

(No Model.)

4 Sheets—Sheet 1.

E. GURNEY.  
STEAM OR HOT WATER BOILER.

No. 528,325.

Patented Oct. 30, 1894.

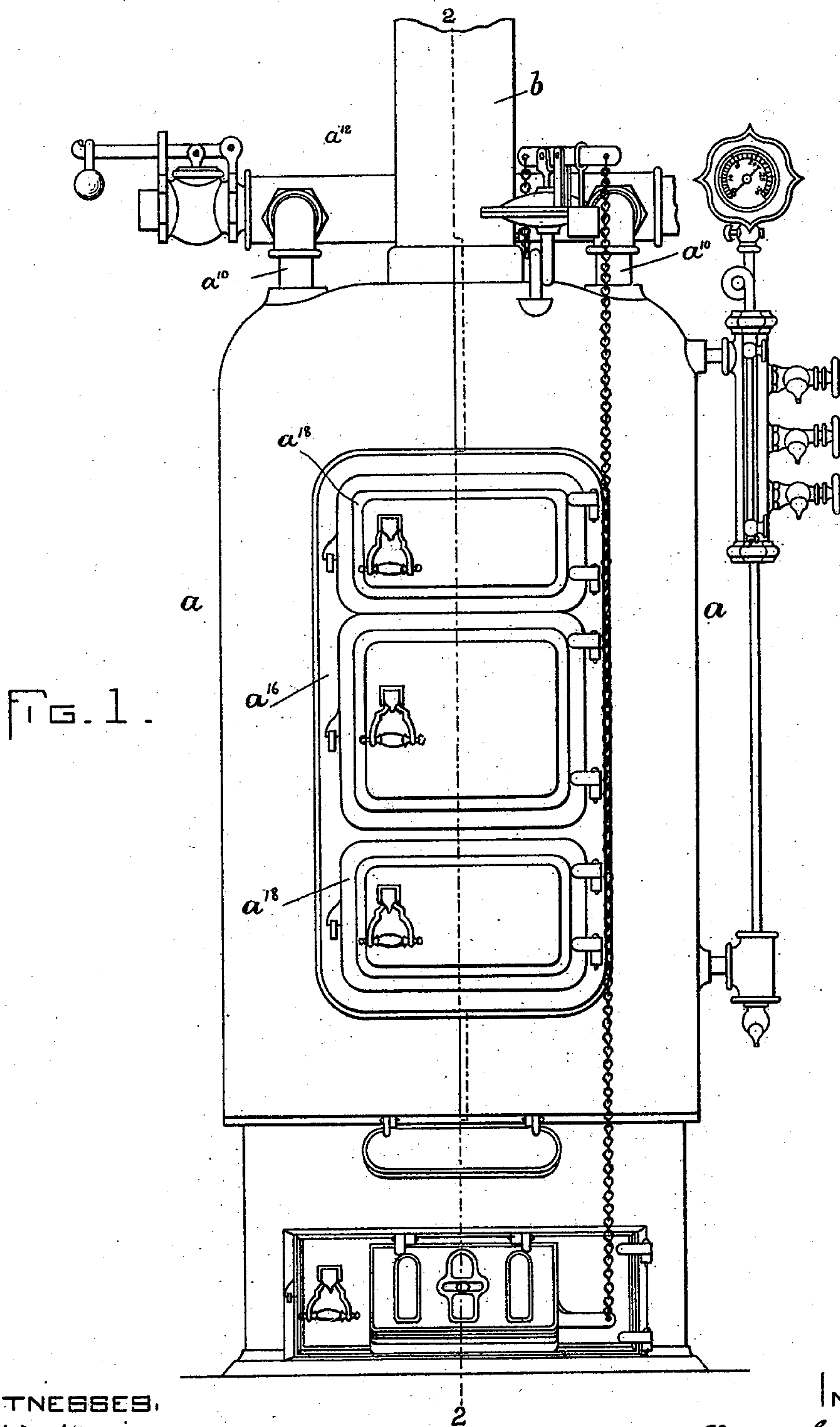


FIG. 1.

WITNESSES.

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W. H. M. Lead.

INVENTOR.

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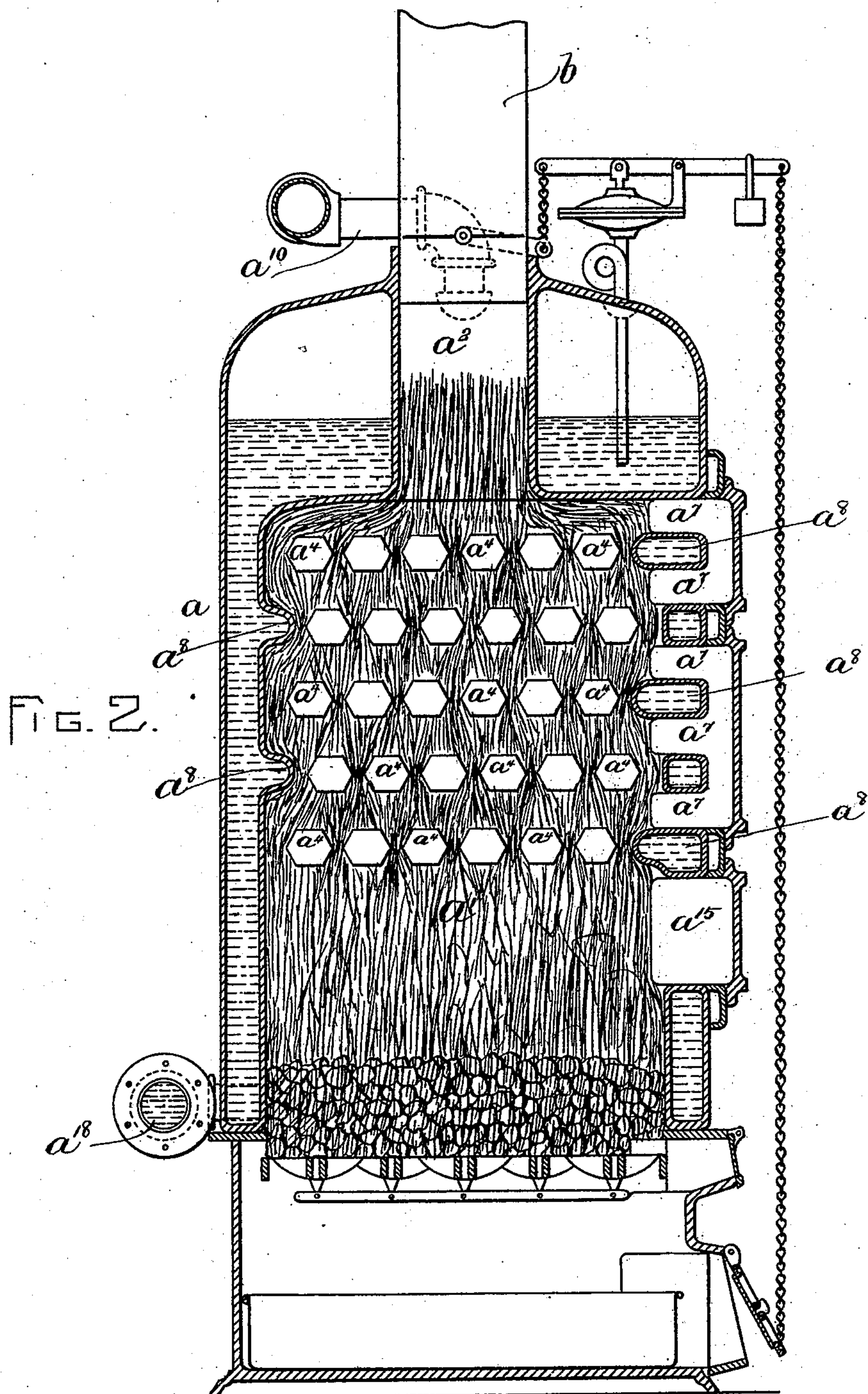
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E. GURNEY.  
STEAM OR HOT WATER BOILER.

No. 528,325.

Patented Oct. 30, 1894.



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(No Model.)

4 Sheets—Sheet 3.

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FIG. 3.

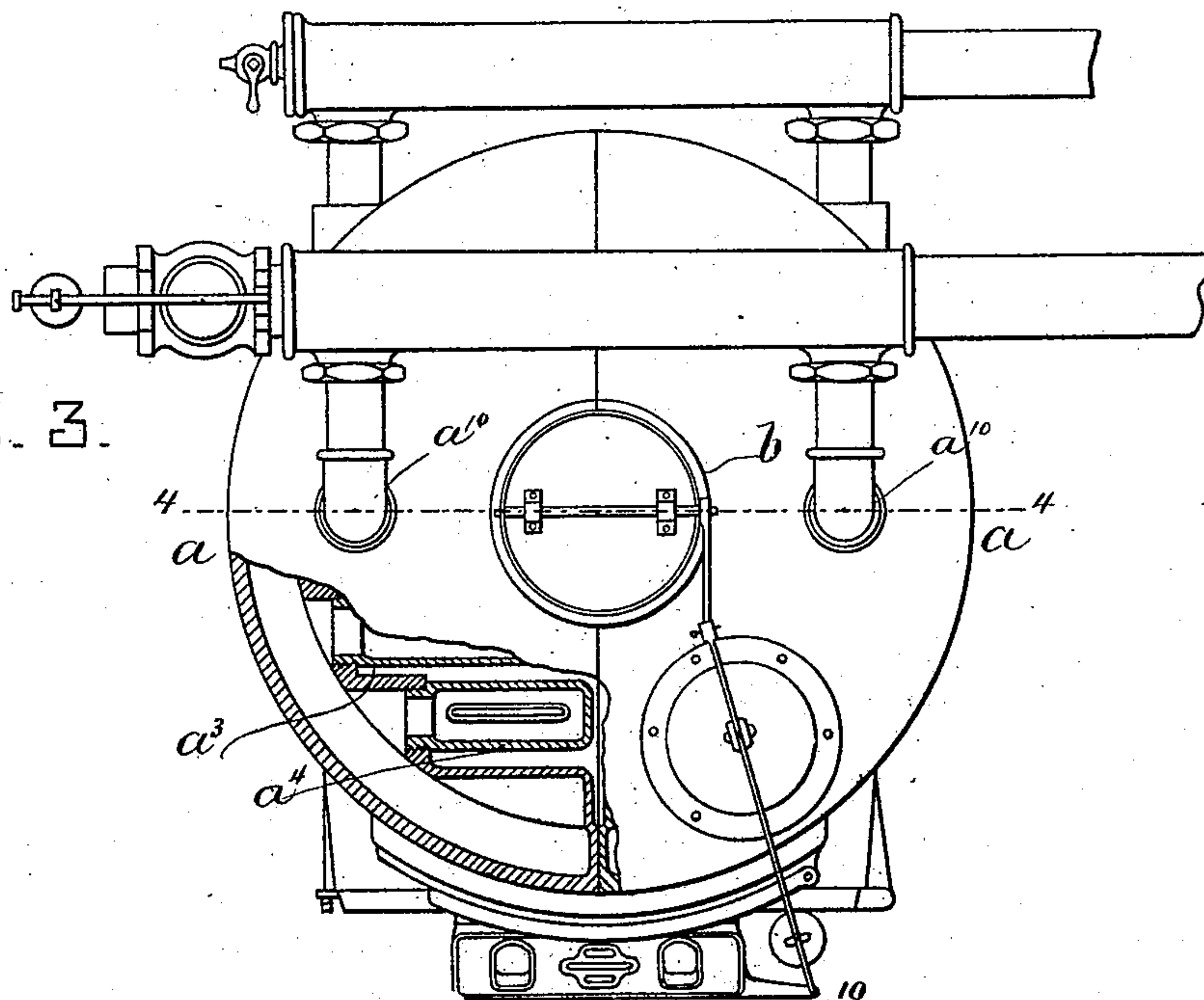
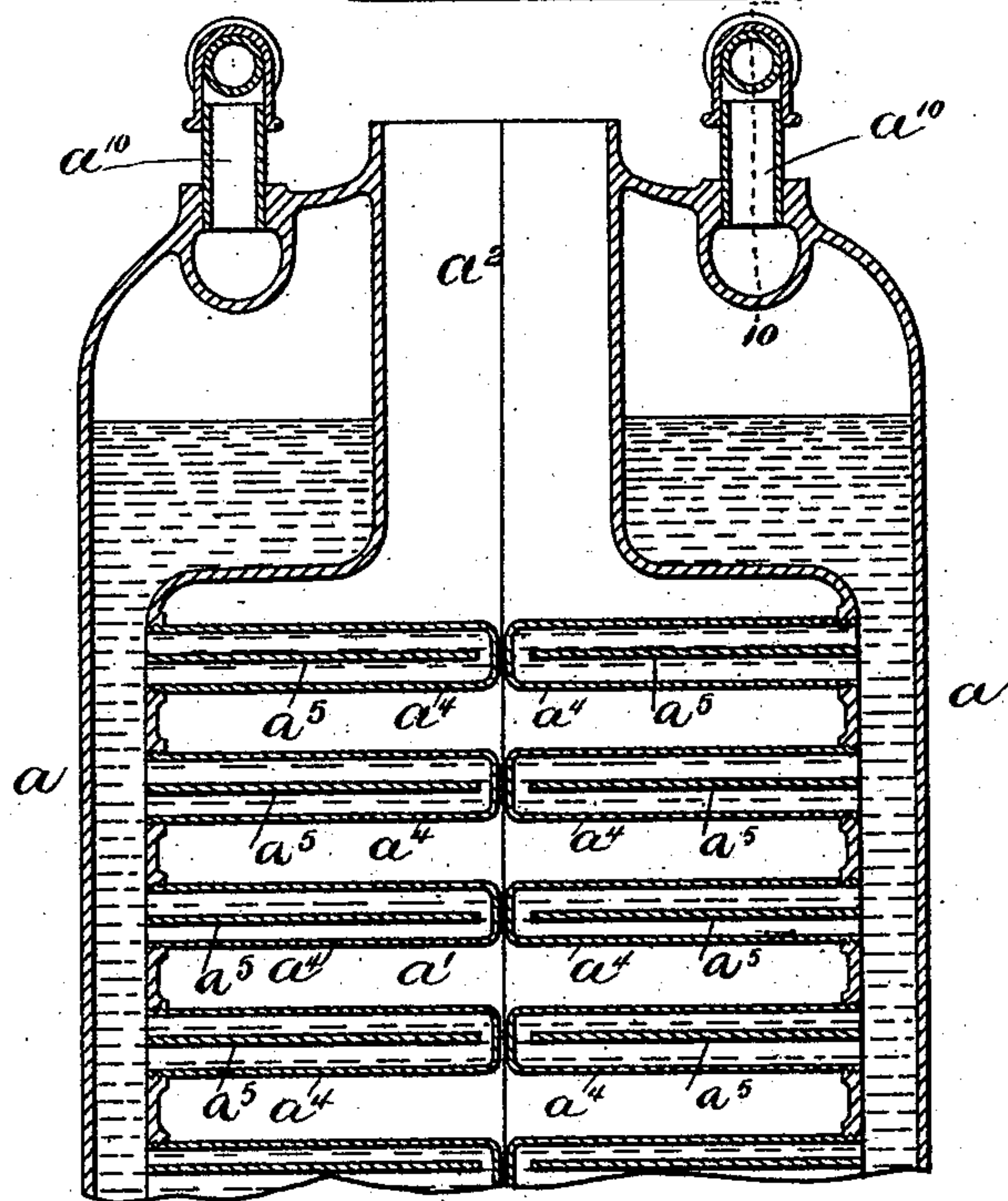


FIG. 4.



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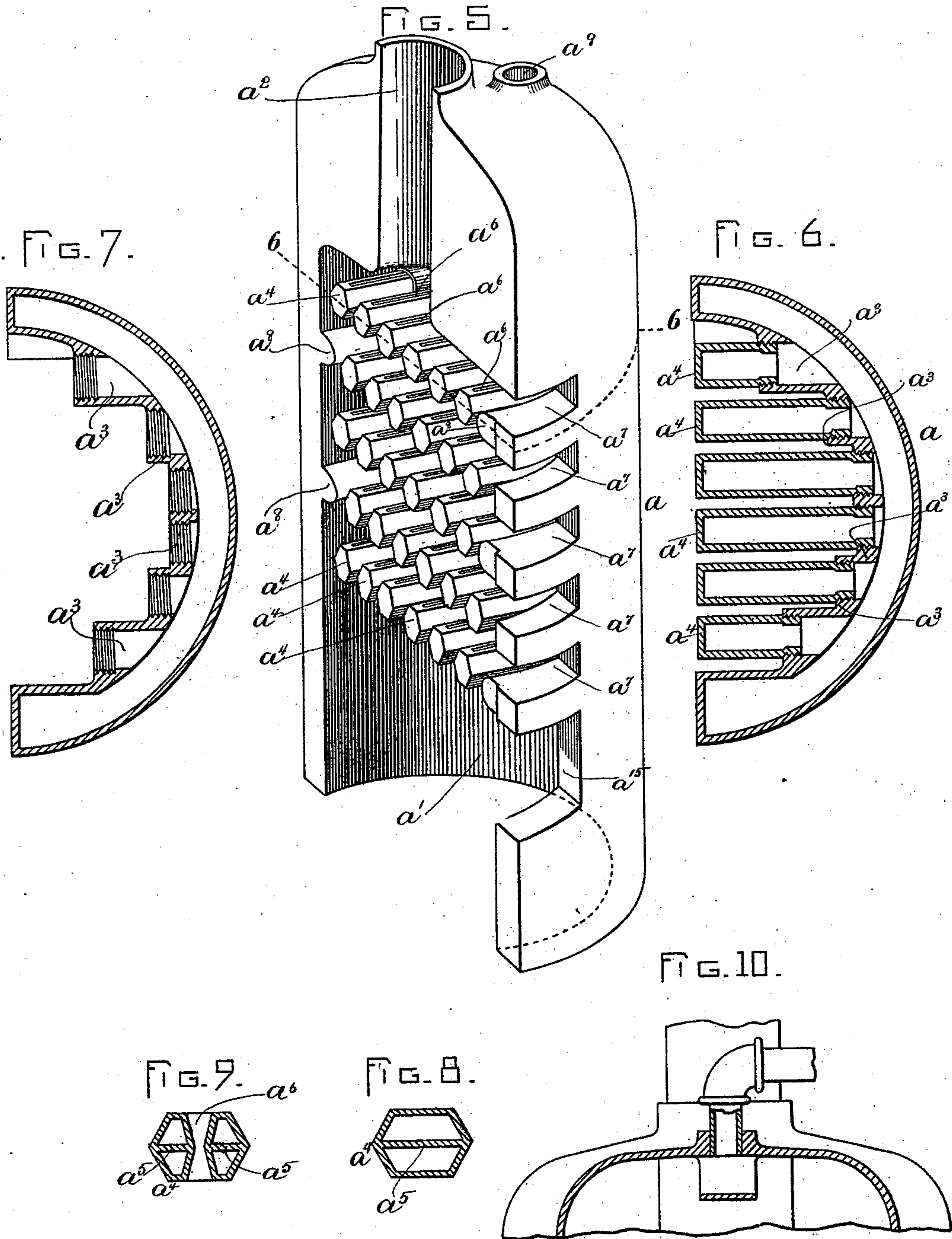
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E. GURNEY.  
STEAM OR HOT WATER BOILER.

No. 528,325.

Patented Oct. 30, 1894.



WITNESSES:

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

EDWARD GURNEY, OF TORONTO, CANADA.

## STEAM OR HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 528,325, dated October 30, 1894.

Application filed October 24, 1893. Serial No. 489,002. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD GURNEY, a subject of the Queen of Great Britain, and a resident of Toronto, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Steam or Hot-Water Boilers, of which the following is a specification.

This invention relates to boilers or heaters, principally for heating purposes, and mainly for steam heating, although the invention may be applied to systems of hot water heating.

In using the term "boiler" throughout this specification, it will be understood that I refer to a receptacle in which water is to be heated, either for steam heating or heating by the circulation of hot water.

The invention has for its object to provide a boiler of simple construction, which shall present a large area of heat-absorbing surface in contact with the water to be heated; which shall be capable of being readily cleaned; and in which the heat developed by the combustion of the fuel shall be utilized to an economical extent.

To these ends, the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification: Figure 1 represents a front elevation of a boiler embodying my invention. Fig. 2 represents a section on line 2—2 of Fig. 1. Fig. 3 represents a top plan view. Fig. 4 represents a section on line 4—4 of Fig. 3. Fig. 5 represents a perspective view of one of the sections of the boiler. Fig. 6 represents a section on line 6—6 of Fig. 5. Fig. 7 represents a section similar to Fig. 6, the tubes or loops being removed. Figs. 8 and 9 represent transverse sections of one of the tubes or loops, showing different forms in which the same may be constructed. Fig. 10 represents a section on line 10—10 of Fig. 4.

The same letters of reference indicate the same parts in all the figures.

In carrying out my invention, I construct a boiler of two sections  $a$ , each having the general construction shown particularly in Figs. 5, 6 and 7. The inner side or wall of each section is recessed from its lower end

considerably more than half-way to its upper end, to form the enlarged chamber  $a'$ , the lower portion of which constitutes the fire-space, and the upper portion the combustion-chamber in which the tubes or loops hereinafter referred to are located. Said inner wall is also recessed at its upper portion, to form an outlet-passage  $a^2$ , with which the stack or funnel  $b$  is connected.

It will be seen by reference to Figs. 4 and 5, that each section comprises a half-dome, and a half water-leg extending downwardly from said half-dome. It will also be seen that the two sections have reciprocal bearing-faces or seats, the seats of each section bearing upon those of the other; so that, when the sections are assembled, a structure is formed, which comprises a dome made in two parts and provided with a central outlet-passage  $a^2$  for the products of combustion, and a water-leg extending downwardly from the dome and inclosing a space for the fire and the tubes or loops hereinafter referred to, which are located above the fire-space and are acted upon by the ascending products of combustion, as indicated in Fig. 2.

Each section has formed upon its inner wall a number of inwardly-projecting nipples or sockets  $a^3$ , best shown in Fig. 7, said nipples being internally screw-threaded. Into said nipples are screwed the inner ends of tubes or loops  $a^4$ , there being a considerable number of said tubes, as shown in Figs. 2 and 5. Each tube is open at its inner end and closed at its outer end, and communicates with the water-leg.

I prefer to place a diaphragm  $a^5$  in each tube, said diaphragm extending from the inner end of the tube partly to its outer end, and being arranged so that water from the water-leg will flow along the under side of the diaphragm to the outer end of the loop, and then back to the water-leg along the upper side of the diaphragm.

Each loop may be provided with a central vertical flue  $a^6$ , as shown in Fig. 9, the loop being thus subdivided into two parts, lying side by side, each having a diaphragm  $a^5$ .

The tubes are arranged in horizontal rows, as shown in Figs. 2 and 5, and the sections are provided with clean-out openings  $a^7$ , which coincide with the spaces between the hori-



zontal rows of tubes, so that the tubes can be readily cleaned from the front of the boiler.

It will be seen that the tubes are located above the fire-space of the boiler, and that the tubes in each row are separated by spaces, the spaces in one row alternating with the tubes of the next row, so that the tubes act as baffle-plates to cause the products of combustion to take a tortuous course in passing upwardly.

The sections  $a a$  are provided with enlargements  $a^8$ , which coincide with the rows of tubes, and form contracted spaces between the tubes at the ends of the rows and the water-leg, so that uniformity of said spaces is secured across the boiler.

The upper portions of the half-domes are provided with openings  $a^9$ , which are connected by suitable connections  $a^{10} a^{10}$  with a horizontal steam-receiving header  $a^{12}$ , through which steam passes from the dome to the radiators. The lower portions of the half water-legs have suitable openings, which are connected by pipes  $a^{13} a^{13}$  with a horizontal header  $a^{14}$ , which receives the return-water from the radiators.

It will be seen that the headers  $a^{12}$  and  $a^{14}$  extend across the joints between the sections  $a a$ , and therefore serve to hold the sections in contact with each other.

The clean-out openings  $a^7$  above referred to are formed partly in one section, and partly in the other, and below said openings are door-ways  $a^{15}$ , each section having a half doorway, the arrangement being such that, when the sections are assembled, the openings  $a^7$  and  $a^{15}$  will coincide.

$a^{16}$  represents a door-frame, which is attached to the sections, and extends across the joint between the sections, and is provided with suitable doors  $a^{18}$  covering said openings. The door-frame therefore serves to additionally secure the sections  $a a$  together.

It will be seen that the sections, constructed as above described, present large areas of heating surface, are readily cleaned, and constitute a very simple and effective boiler.

I do not limit myself to the particular form of the sections and of the loops or tubes here shown, and may vary the same within such limits as may be dictated by skill and judgment, without departing from the spirit of the invention. For example, the outlet passages  $a^2$  may be dispensed with, and the outlet made from the upper portion of the chamber

$a'$  through the water-leg, instead of through the dome, although I prefer the construction shown.

I claim—

1. A boiler, composed of two independent sections having at their inner sides reciprocal seats or bearing-surfaces, each section comprising a dome portion and a water-leg portion, the latter having inwardly-projecting nipples on its inner wall and horizontal loops or tubes engaged with said nipples and projecting into the space inclosed by the water-leg, the ends or bearing surfaces of the sections and their loops or tubes being in a uniform vertical plane and adapted to abut, and the said tubes being in rows with the tubes of one row above the spaces between the tubes of the next row, as set forth.

2. A boiler, composed of two independent sections, each including a half-dome, a half water-leg below the dome, and horizontal rows of inwardly-projecting loops or tubes separated by spaces which alternate in each row with the tubes of the next row, whereby the tubes are caused to act as baffle-plates, the water-leg having enlargements in line with the rows of tubes, said enlargements reducing the width of the spaces between the water-leg and the end tubes, and the ends of all the tubes being flush with or in the same vertical plane as the meeting surfaces of the two half-domes and water-legs and adapted to abut, as set forth.

3. A boiler composed of two independent sections formed to bear on each other and each comprising a dome-portion and a water-leg portion, and horizontal loops or tubes engaged with the inner walls of the water-leg portion and projecting into the fire space inclosed thereby, each loop having a direct connection with said water-leg and provided with an internal partition extending nearly to its end, whereby water from the water-leg will be caused to flow along the lower portion of the tube in the fire space and back through the upper portion of the tube to the water-leg, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 14th day of October, A. D. 1893.

EDWARD GURNEY.

Witnesses:

GEORGE BELL,  
DAVID HENDERSON.