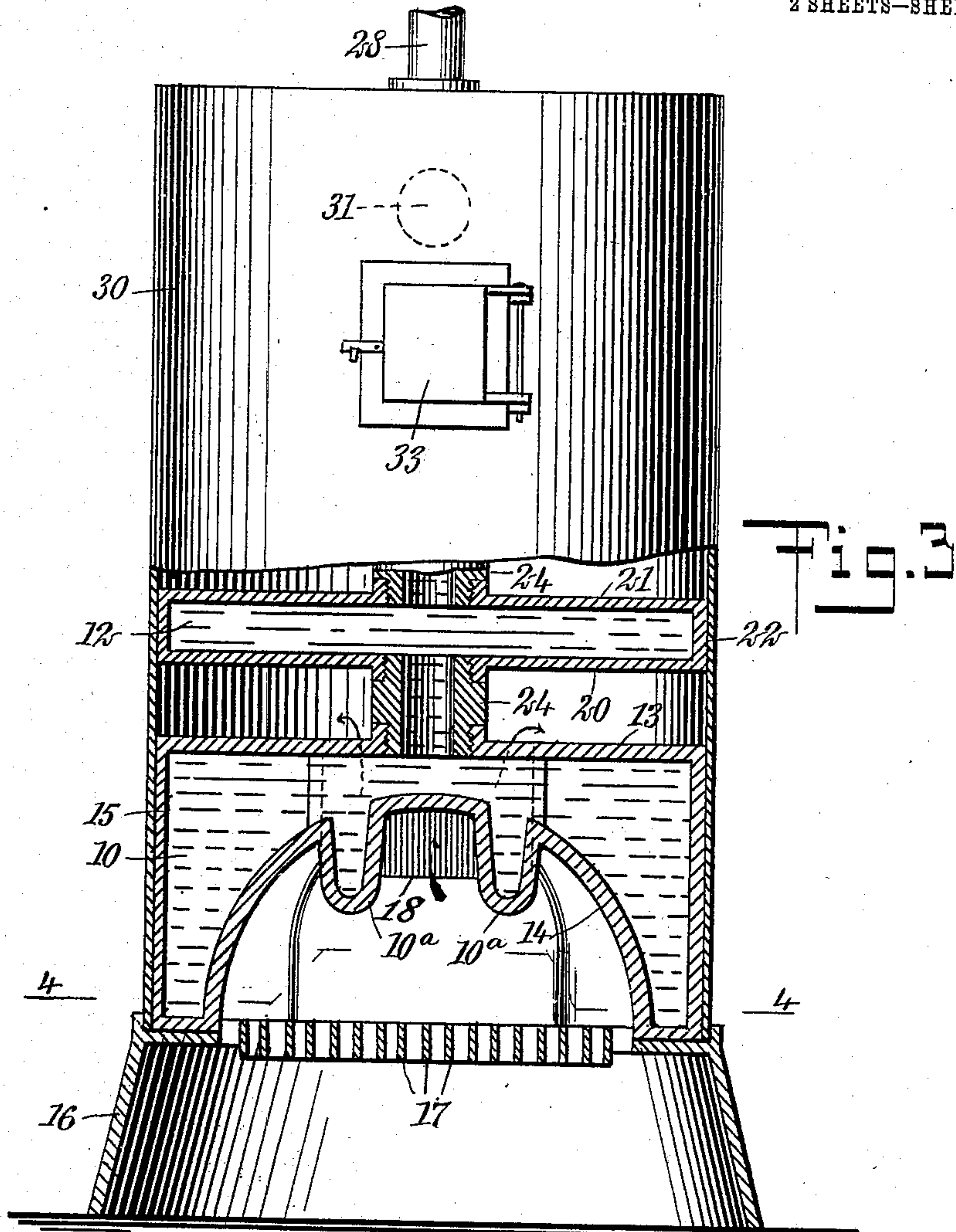
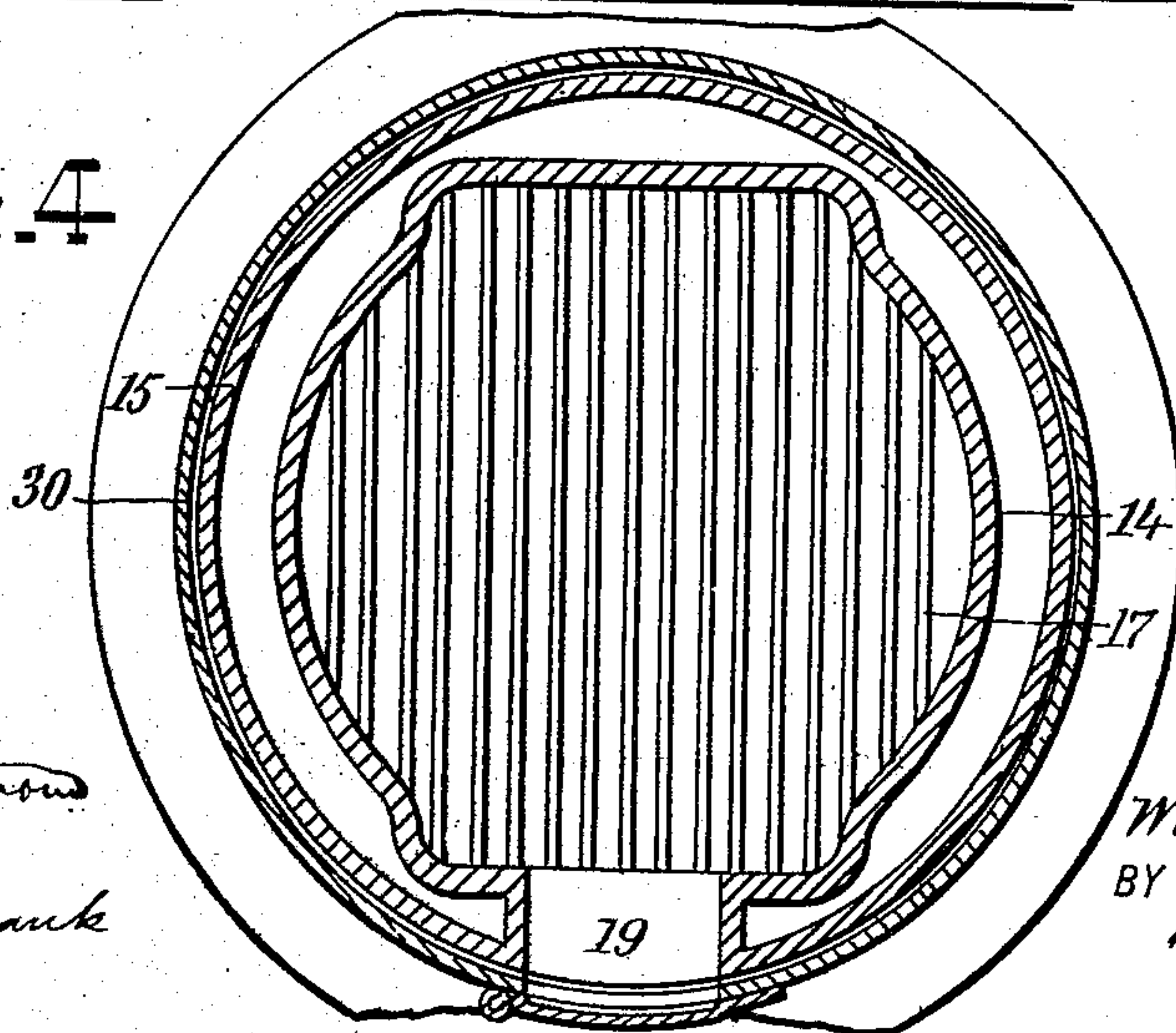


Fig. 4



WITNESSES  
*John A. Bergstrom*  
*C. M. Fairbank*

INVENTOR  
*William S. Hawley*  
BY *Mumme*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

WILLIAM SERVISS HAWLEY, OF LANDING, NEW JERSEY.

## BOILER.

No. 899,299.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed January 7, 1908. Serial No. 409,639.

*To all whom it may concern:*

Be it known that I, WILLIAM SERVISS HAWLEY, a citizen of the United States, and a resident of Landing, in the county of Morris and State of New Jersey, have invented a new and Improved Boiler, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in boilers, and more particularly to that type of boiler designed for use in heating water or generating steam for the heating system of houses.

Structurally, the invention relates to that type in which the water is contained in a plurality of superimposed communicating sections or chambers inclosed in a casing wall, the products of combustion being caused to pass back and forth between the sections to heat the same, and the objects of the invention are to provide certain improvements whereby the space between the sections may be more readily cleaned, the water in the lowermost section more effectively heated, and the series of sections more effectively supported.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures, and in which

Figure 1 is a vertical section through a boiler constructed in accordance with my invention; Fig. 2 is a transverse section on the line 2—2 of Fig. 1. Fig. 3 is a side elevation, a portion being shown in section on the line 3—3 of Fig. 1; and Fig. 4 is a transverse section on the line 4—4 of Fig. 3.

In my improved boiler, I employ a plurality of superimposed sections or chambers, the lowermost section 10 being designed to substantially inclose the grate, the uppermost section 11 being designed to constitute a steam dome, and the intermediate sections 12, 12<sup>a</sup> and 12<sup>b</sup> being connected in series and in open communication with both the upper and the lower sections. The lowermost section is provided with a substantially horizontal top wall 13, a hemispherical or dome-shaped lower wall 14, and a circumferential substantially vertical outer wall 15. The lower edge of the latter section rests upon the base 16 of the structure, and the grate-bars 17 are preferably in substantially a plane with the lower surface of the section. The section is provided with two passages 18 and 19 therethrough, one of said passages,

18, extending diagonally from the inner dome-shaped wall to the upper wall or top 13, and serving to permit the escape of the products of combustion, while the other passage, 19, extends substantially horizontally from the dome-shaped wall 14 to the circumferential wall 15 and serves for the admission of fuel.

For reinforcing and strengthening the dome-shaped wall and at the same time for directing the gases toward the escape passage 18 and for facilitating the heating of the water, the dome is preferably formed with two depending hollow flanges 10<sup>a</sup>, communicating at their upper ends with the water chamber of the section, and curved at their lower ends. The flanges extend transversely of the boiler upon opposite sides of the center and lead from adjacent the fuel inlet door 19 toward the gas escape passage 18. The curved lower edge of the flange serves as a truss, while the space between the flanges forms a transverse channel for the gases, and water within the flanges is exposed to heating action from opposite sides. Thus, in the lower section the water extends entirely over the fire chamber and down upon all sides thereof and also down into the fire chamber in the flanges. In the lower section, the water thus extends entirely over the fire chamber and down upon all sides thereof to the level of the grate, so that the largest possible amount of heat is absorbed from the fire by the water.

The sections 12, 12<sup>a</sup> and 12<sup>b</sup> are all substantially identical, and each is provided with a lower substantially horizontal wall 20, an upper substantially horizontal wall 21, and a circumferential wall 22, all of substantially the same diameter as the circumferential wall 15 of the lower section. Each of the sections 12, 12<sup>a</sup> and 12<sup>b</sup> is provided with a centrally-disposed threaded boss in both its upper and its lower wall, and the upper wall 13 of the lowermost section and the lower wall 23 of the uppermost or top section 11, are provided with threaded bosses in their upper and lower surfaces, respectively, and in alinement with those of the intermediate sections. A plurality of threaded nipples 24 are provided, each threaded into the apertures of the walls of adjacent sections, and these nipples serve to establish communication between each section and the next adjacent one, and also serve to support each section from the one below. Each of the in-



intermediate sections is provided with a passage 25 therethrough by means of which the spaces intermediate the several sections or chambers communicate with each other.

5 Each of these passages is preferably formed at the side of its section and is open at its outer side, the circumferential wall 22 of the section having a reëntrant portion 22<sup>a</sup> to leave a recess constituting the passage. In  
10 assembling the intermediate sections, they are so disposed that the passage of one section is located at the opposite side from the passage of the adjacent sections, whereby the space between the sections or chambers and  
15 the passages forms a zigzag conduit.

The uppermost section is provided with upper and lower walls 26 and 23, and a circumferential wall 27 in alinement with the circumferential walls 22 and 15. The walls  
20 of the upper section or chamber are provided with a suitable steam or water inlet 28 and a suitable steam or water outlet 29, whereby the heating medium may be continuously circulated to and from the boiler. The en-  
25 tire series of sections is inclosed in a casing 30, closely fitting the outer circumferential walls and forming with the spaces between the sections and the passages 25, a continuous zigzag conduit for the products of com-  
30 bustion rising from the fire chamber through the passage 18. Just below the upper chamber, the casing is provided with a suitable outlet conduit 31 leading to the chimney and serving to permit of an escape of said prod-  
35 ucts of combustion.

In order to clean the spaces intermediate the sections without disassembling the entire device, the casing is provided with a plurality of apertures 32 adjacent the several sections  
40 and of a height slightly greater than said sections, each aperture being preferably disposed adjacent a passage 25 and normally closed by a suitable door 33. Each aperture and its door or closure is so disposed that a  
45 cleaner may be inserted through the aperture both above and below the particular chamber adjacent the same, whereby all of the soot, or other accumulated material may be removed. For cleaning and draining the  
50 space within the chambers or sections, the lowermost section is preferably provided with a suitable outlet 34, through which the water may be drawn off.

The circumferential casing 30 is unat-  
55 tached to the sections, and may be readily removed without disturbing any of the sections or the connections between the same. Any desired number of sections may be employed, and the structure thus built up to  
60 any desired height. The lowermost section

or chamber incloses the fire box, so as to form a water jacket around its outer sides and prevent the direct loss of heat, and all chambers, save the top one, are subjected to the heat of the products of combustion upon both  
65 their upper and their lower sides.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In combination, a series of communicat- 70  
ing chambers arranged one above the other and adapted for the reception of the water to be heated, said chambers being so disposed as to leave a space between each pair of adja- 75  
cent chambers, passages connecting said spaces to form a zigzag conduit, the lower-  
most chamber having an upper wall, a substantially dome-shaped lower wall, and a vertical circumferential wall, and the space  
80 beneath said dome constituting a fire chamber, passages through said lowermost chamber to said fire chamber, and a casing inclosing said chambers.

2. In combination, a series of communicat- 85  
ing chambers arranged one above the other and adapted for the reception of the water to be heated, said chambers each having a recess in one side thereof constituting a passage, whereby the spaces between said chambers  
90 communicate with each other, the recesses in adjacent chambers being formed in correspondingly opposite sides, a metal casing inclosing said chambers and having openings adjacent each chamber, whereby the spaces  
95 intermediate the chambers may be cleaned, and means for closing said openings.

3. In combination, a series of communicat-  
ing chambers arranged one above the other and adapted for the reception of the water to be heated, said chambers each having a re- 100  
cess in one side thereof constituting a passage, whereby the spaces between said chambers communicate with each other, the recesses in adjacent chambers being formed in  
105 correspondingly opposite sides, a casing inclosing said chambers and having an opening adjacent each chamber, whereby the spaces intermediate the chambers may be cleaned, and means for closing said openings, said  
110 openings being disposed adjacent the recesses in said chambers and said casing being unattached to said chambers.

In testimony whereof I have signed my name to this specification in the presence two subscribing witnesses.

WILLIAM SERVISS HAWLEY.

Witnesses:

CLAIR W. FAIRBANK,  
EVERARD B. MARSHALL.