

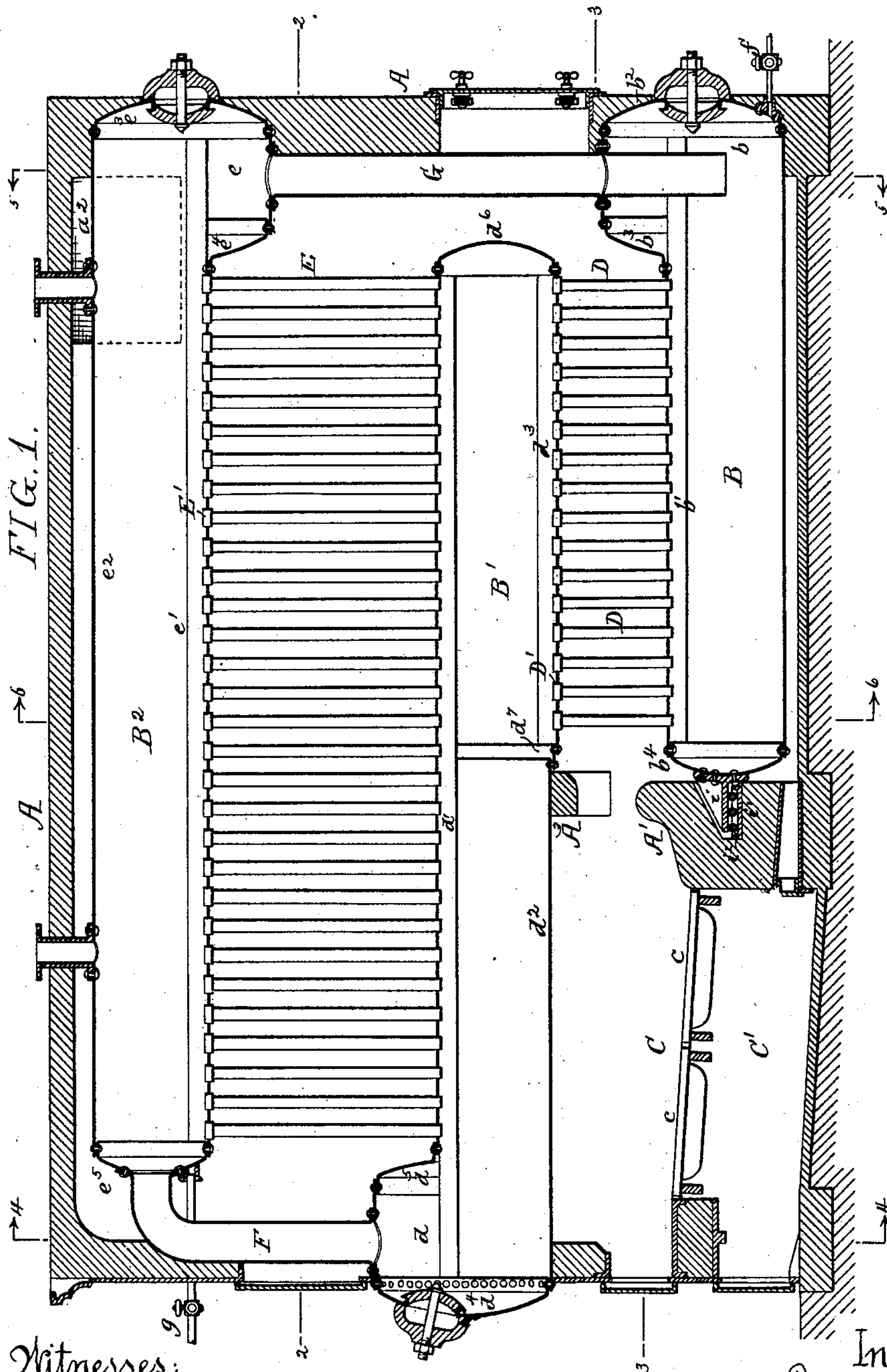
(No Model.)

4 Sheets—Sheet 1.

E. J. MOORE.
STEAM BOILER.

No. 605,791.

Patented June 14, 1898.



Witnesses:
Chas. De Bow,
Will. A. Barr.

Inventor:
Edward J. Moore
by his Attorneys:
Korism & Howson

(No Model.)

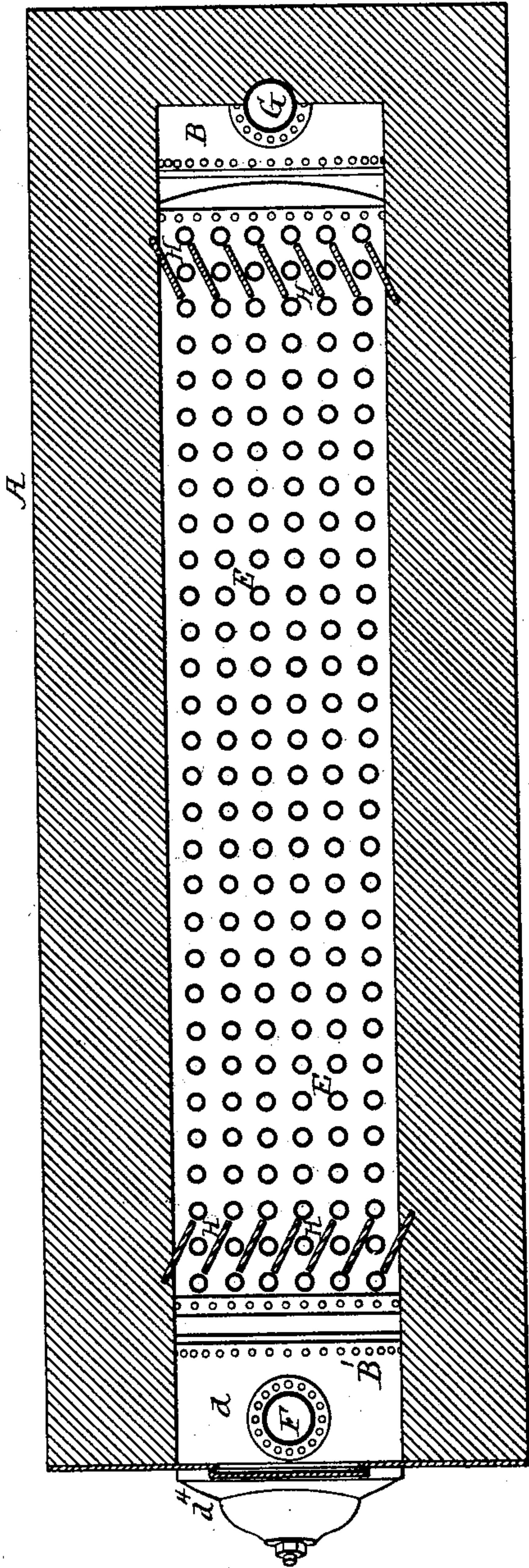
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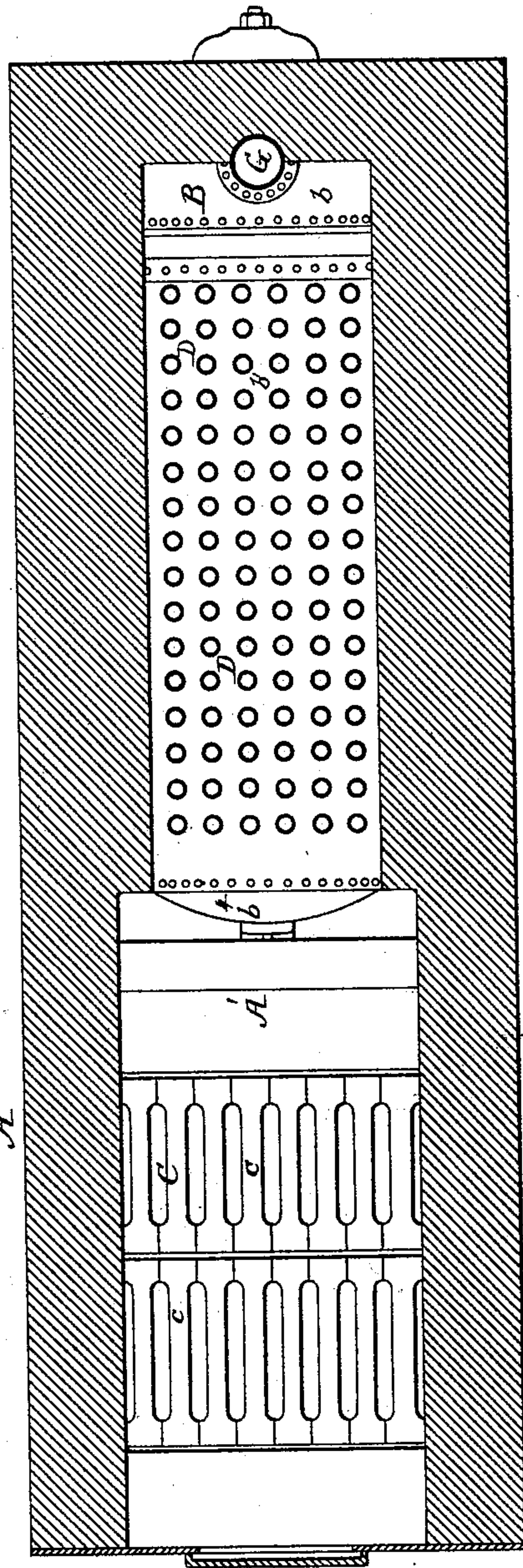
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FIG. 2.



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FIG. 3.



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FIG. 5.

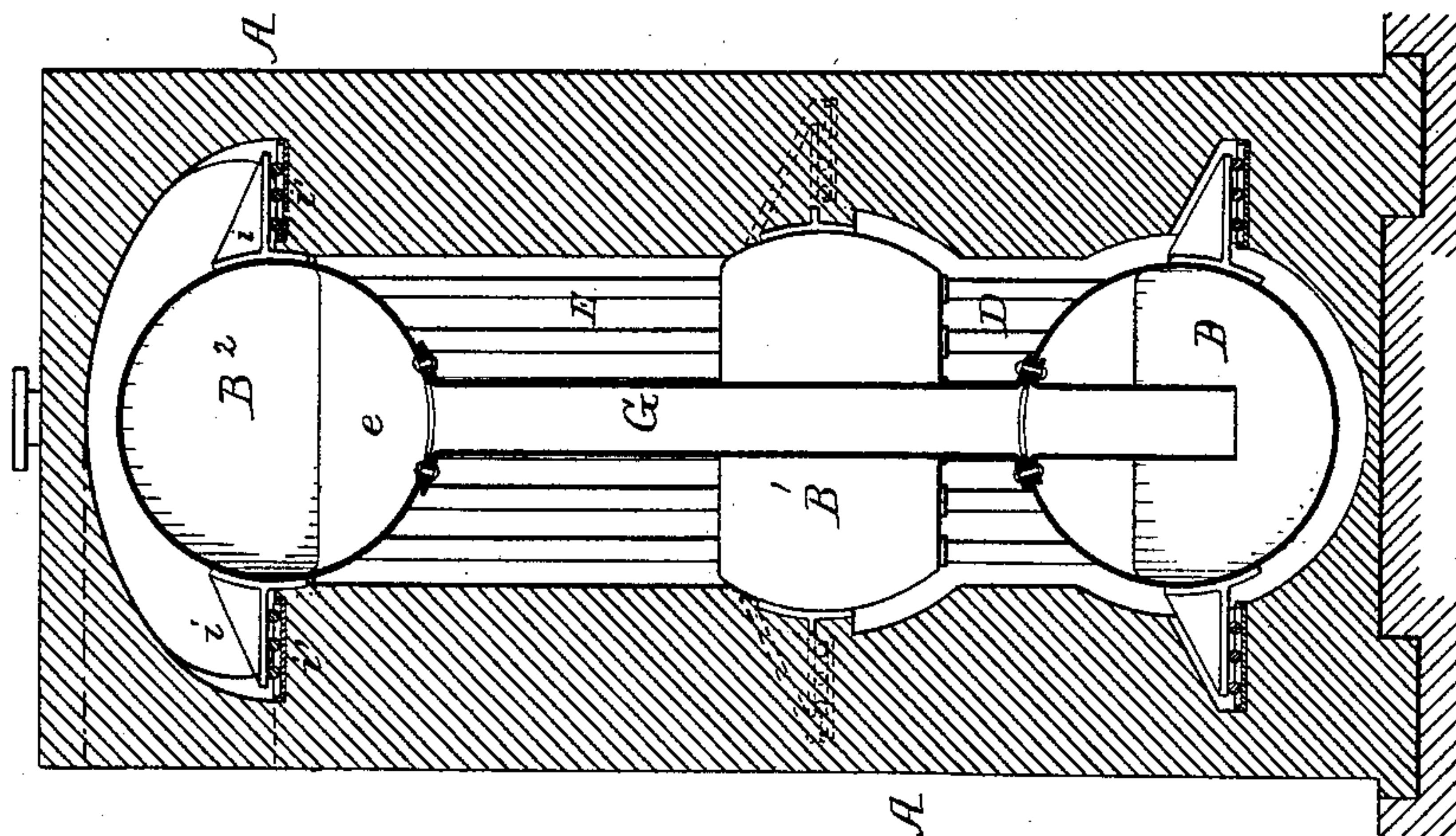
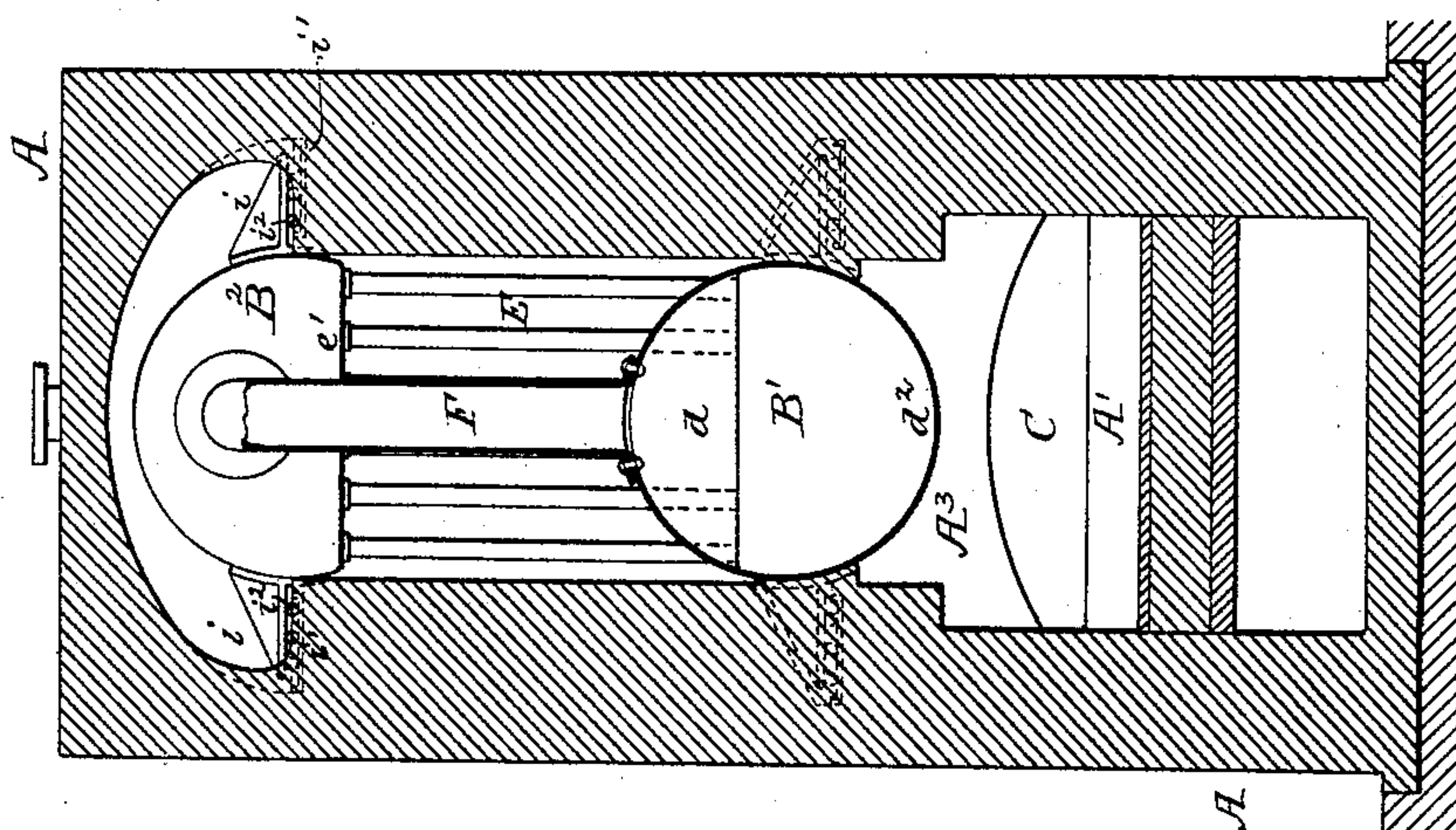


FIG. 4.



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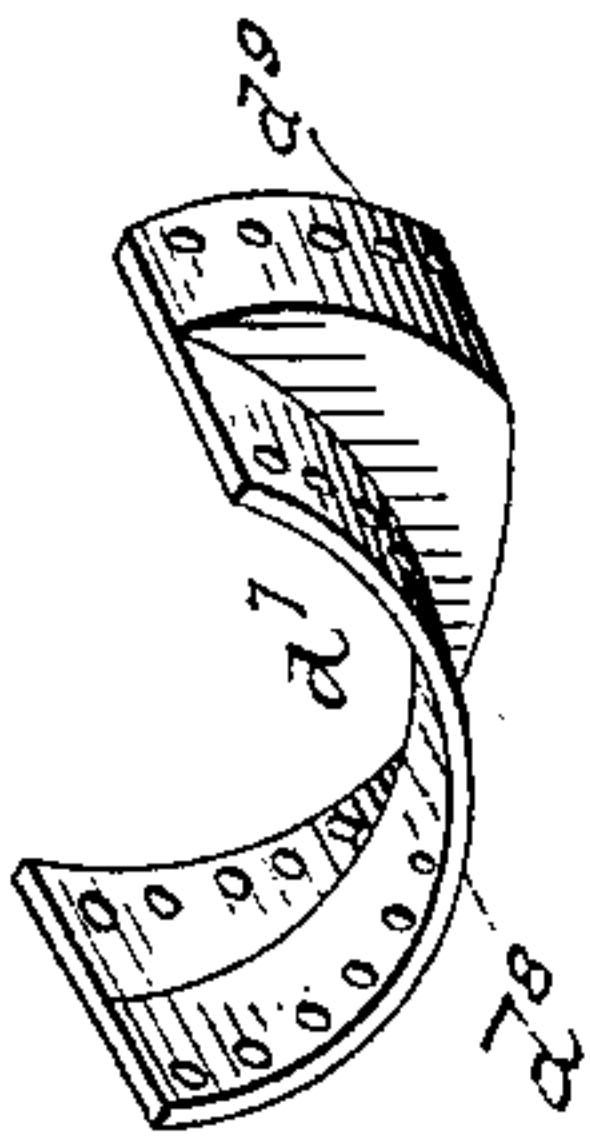
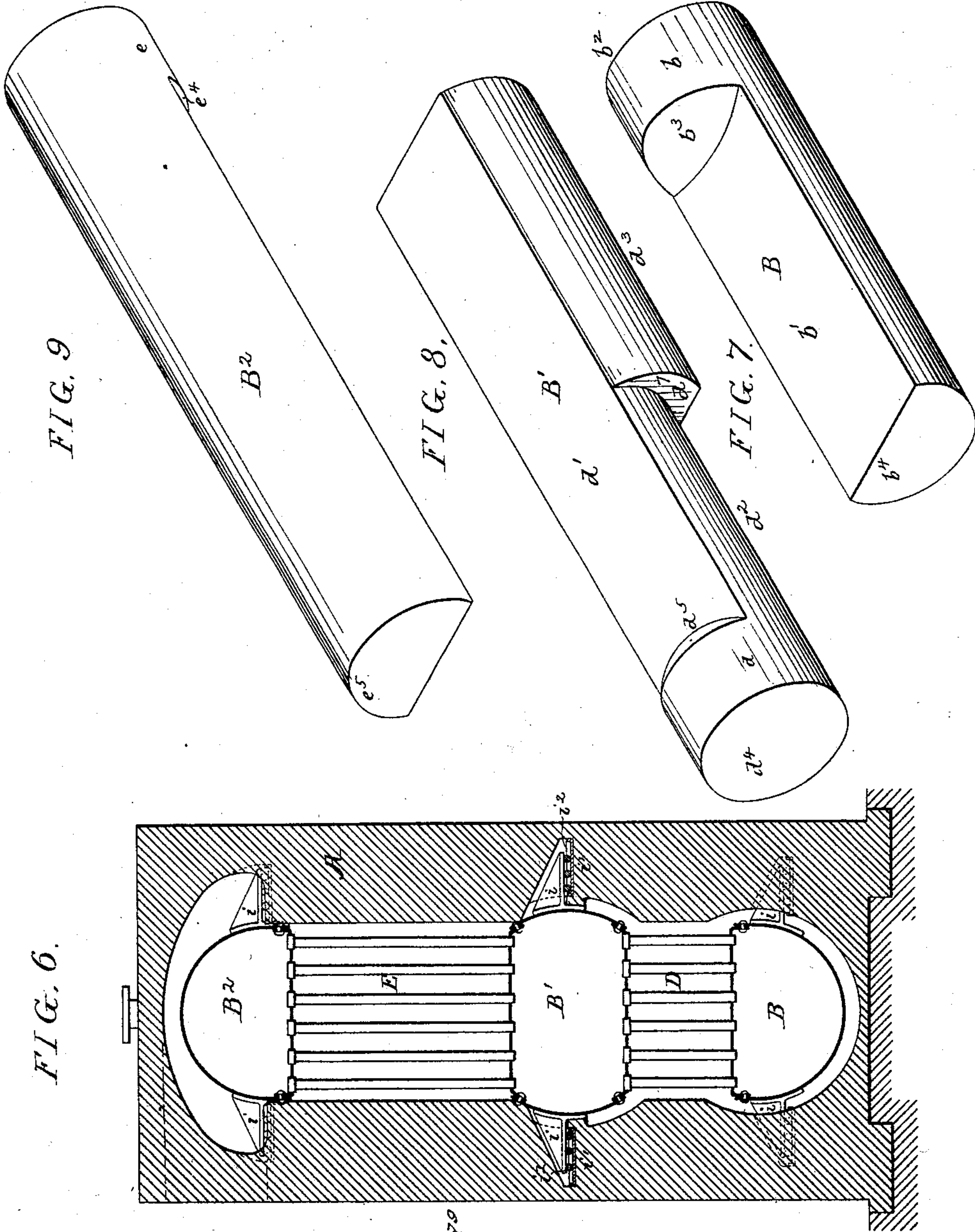
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FIG. 10.

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UNITED STATES PATENT OFFICE.

EDWARD J. MOORE, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 605,791, dated June 14, 1898.

Application filed July 21, 1897. Serial No. 645,433. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. MOORE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Steam-Boilers, of which the following is a specification.

The object of my invention is to improve the construction of water-tube boilers and dispense with the ordinary stays within the
10 drums. This object I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of my improved boiler. Fig. 2 is a sectional
15 plan view on the line 2 2, Fig. 1. Fig. 3 is a longitudinal sectional view on the line 3 3, Fig. 1. Fig. 4 is a transverse section on the line 4 4, Fig. 1. Fig. 5 is a transverse section on the line 5 5, Fig. 1. Fig. 6 is a transverse
20 section on the line 6 6, Fig. 1. Figs. 7, 8, and 9 are detached perspective views of the drums. Fig. 10 is a perspective view of the crescent gusset-piece.

A is the boiler-casing, preferably made of
25 brick, and B B' B² are three longitudinal drums, which are connected together by vertical water-tubes.

C is the fire-chamber, and C' is the ash-pit. c are the grate-bars, and A' is the bridge-wall.
30 Back of the bridge-wall and extending into the rear wall of the boiler is the lower drum B, of the form shown in Figs. 1 and 7. This drum B has a circular end section b and a flat tube-plate b'. The heads b² b³ b⁴ are
35 dished and are secured to the plates of the drum, so as to make a rigid construction, dispensing with internal stays.

Directly above the fire-chamber and the drum B is the intermediate drum B', Figs. 1
40 and 9. The front portion d of this drum is circular, and the upper tube-plate d' is flat, and the portion d² extending above the fire-chamber is semicircular, while the portion d³ directly above the drum B is flat for the re-
45 ception of tubes D, which extend vertically from the tube-plate b' to the tube-plate d³. These tubes are so spaced that any one of them can be readily removed without disturbing the others, and in order to provide
50 for the ready removal of the tubes I place nipples D' in the tube-plate d³, so that when

a tube is removed the nipple will allow for the removal of the tube within the plate.

The heads d⁴, d⁵, and d⁶ of the drum B' are
55 dished in the same manner and for the same purpose as the heads of the drum B, so as to dispense with stays, and by making the drum semicircular at a point directly above the fire-chamber I give the drum sufficient strength
60 to dispense entirely with the stays at this point. The vertical tubes connected to the other part of the structure stay the drum sufficiently.

The gusset-piece d⁷, Fig. 10, unites the semicircular portion d² to the portion d³, the flange
65 d⁸ being secured to the portion d² and the flange d⁹ to the portion d³ and the curved side portion of the drum.

Mounted above the drum B' is a drum B²,
70 which may be the steam-drum of the boiler. This drum is of the same form, only inverted, as the drum B, a portion of the drum at the rear end e being cylindrical, the tube-plate e' at the bottom being flat, so as to receive the
75 vertical tubes E, and the upper portion e² is semicircular throughout its entire length. The heads e³ e⁴ e⁵ are dished in order to strengthen the drum in the same manner as the other drums, and the tube-plate e' is provided with nipples E', in which the vertical
80 tubes E are expanded, so that they can be removed in the same manner as the tubes D. It will be seen that by this construction I provide a short longitudinal lower drum and two
85 long longitudinal drums, one above the other. The two upper drums extend over the fire-chamber. These drums are connected together by the vertical tubes, so that the products of combustion will pass from the fire-chamber between the drums B and B', then
90 around the rear end of the drum B' and between the drums B' and B² and then around the front end of the drum B² over the drum B² to the passage a², which communicates with the stack.

In some instances the products of combustion may escape at the front of the furnace to the stack without passing over the drum B²; but I prefer the construction shown.

I connect the forward ends of the drums B' 100 and B² with a circulating-tube F, (shown clearly in Figs. 1 and 4,) and I connect the

rear end of the drums B and B² by a circulating-tube G. This tube has an extension G', which passes into the drum B to a point near the bottom, so that the circulation will be more complete.

Each drum has a series of brackets *i*, which extend over bearing-plates *i'*, and between the brackets and the bearing-plates are balls *i''*, so as to allow for expansion and contraction. The lower drum B has also a bracket at its forward end, supported by balls in the same manner as the side brackets, as shown in Fig. 1.

I extend the semicircular portions of the drums past the center, so as to give better facilities for expanding the tubes; but I do not extend them sufficiently so that the drums will need inside bracing. Under the drum B', in advance of the gusset-piece *d'*, I form an arch A³ to add to the support of the drum and to form with the bridge-wall A' the throat through which the products of combustion pass to the space between the drums B B'.

I form a space between the main body of the lower drum and the side walls of the furnace, as shown clearly in Fig. 5, so that the products of combustion can come in contact with all portions of the drum, and I form a space between the lower portion of the rear section of the drum B' for the same purpose.

I provide vertical deflecting-plates II at each end of the boiler between several of the vertical tubes E, Fig. 2, so as to divert the gases, making them pass through the combustion-chamber in a serpentine path, so that the tubes will be more evenly heated.

When the upper drum is the steam-drum, the water-level is a short distance above the tube-plate, and by connecting the lower drum B in the manner shown I am enabled to utilize this lower drum as the mud-drum and provide means for blowing out the mud from this drum through the blow-off pipe *f*. *g* is the feed-water pipe communicating with the upper drum, as shown in Fig. 1.

Each of the drums is provided with a man-hole-opening, suitably capped, so that access may be had to any one of the drums or to the spaces at the front and back of the boiler, thus making it a boiler that is readily accessible from all points.

In some instances the upper drum and tubes may be omitted, in which case the upper portion of the central drum will be circular and will connect with the steam-pipes.

I claim as my invention—

1. The combination in a boiler, of two or more longitudinal water-drums one mounted above another, water-tubes connecting the drums, the lower drum being short, with a fire-chamber in advance of said lower drum, substantially as described.

2. The combination in a boiler, of three longitudinal drums, one mounted above another, vertical tubes connecting the central drum with the top and bottom drums, the bot-

tom drum being short, with a fire-chamber in front of the bottom drum, substantially as described.

3. The combination in a boiler, of three drums, tubes connecting the central drum with the top and bottom drums, a fire-chamber in advance of the bottom drum, the central drum terminating short of the top and bottom drums so as to allow for the passage of the products of combustion around the end of the central drum, substantially as described.

4. A steam-boiler drum semicircular in cross-section and having a tube-plate on its flat side, and a short circular section at one end, substantially as described.

5. A steam-boiler drum semicircular in cross-section and having a tube-plate on its flat side, and a short circular section at one end, with dished head at each end, substantially as described.

6. A steam-boiler drum having one portion semicircular in cross-section, the circle extending beyond the center and having a flat tube-plate coupling the two edges of the semicircular portion, substantially as described.

7. A drum for a boiler having a long tube-sheet extending nearly the full length of the drum, and a short tube-sheet connected to the long tube-sheet at one end by curved side plates, and a semicircular section coupled to the other end of the long tube-sheet and secured to the short tube-sheet by a gusset-plate, substantially as described.

8. A gusset for a steam-boiler in the shape of a crescent having a flange extending in one direction from the upper portion of the gusset and a flange extending in the opposite direction from the opposite portion of the gusset, said flanges being attached to the boiler-plates, substantially as described.

9. The combination in a steam-boiler, of three drums, tubes connecting the central drum with the upper section and with the lower section, with a fire-chamber in advance of the lower drum, the portion of the central drum above the fire-chamber being semicircular in cross-section, substantially as described.

10. The combination in a steam-boiler, of three longitudinal drums, the fire-chamber, circulating-tubes extending from the lower drum to the middle drum and from the middle drum to the upper drum, a tube forming communication between the forward end of the central drum and the upper drum and a tube forming communication between the rear end of the upper drum and the rear end of the lower drum, substantially as described.

11. The combination of three drums arranged one above another, vertical circulating-tubes connecting the central drum to the upper and lower drums, with a series of vertical deflecting-plates arranged between the upper and the central drums whereby the products of combustion will pass between the

tubes in a serpentine path, substantially as described.

12. The combination in a steam-boiler, of the fire-chamber, its bridge-wall, a drum back
5 of the bridge-wall, a drum over the fire-chamber and the first-mentioned drum, vertical tubes extending from one drum to the other, an arch directly over the bridge-wall, and an upper drum with vertical tubes extending

from the central drum to the upper drum, so substantially as described.

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

EDWARD J. MOORE.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.