

No. 760,002.

PATENTED MAY 17, 1904.

R. S. LAWRENCE.
WATER HEATER.

APPLICATION FILED JULY 13, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 3.

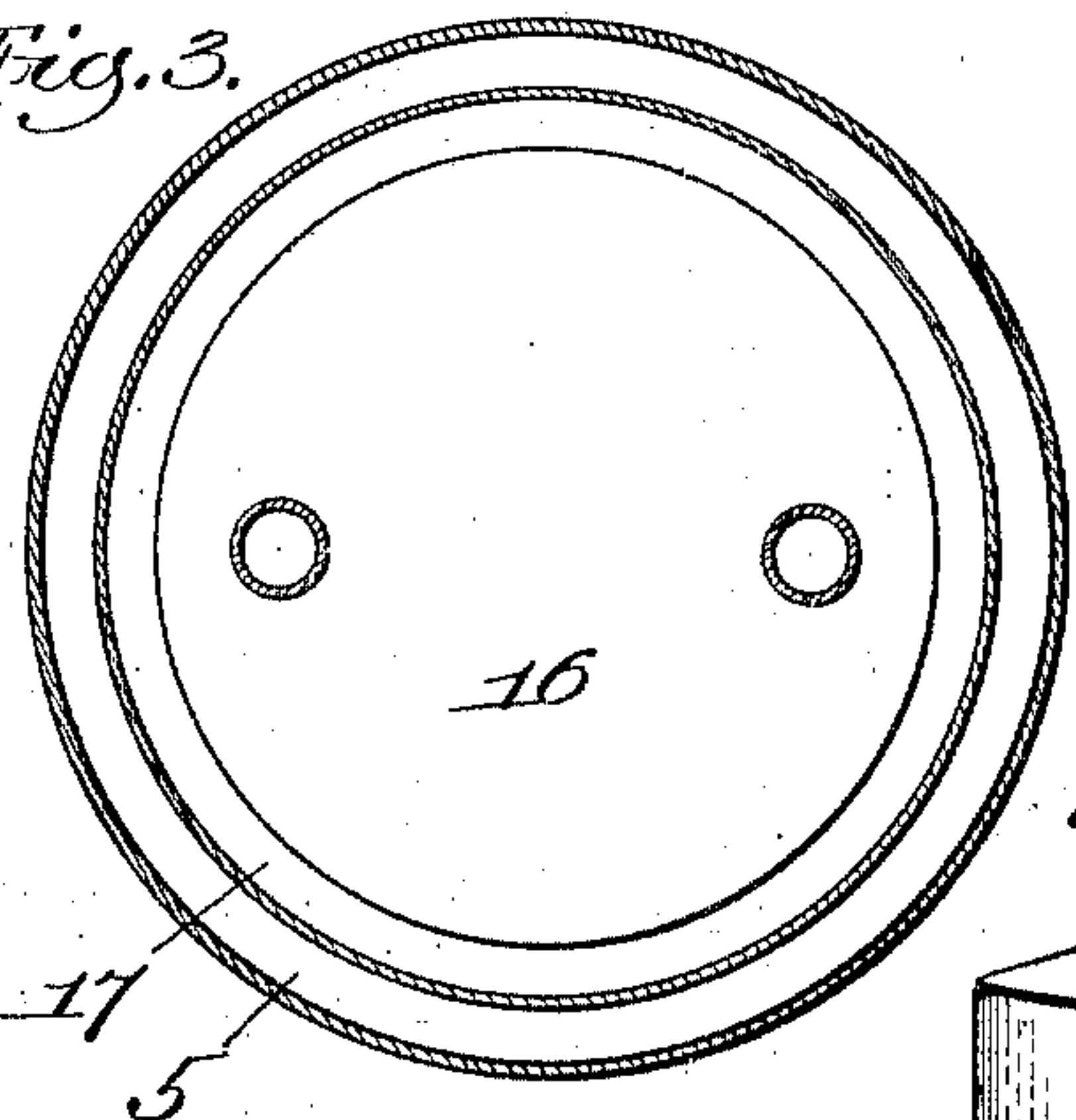


Fig. 1.

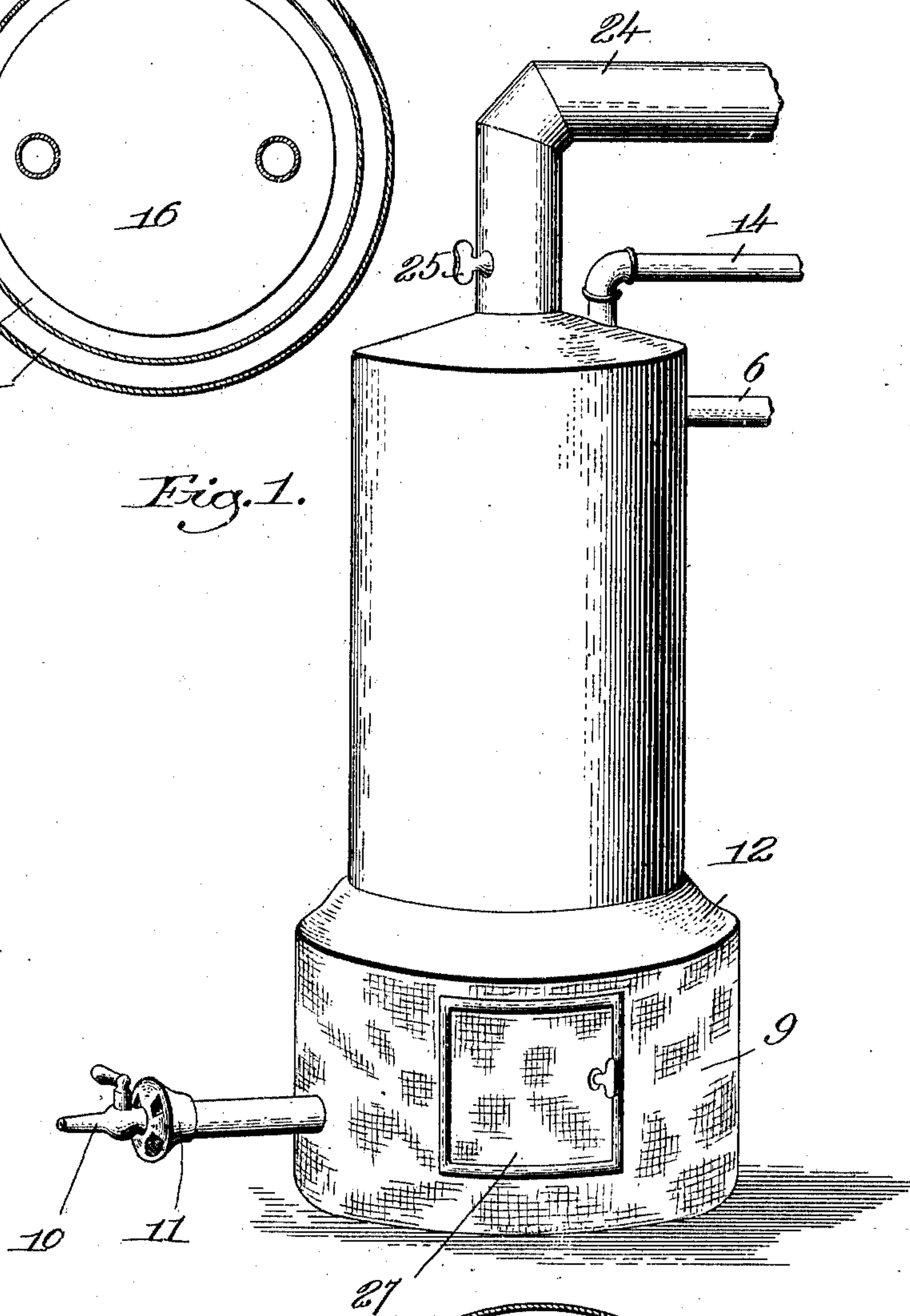
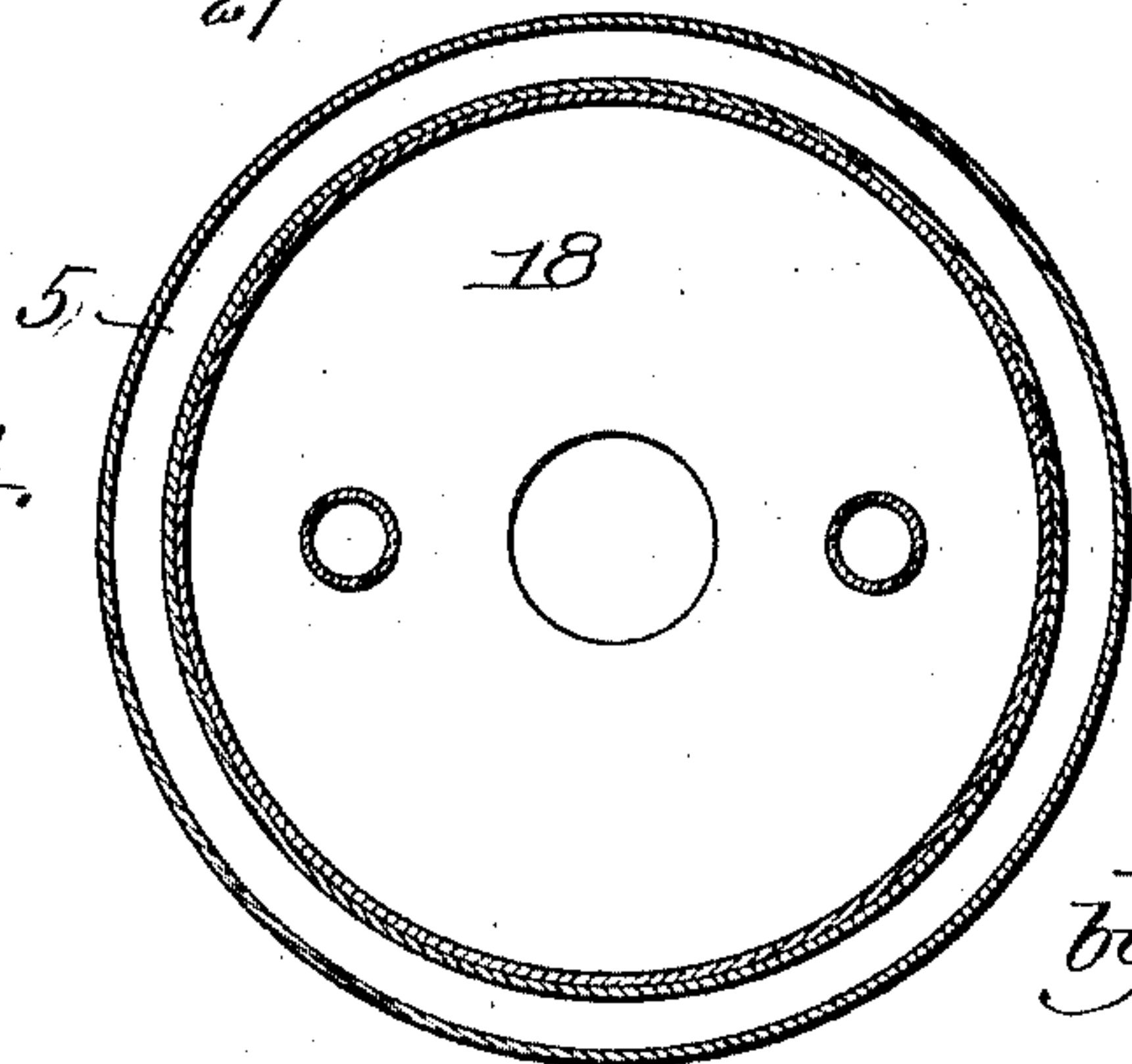


Fig. 4.



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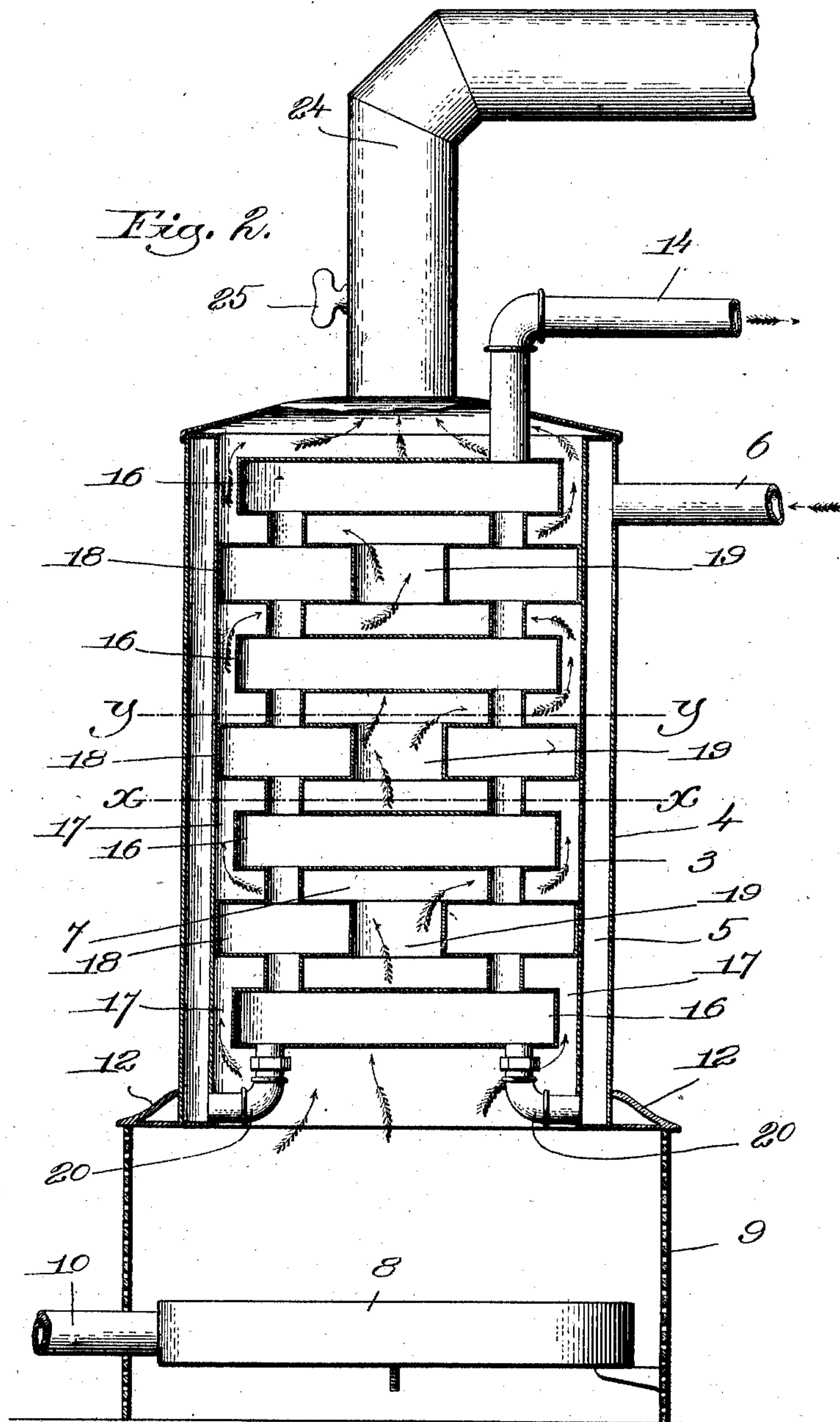
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R. S. LAWRENCE.
WATER HEATER.

APPLICATION FILED JULY 13, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

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WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 760,002, dated May 17, 1904.

Application filed July 13, 1903. Serial No. 165,232. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. LAWRENCE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Water-Heaters, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention has for its object to provide a novel apparatus for heating water which is simple and inexpensive to manufacture, effective in operation, and of such a construction that it can be employed in any place where there is running water and it is desired to heat the water.

The device comprises some suitable heat-producing agency—such, for instance, as a gas or oil burner—and a heating-chamber into which the heat generated by the heat-producing agency is delivered. Inside of the heating-chamber are a plurality of independent connected water-chambers so arranged that in passing through the heated chamber the heated products of combustion have to assume a zigzag or sinuous course around said chambers. Surrounding the heating-chamber is a water-jacket which is connected with a water-supply in some suitable way and also is connected to one of the heating-chambers of the series. When the water is turned on, it enters first the water-jacket and becomes partially heated and from there passes into the various heating-chambers in succession and is finally discharged from the last chamber of the series.

In the drawings, Figure 1 is a perspective view of one form of my improved heater. Fig. 2 is a vertical sectional view of the heater. Fig. 3 is a section on the line *x x*, Fig. 2; and Fig. 4 is a section on the line *y y*, Fig. 2.

The device comprises an inner shell 3 and an outer shell 4, forming between them a water chamber or jacket 5, which is connected, preferably, at its upper end to a suitable pipe 6. The interior of the inner shell 3 forms a heating-chamber 7, which in this embodiment of my invention is situated above a heat-pro-

ducing agency, such as a burner 8 of any suitable construction for oil or gas. I have herein shown the said burner as supported in a suitable casing 9, the walls of which are preferably perforated, so as to allow sufficient air to enter to properly support combustion. This burner is supplied with gas or vaporized oil through a suitable pipe 10, which has any usual or suitable air-mixing device 11 connected thereto. The inner and outer shells 3 and 4 are suitably connected together at top and bottom, so as to close the ends of the chamber or jacket 5, and said shell structure has the flange 12, which rests on the casing 9.

In the interior of the shell 3 are a plurality of connected drums, through which the water passes successively during its flow from the inlet 6 to the outlet-pipe 14. As herein illustrated, these drums are each substantially circular in horizontal cross-section, as shown in Figs. 3 and 4, and certain of the drums are smaller in diameter than the interior diameter of the shell 3, so as to leave an annular raceway around the drum, while other drums are of a size to completely fill the inner chamber and have extending through them flues or openings for the passage of the heated products of combustion. In this embodiment of my invention the drums 16 are the smaller-sized drums and are so placed in the heating-chamber 7 as to leave the annular passage-ways 17 around them, while the drums 18 are the larger-sized drums and completely fill the inner shell 3. These larger drums have the opening or flue 19 therethrough for the passage of the products of combustion. The lower drum of the series is connected by suitable connections 20 with the lower portion of the water-jacket, and the upper drum has the discharge-pipe 14 connected thereto. The adjacent drums of the series are connected in any suitable way so that the water may pass through the drums successively.

24 designates a suitable smoke-pipe, through which the products of combustion are finally exhausted from the heating-chamber 7. This pipe may be provided with any usual damper 25 to control the draft.

The operation of the device is as follows: When the burner is lighted, the heated products of combustion pass upwardly through the heating-chamber 7 in the zigzag manner indicated by the arrows—that is, first around the lower drum 16 and then up through the flue 19 in the next drum 18 and then around the second drum 16, &c. The hot gases are therefore considerably retarded in their progress and are continually being brought against some heating-surface, for it will be seen as they strike the bottom of the lower drum 16 they are deflected first against the inner shell 3 and give up some of their heat units to the water in the chamber 5 and then meet the second drum 19 and are compelled to pass around the inner wall of said drum during their passage through the flues 19. Upon meeting the second smaller drum 16 they are again deflected against the side of the heating-chamber, as above described, this operation being repeated until they finally escape through the smoke-pipe 34. The water on entering the inlet-pipe 6 first fills the water-jacket and is partially heated therein and gradually flows from one drum to the other and finally is discharged through the discharge-pipe 14. It will be seen that with my arrangement of drums and water-jacket I have provided a maximum area of heated surface, with the result that with my device water can be heated sufficiently for a bath or other purposes in a very short time and with the expenditure of a minimum amount of fuel.

The casing 19 is preferably provided with a suitable door 27, which gives access to the combustion-chamber for the purpose of lighting the burner.

While I have herein shown one form which my invention may assume, I do not wish to be limited in all details of construction to the precise form shown, as various changes will readily suggest themselves to those skilled in the art which can be made without departing from the invention.

While I have herein shown the heating-chamber as being substantially circular in horizontal cross-section and the drums or water-chambers as having a similar shape, I wish it understood that the particular cross-sectional shape given to the heating-chamber is not essential, as the same might be polygonal or have any appropriate cross-sectional shape without departing from the invention.

In case the chamber were polygonal in cross-section the drums in the chamber would of course have the proper shape and disposition to cause the products of combustion to take a sinuous or zigzag course in their passage through the chamber.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a water-heater, an inner and an outer shell connected together at both the top and the bottom and forming between them a water-chamber, said inner shell having an open bottom, a burner beneath said open bottom, a series of drums entirely inclosed within said inner shell, each drum being connected directly to the one next above it, the alternate drums each extending entirely across the inner shell, and each having a central opening therethrough, the remaining drums being smaller than the inner shell whereby an annular space exists between said drums and shell, connections within the inner shell between the bottom of the lower drum of the series and the lower end of the water-jacket, means to admit water to be heated to the upper portion of said jacket, and having an outlet for the water from the upper drum.

2. In a device of the class described, two concentric shells of the same height forming between them a water-chamber, a burner-chamber beneath said shells and communicating with the inner shell, a burner in said burner-chamber, a series of drums in the inner shell connected together successively, the lower drum being situated above the bottom of the water-chamber, and the alternate drums each extending entirely across the shell and having a central opening therethrough for the passage of the products of combustion, and each of the remaining drums being smaller than the inner shell to leave an annular space between it and the said shell, pipes located within the inner shell and connecting the lower drum of the series to the lower end of the water-jacket, and means to admit water to be heated to the upper portion of said jacket.

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

ROBERT S. LAWRENCE.

Witnesses:

LOUIS C. SMITH,
NATHAN HEARD.