

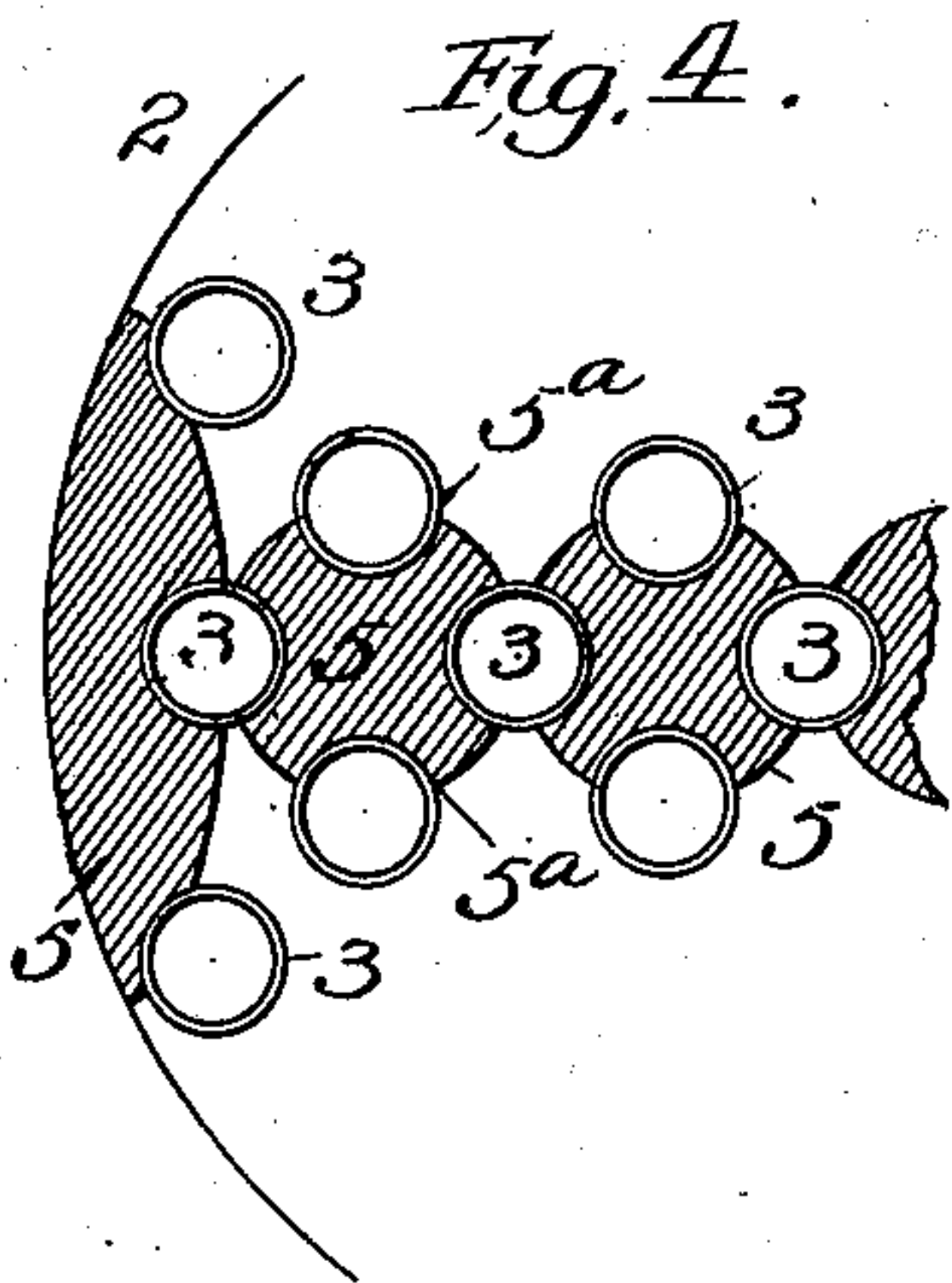
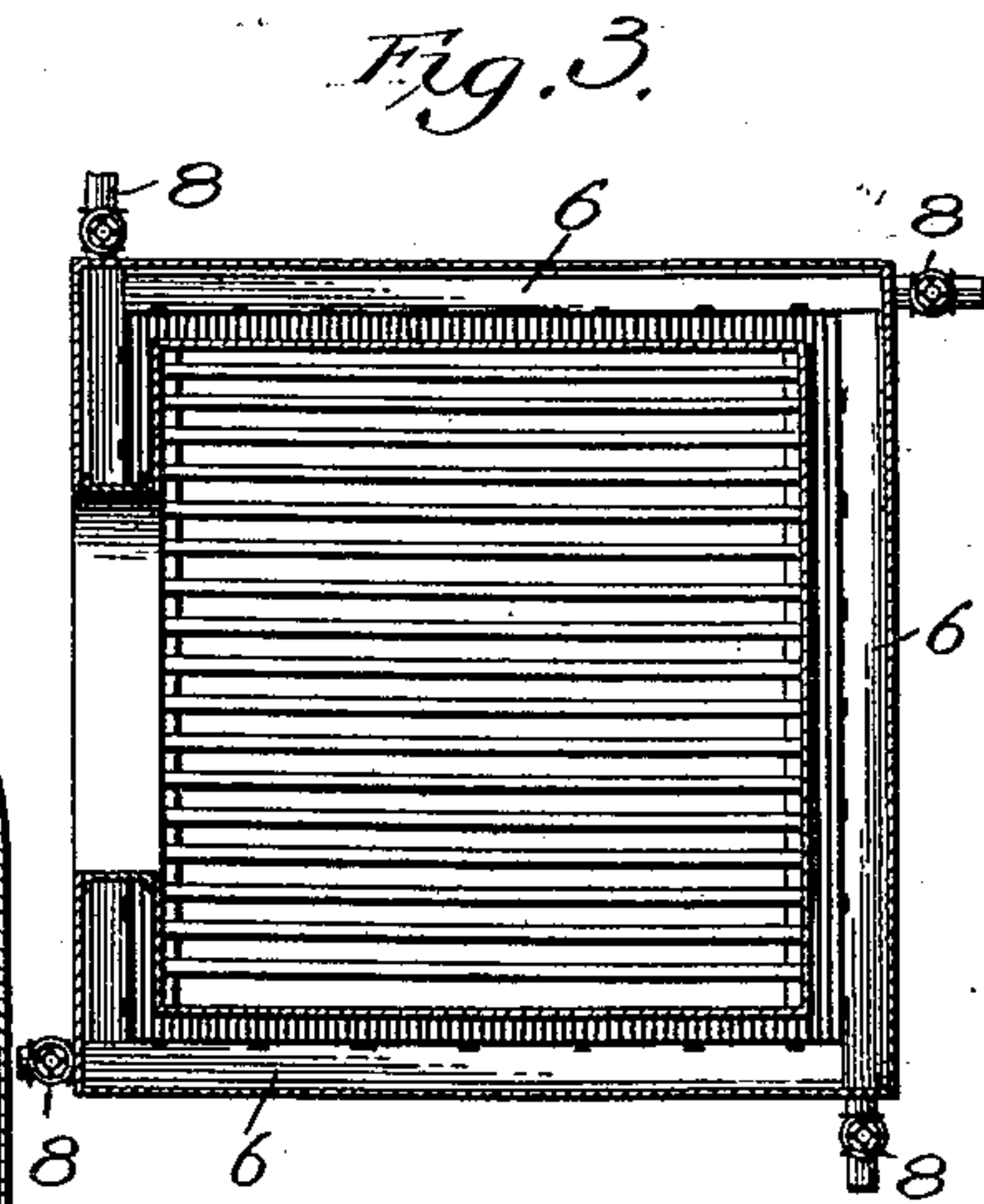
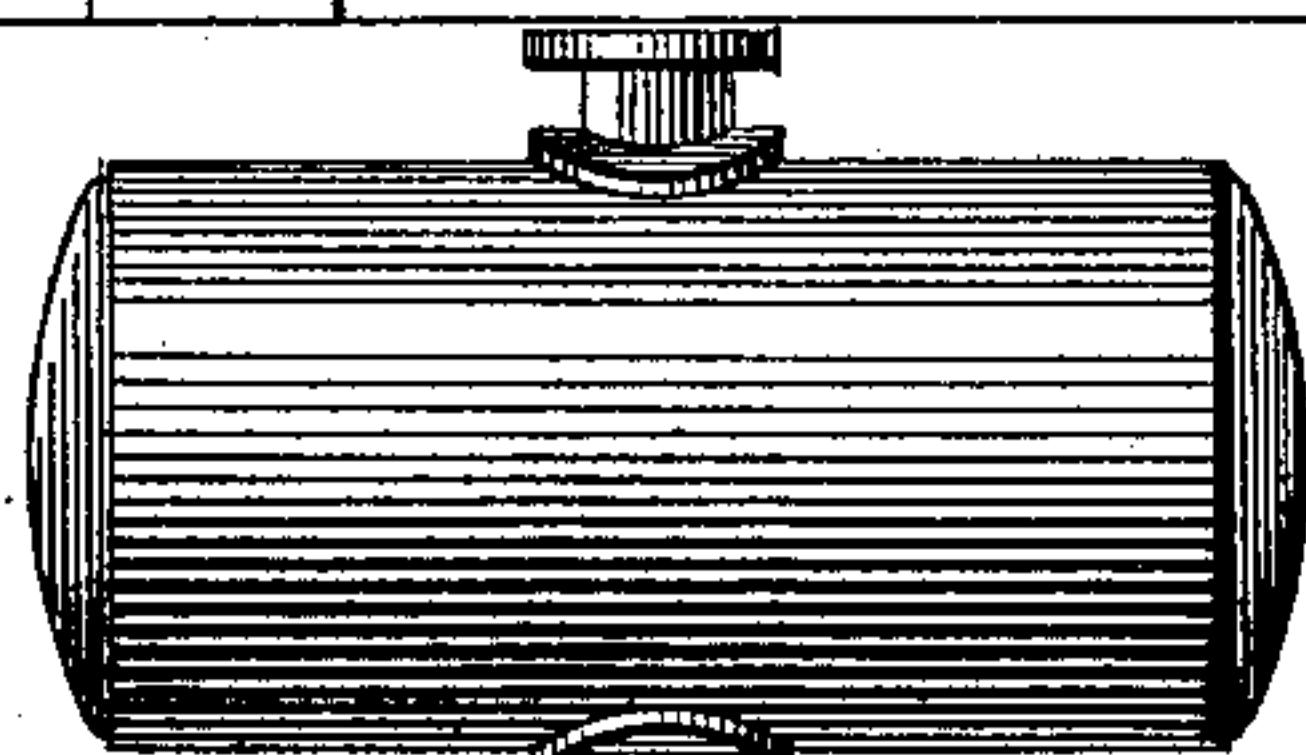
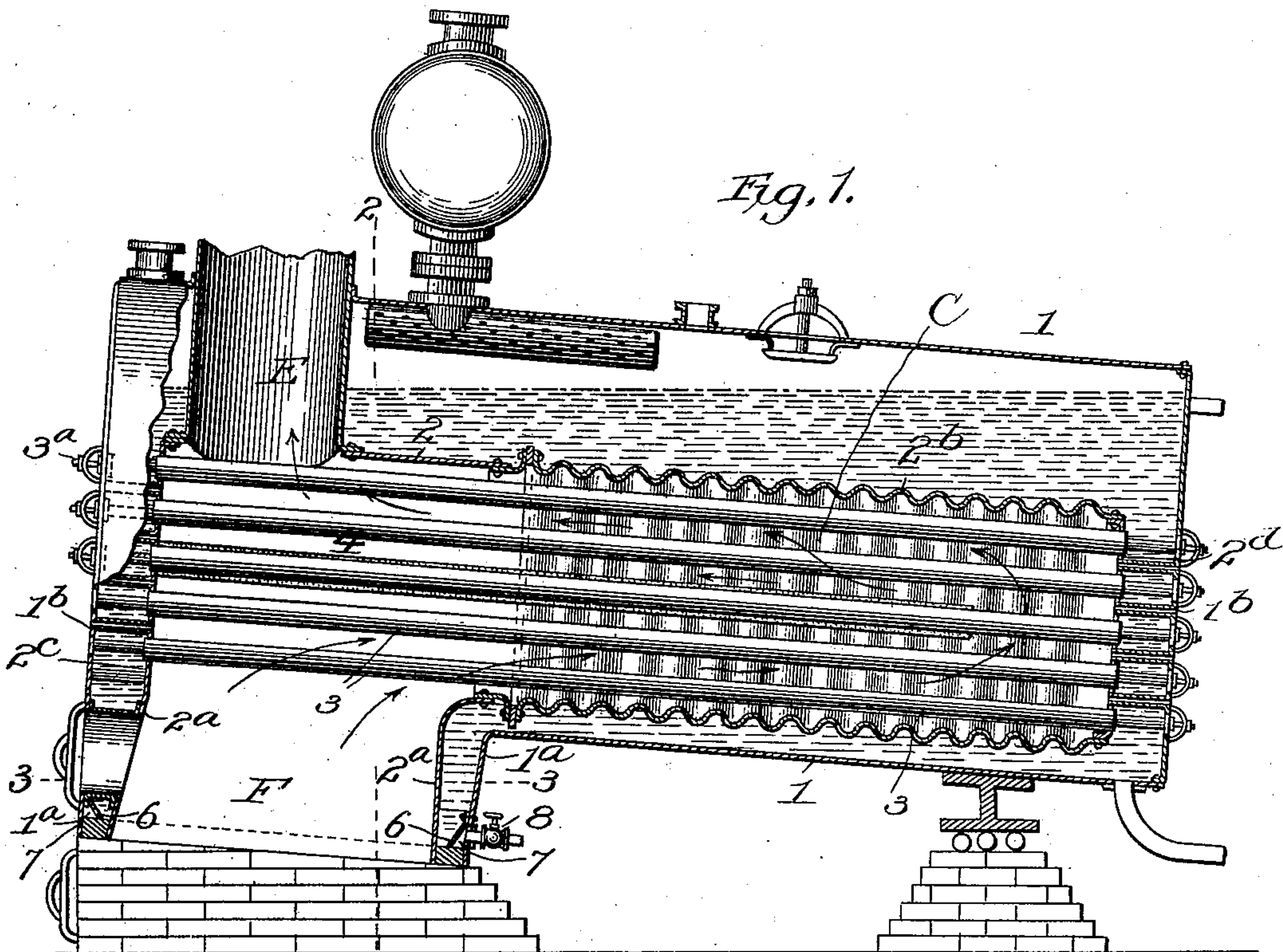
(No Model.)

2 Sheets—Sheet 1.

J. J. TONKIN.
STEAM BOILER.

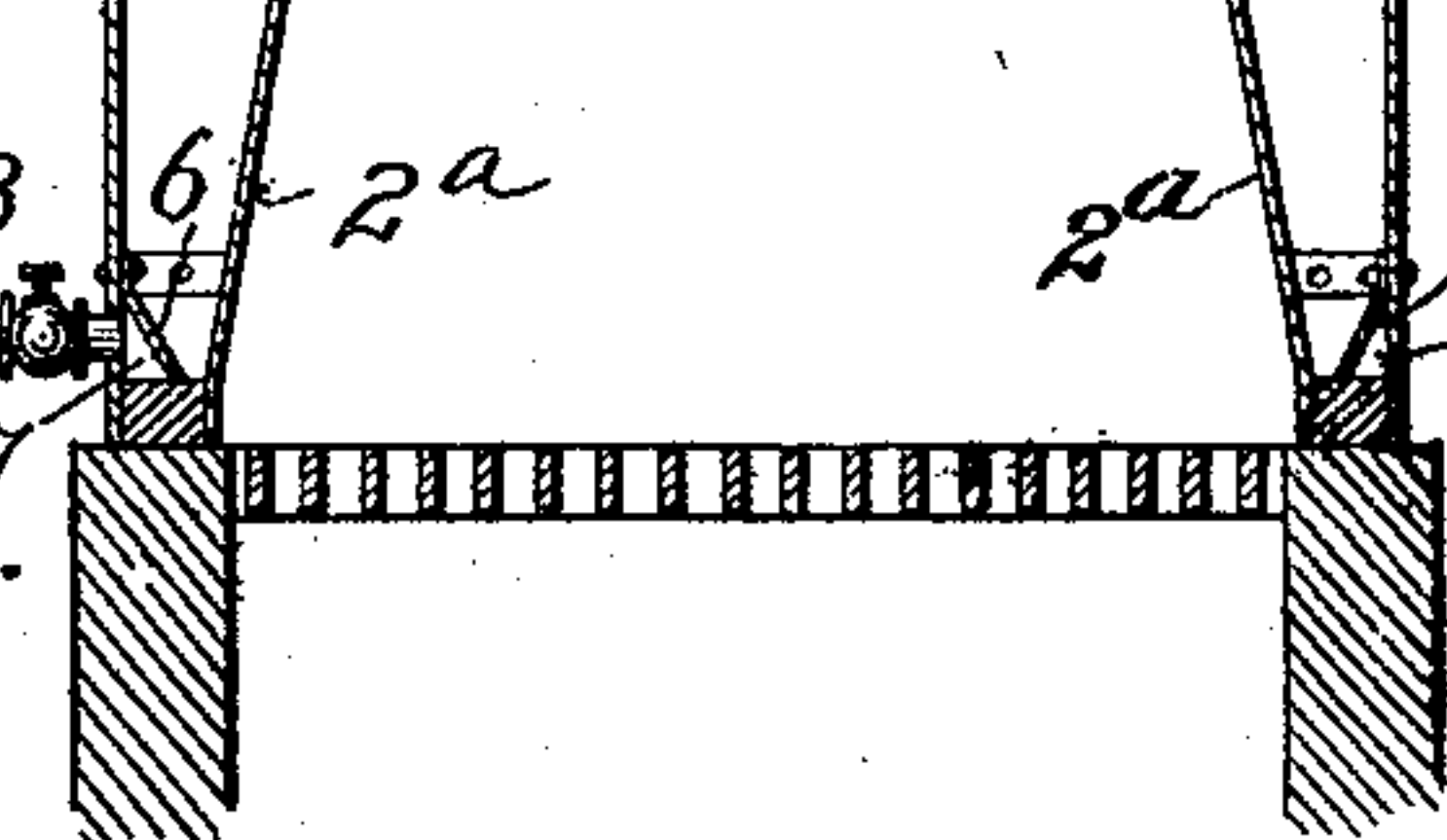
No. 601,216.

Patented Mar. 22, 1898.



WITNESSES:

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(No Model.)

2 Sheets—Sheet 2.

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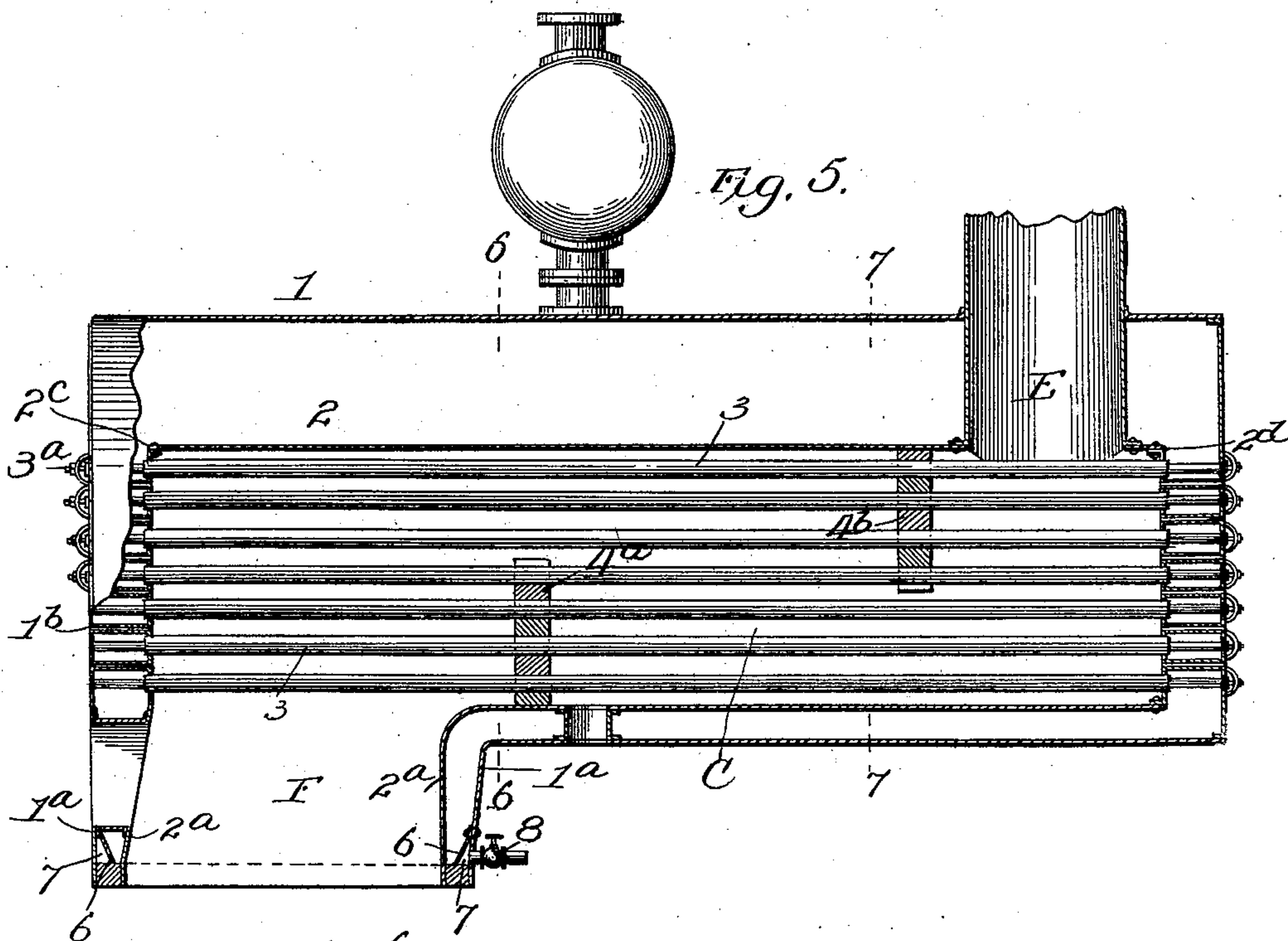
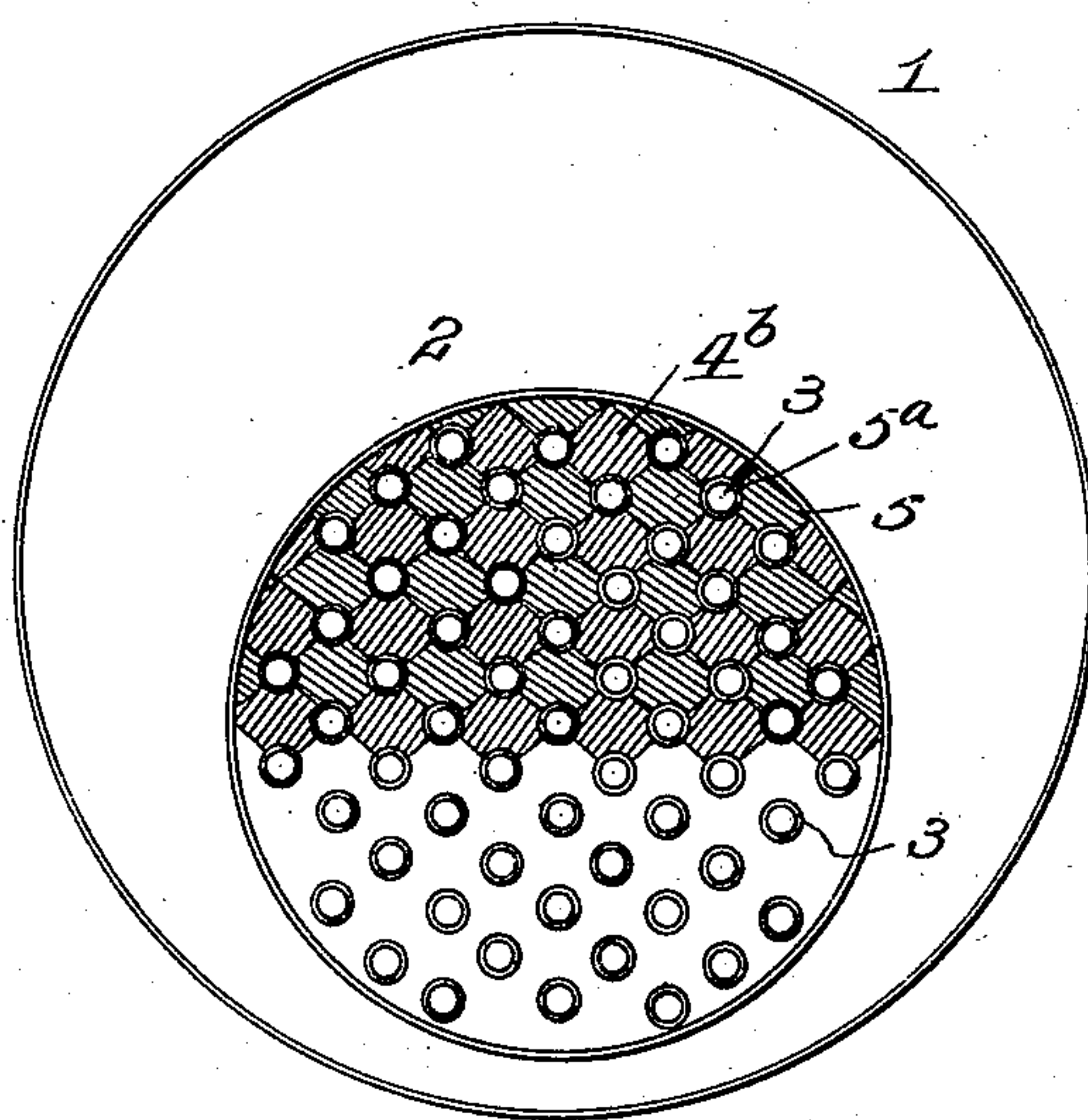
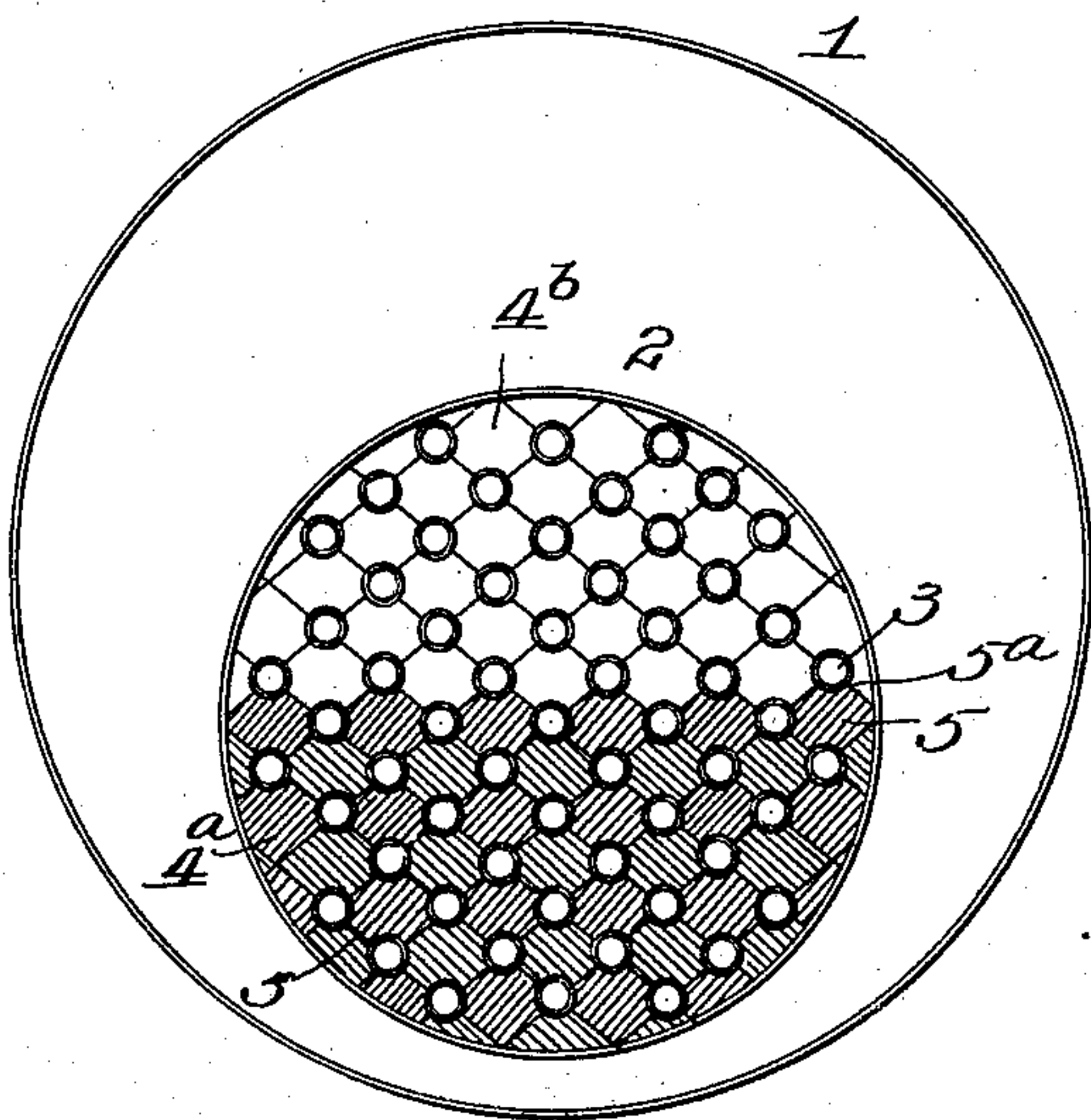


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN JAY TONKIN, OF OSWEGO, NEW YORK, ASSIGNOR TO JOHN EATON,
OF PITTSBURG, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 601,216, dated March 22, 1898.

Application filed February 23, 1897. Serial No. 624,642. (No model.)

To all whom it may concern:

Be it known that I, JOHN JAY TONKIN, a citizen of the United States, residing at Oswego, in the county of Oswego, State of New York, have invented certain new and useful Improvements in Steam-Boilers; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—
10 Figure 1 is a longitudinal central section of a steam-boiler embodying my invention. Fig. 2 is a vertical transverse section of the boiler and fire-chamber on the dotted line 2 2, Fig. 1. Fig. 3 is a horizontal section of the fire-box and water-legs of the boiler on the line 3 3, Fig. 1. Fig. 4 is an enlarged detail sectional view of a portion of the fire-chamber and deflecting-partition, illustrating the preferred form and arrangement of the fire-brick
15 which constitute the deflecting-partition of the fire-chamber. Fig. 5 is a longitudinal central section of a steam-boiler embodying my invention, showing a modified arrangement of the deflecting-partitions; and Figs. 6 and 7 are vertical sectional views taken on the dotted lines 6 6 and 7 7, Fig. 5, showing, respectively, the anterior and posterior or bridge and pendent deflecting-partitions.

Like symbols refer to like parts wherever they occur.

My invention relates to that class of steam-boilers having an included combustion-chamber and commonly known as "internally-fired" boilers, and has for its object the production of a simple and efficient steam-boiler of the portable locomotive pattern.

One feature of my invention, generally stated, involves the combination, in an included-combustion-chamber boiler, of an outer shell, an inner shell, water-tubes which cross the included combustion-chamber and connect the heads of the inner shell, a deflecting-partition arranged in the included combustion-chamber and composed of a series
45 of tiles or bricks whose cross-sectional area substantially corresponds with the space included by a group of the water-tubes, and hand-holes arranged in the outer shell in line with the water-tubes which traverse the included combustion-chamber, whereby the wa-

ter-tubes may be removed and repaired without displacing the deflecting-partition of the included combustion-chamber.

A further feature of my invention embraces the combination, with the water-legs and blow-off, of an inclined perforate plate or plates arranged in the water-legs of a steam-boiler and forming a mud-chamber therein for facilitating the blowing off of the mud and sediment.

There are other minor features of invention, all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings, 1 indicates the main shell of a steam-boiler, preferably of general cylindrical form, as well as sufficiently elongated to accommodate an internal combustion-chamber without materially reducing the water-space of a boiler of given horse-power, said shell being extended down, as at 1^a, at the fire-box end and provided with an exit-flue at the fire-box end of the shell.

2 indicates an included shell of the same general form as the main shell, but of less dimensions, the shell 2 having downward extensions 2^a, which, in conjunction with the extensions 1^a of main shell 1, constitute continuous water-legs, which inclose and form the fire-box F, which fire-box is coextensive with the forward end of inner shell 2 and with which it has an unobstructed communication, and said inner shell has its exit-flue in like position or to register with the exit-flue of outer shell 1.

The major portion of the inner shell 2 back of the fire-box F and which constitutes the combustion-chamber C is preferably corrugated, as indicated at 2^b, as thereby the shell is materially stiffened and the water-surface proportionately increased.

The heads 2^c 2^d of the included shell 2 are connected by a series of water-tubes 3, which not only brace the inner heads and afford support for the deflecting-partitions of combustion-chamber C, but also increase the water-surface and facilitate the circulation. In the outer shell 1 and in line with said tubes 3 at both ends are a series of hand-holes 3^a, where-

by the said water-tubes 3 may be readily cleaned of scale or other deposit and removed for repair when necessary.

1^b indicates a series of hollow stay-bolts, which connect and brace the corresponding heads of the outer or main shell 1 and the included (or combustion-chamber) shell 2, and said hollow stay-bolts are so placed between the water-tubes 3 as to allow of the introduction of steam-jets (or equivalent means) into the combustion-chamber for cleaning the exposed or outer surfaces of the water-tubes 3.

E indicates the exit-flue, which leads from the internal combustion-chamber C to a suitable smoke-stack, and the location of said exit-flue will depend upon whether longitudinal or transverse deflecting-partitions are employed in the included combustion-chamber to prolong the travel of the products of combustion after the same leave the fire-box F. For many reasons I prefer to employ a longitudinal transverse partition 4, (see Fig. 1,) which at the front is interposed between the fire-box F and the crown-sheet, thus preventing the overheating of the crown-sheet, and which extends backward, terminating at such point within the shell 2 as will leave a suitable throat for the passage of the products of combustion into the space (or return-flue) above said partition 4. With such an arrangement of the deflecting-partition, the exit-flue E should be at the same end of the boiler as the fire-box. If, however, a different construction is desired, the deflecting-partitions may take the form of a bridge-wall 4^a and pendent wall 4^b, (see Figs. 5, 6, and 7,) in which case the exit-flue E will be at the end of shell 2 distant from the fire-box F. However the deflecting-partitions of the combustion-chamber C may be placed, I prefer to construct them of a series of separate fire-brick 5, the cross-section of which corresponds to the space included between a group of the water-tubes or between a group of the water-tubes and the shell 2, and with a plurality of tube-seats 5^a so arranged and disposed that the bricks constituting the partition will be supported and held in position by the water-tubes 3, while at the same time individual water-tubes may be withdrawn from time to time and replaced or renewed without displacing the fire-bricks constituting the flame-deflecting partition.

In the water-leg of a steam-boiler and in the present instance between the pendent portions 1^a 2^a of the shells 1 and 2, or that portion which incloses the fire-box F, I arrange one or more inclined perforated plates 6 (see Figs. 1, 2, and 3) at such distance from the bottom of the water-leg as will form a mud-chamber 7, with which the blow-off cock 8 communicates, and so arrange that the total area of the perforations in the inclined plate 6 shall be less than the area of the blow-off cock 8, whereby the pressure in chamber 7 is reduced when the blow-off cock is opened, thus facilitating the discharge of the mud and sediment

from the water-leg above the inclined perforated plate 6.

In the case of a rectangular water-leg of the character constituting the fire-box of the steam-boiler I prefer to employ a series of four separate plates, (see Fig. 3,) the communication between the chambers formed thereby being closed and each chamber provided with its own blow-off cock, so that no angles or obstructions to the free flow of the sediment will be formed to interfere with the thorough efficiency of the devices.

Having constructed a steam-boiler substantially as hereinbefore pointed out, I prefer to set the same time at such an inclination—say an inch to the foot—as will insure that the distant ends of the water-tubes 3, or those farthest from the fire-chamber F, and those located beneath the horizontal deflecting-partition 4 shall at all times be below the water-level, even when the water is low in the boiler. The water-tubes which are above the partition 4 or next the crown-sheet over the fire-box, being protected from the direct flames of the fire and subject only to the practically spent products, will be preserved by the interposed fire-brick deflecting-partition 4 from injury in case the boiler-water should fall nearly or quite to the level of the partition at the front thereof.

In setting a boiler embodying my invention only a sufficient brickwork is required at the front to afford a foundation and constitute an ash-chamber beneath the grate-bars, so that little heat is lost in that direction, while a short pier at the rear and a saddle and rollers will accommodate any expansion and contraction of the boiler.

Among the advantages incident to a steam-boiler constructed in accordance with my invention is that the fire and combustion chambers are entirely within the boiler, so that all heat generated must pass by absorption to the boiler-water, and none can be lost by radiation other than that due to radiation from the boiler-water, and this can be reduced to a minimum by the use of an asbestos or other suitable boiler-covering, there being no brickwork to obstruct the jacketing of the boiler, to absorb and radiate heat, or to crack and admit air-drafts to the combustion-chamber.

A further advantage of my invention consists in the ability to remove, repair, and replace the water-tubes without disturbing the deflecting-partition of the combustion-chamber.

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

1. In a steam-boiler, the combination with an outer shell having a downward extension and an exit-flue located above the same, of an inner shell of like form, said inner shell constituting an included fire-chamber and combustion-chamber, a series of water-tubes which traverse the combustion-chamber and connect the heads of the inner shell, a hori-

zontal rearwardly-extending deflecting-parti-
tion composed of a series of brick or tile whose
cross-sectional area corresponds substantially
with the space included by a group of water-
5 tubes, and hand-holes in the outer shell and
in line with the water-tubes, substantially as
and for the purposes specified.

2. In a steam-boiler, the combination with
a water-leg, of an inclined perforate plate ar-
10 ranged to form a mud-chamber in said water-
leg, and a blow-off cock beneath the plate, sub-
stantially as and for the purposes specified.

3. In a steam-boiler the combination with

a water-leg and a blow-off cock, of an inter-
posed perforated plate forming a mud-cham- 15
ber, the aggregate area of the perforations of
said plate being less than the area of the blow-
off cock, substantially as and for the purposes
specified.

In testimony whereof I affix my signature, 20
in presence of two witnesses, this 20th day of
February, 1897.

JOHN JAY TONKIN.

Witnesses:

EDWARD FRANKLYN COLE,
JOHN EATON.

It is hereby certified that in Letters Patent No. 601,216, granted March 22, 1898, upon the application of John Jay Tonkin, of Oswego, New York, for an improvement in "Steam-Boilers," an error appears in the printed specification requiring correction, as follows: In line 82, page 2, the word "time" should be stricken out; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 29th day of March, A. D., 1898.

[SEAL.]

WEBSTER DAVIS,
Assistant Secretary of the Interior.

Countersigned:

C. H. DUELL,
Commissioner of Patents.