

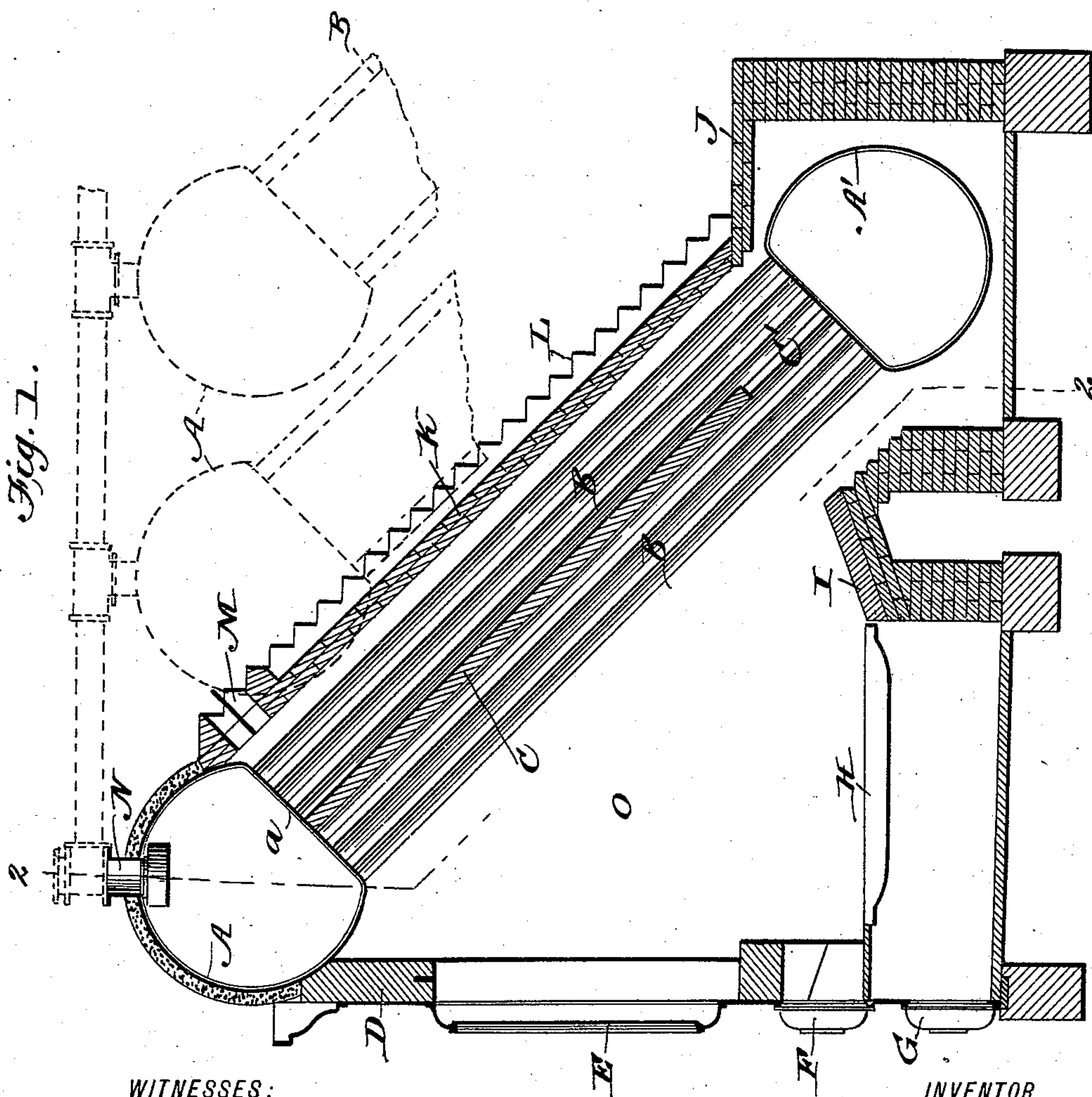
(No Model.)

3 Sheets—Sheet 1.

C. EDGERTON.
WATER TUBE BOILER.

No. 572,476.

Patented Dec. 1, 1896.



WITNESSES:

W. D. Blondell.
Edw. W. Byrum.

INVENTOR

Charles Edgerton.

BY

Munn & Co.

ATTORNEYS.

(No Model.)

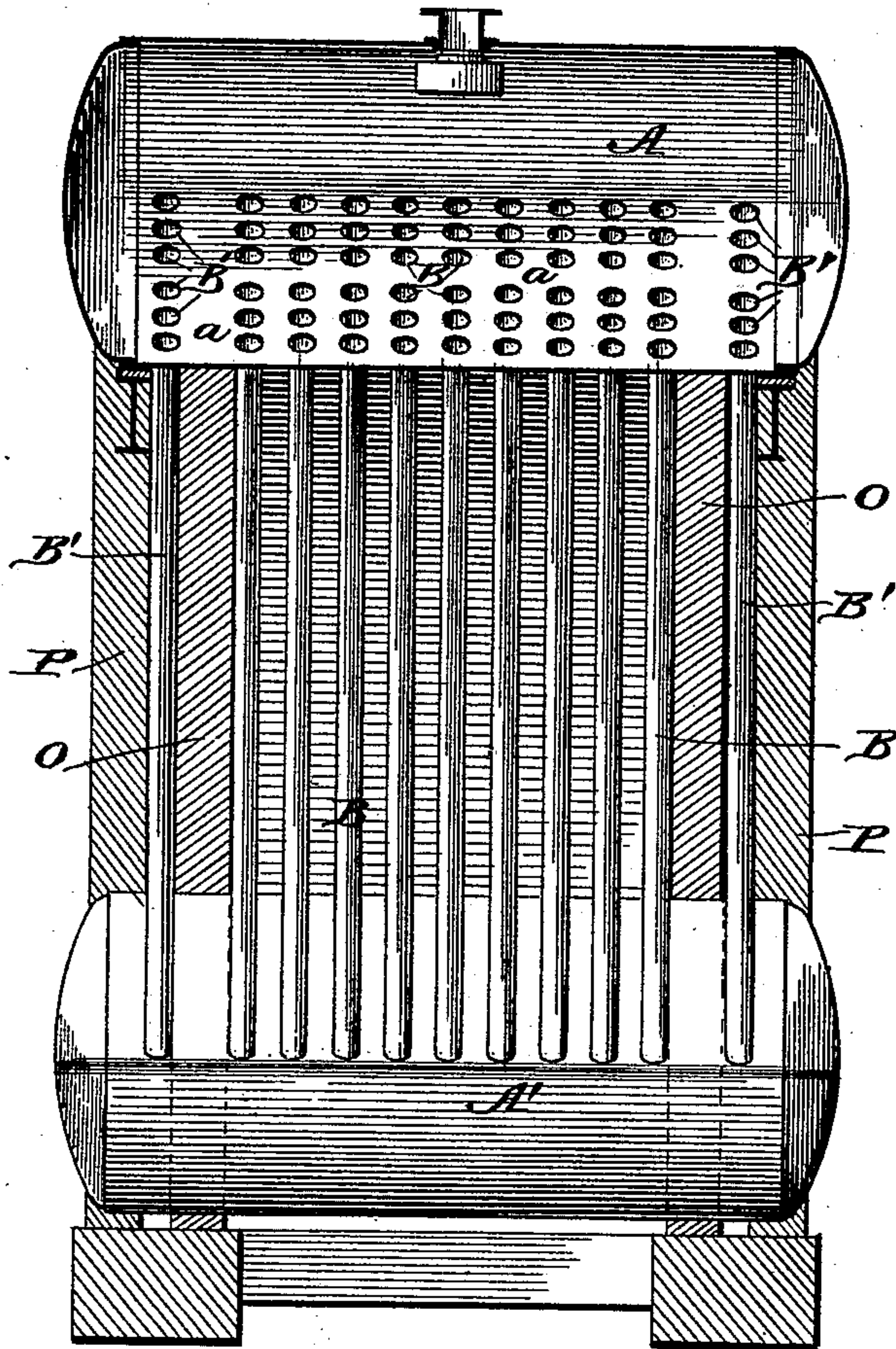
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Fig. 2.



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Fig. 3.

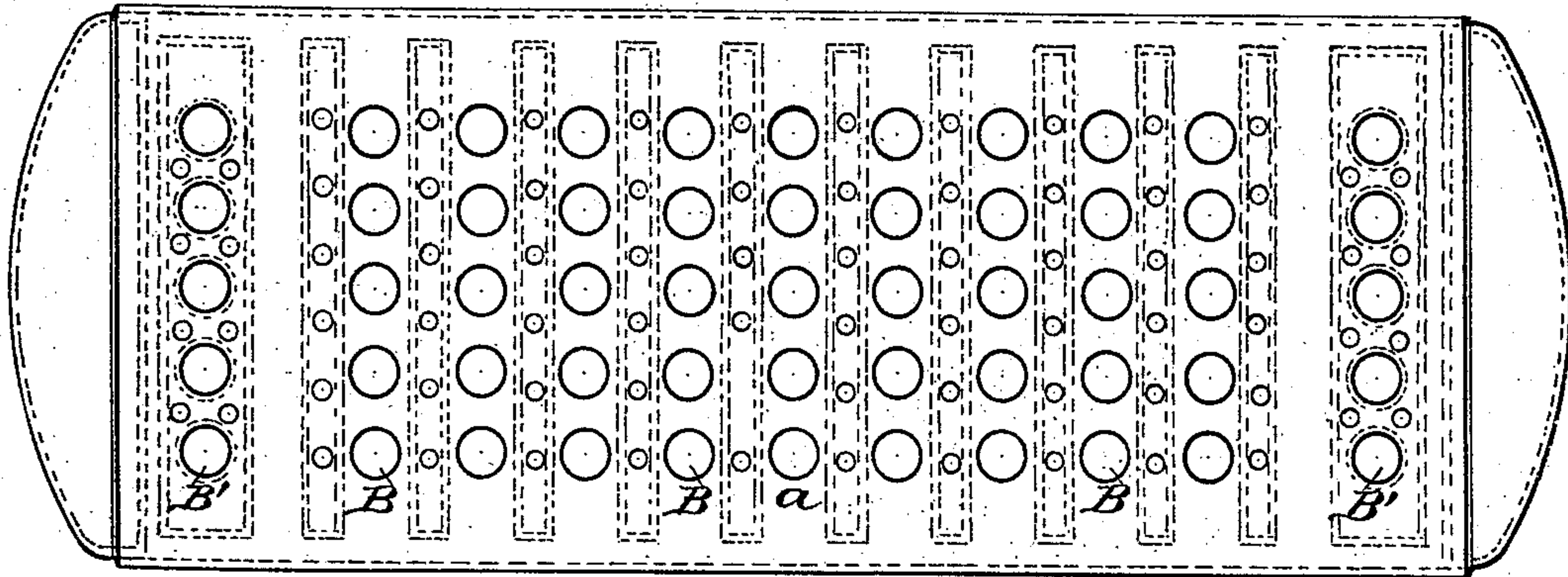


Fig. 4.

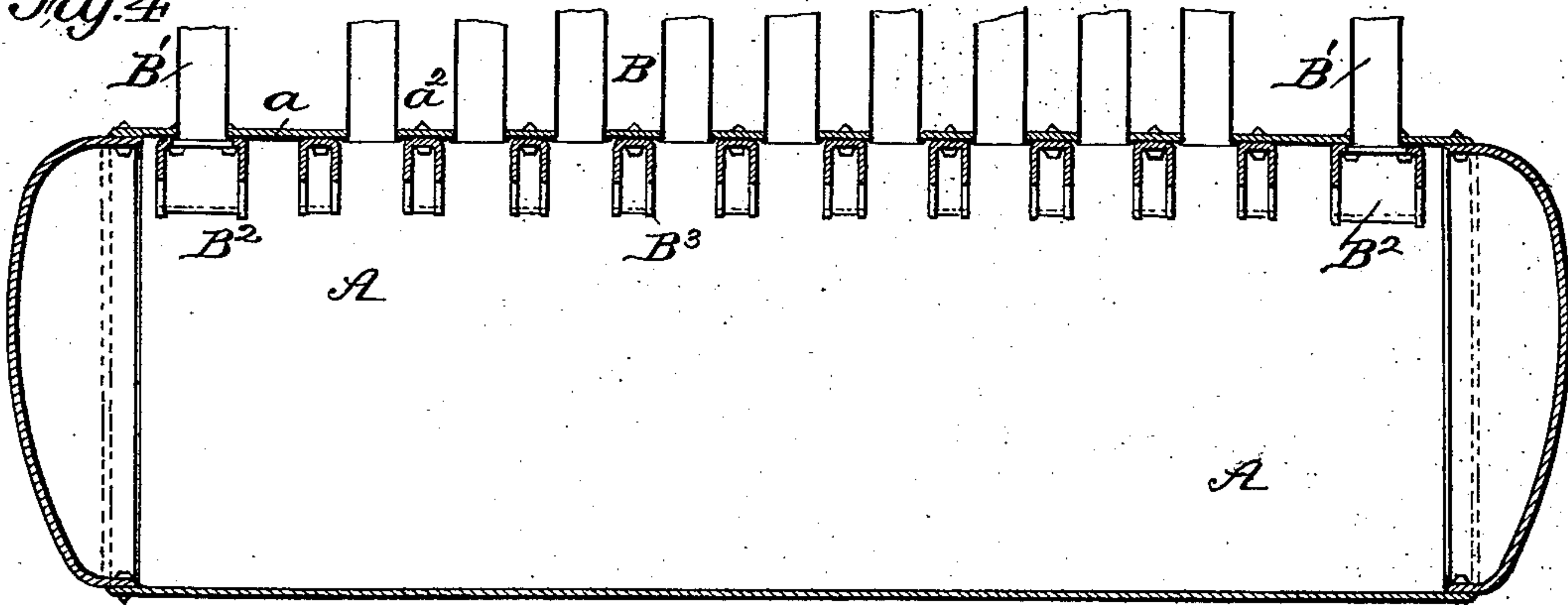


Fig. 5.

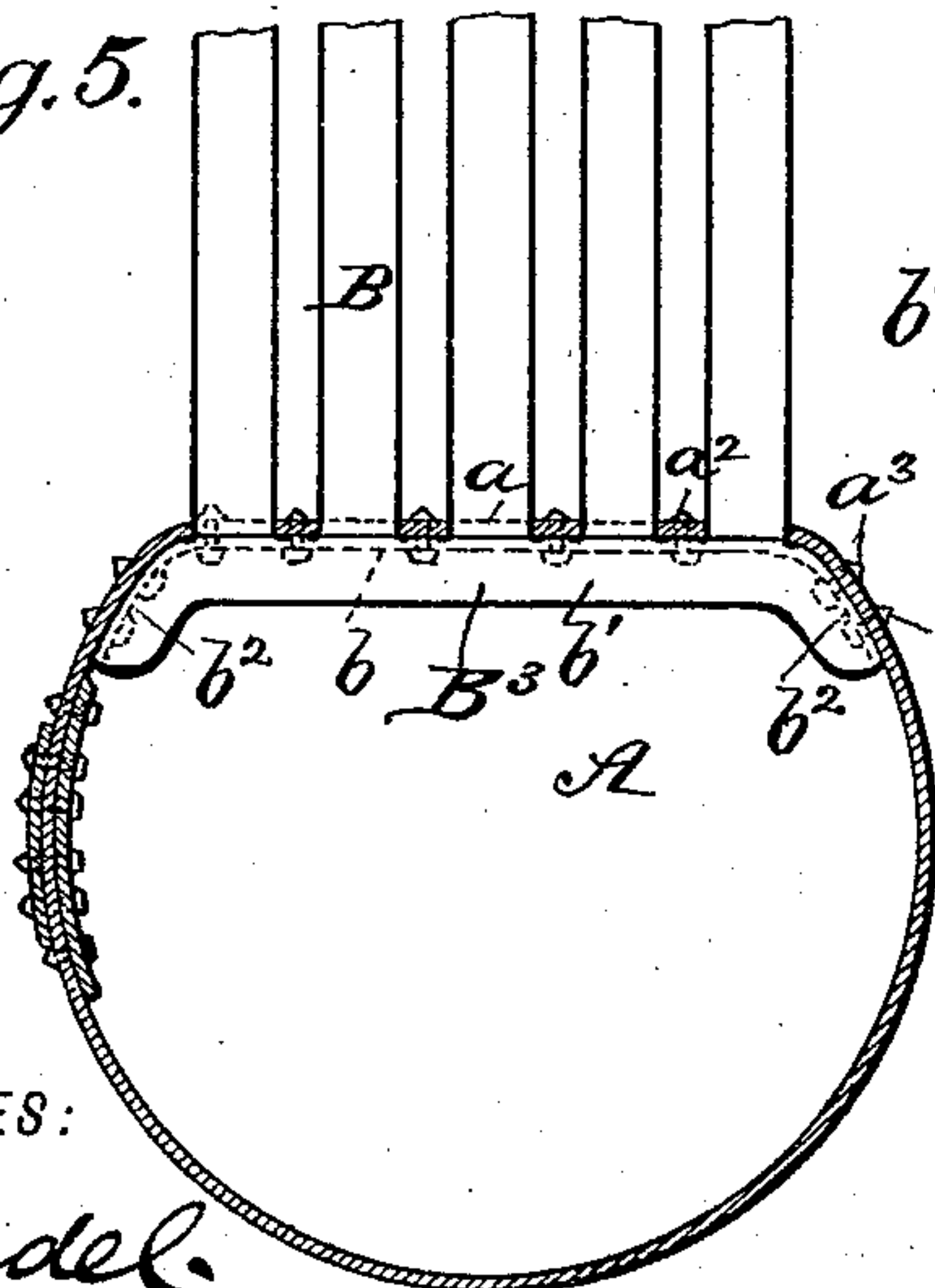


Fig. 6.

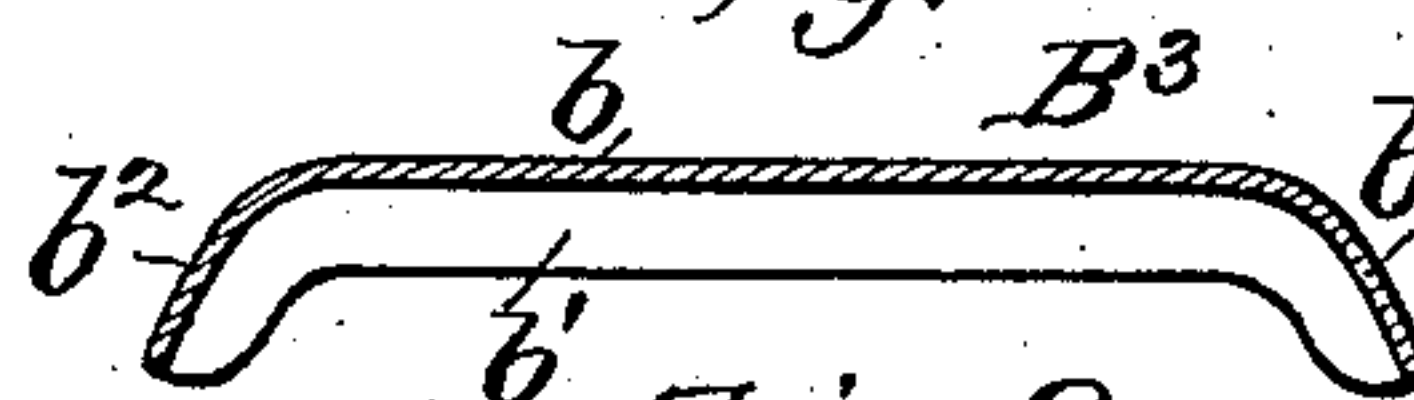


Fig. 7.

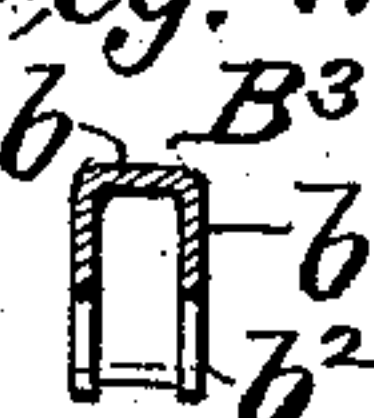
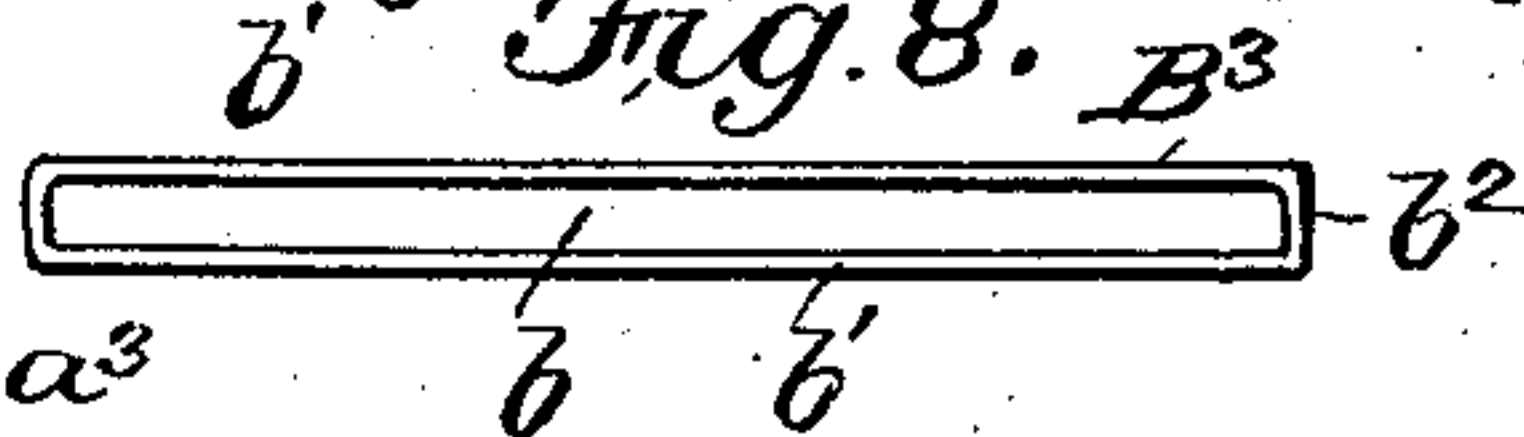


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES EDGERTON, OF PHILADELPHIA, PENNSYLVANIA.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 572,476, dated December 1, 1896.

Application filed February 3, 1896. Serial No. 577,885. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDGERTON, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Water-Tube Boilers, of which the following is a specification.

My invention is in the nature of certain improvements in high-pressure water-tube boilers in which tubes are entered into the flattened side of a cylindrical drum; and it consists in the special means of strengthening such drums upon their flat sides, as will be hereinafter fully described.

Figure 1 is a vertical longitudinal section taken at right angles to the front wall of the furnace to which my invention is to be applied. Fig. 2 is a section taken on the line 2 2 of Fig. 1. Fig. 3 is a plan view of one of the drums. Fig. 4 is a longitudinal and Fig. 5 a transverse section of the same. Fig. 6 is a longitudinal section, Fig. 7 a transverse section, and Fig. 8 an inside view, of one of the braces for that side of the drum with which the water-tubes connect.

Referring to Figs. 1 and 2, A and A' are two drums connected by water-tubes B B', arranged in inclined position and extending from the drum A' in rear of the bridge-wall and at the bottom of the furnace to the drum A at the top of the furnace above the grate-bars and near the front wall. Both these drums are parallel to the front wall, the drum A' being contained within a chamber inclosed by the masonry J in rear of the bridge-wall, and the upper drum A being covered by some non-conducting packing, through which access is had to the interior of the drum by means of a manhole N. Back of and between the two drums there is a rear wall or casing K, of masonry, suitably supported in inclined position and provided with a flue-outlet M at the top, and also steps L, by which the upper drum may be conveniently reached. Between the two drums there is a longitudinal partition C, with an opening C' at the bottom, which partition causes a tortuous or lengthened passage-way for the hot currents, which causes the said currents to pass downwardly among the front tubes and upwardly among the rear tubes to the flue-outlet M.

The lower front part of the furnace is constructed in the usual manner with a front wall

D, charging-door E, door F for slicing and raking the fire, an ash-pit door G, grate-bars H, and bridge-wall I.

The side walls of the furnace are made of masonry and are made double with an air-space between, as shown in Fig. 2, in which the outer or exposed walls are shown at P P and the inner walls at O O. These two walls are at right angles to the drums and on each side extend all the way from the upper drum to the lower drum, and the space between the walls O and P has no communication with the interior of the fire-chamber of the furnace, but simply consists of a dead-air space in which are contained the water-tubes B' at the ends of the boiler, which are thus insulated or housed from excessive heat, to promote the downward circulation of water through them in accordance with the laws of convection. When in this type of boiler all the tubes connecting the drums are exposed to the direct influence of the heat in the fire-chamber, there is a tendency in the water to rise from convection in all the tubes, which seriously obstructs the proper descent of a sufficient body of water to establish a vigorous and complete cycle of circulation. By housing the pipes B', which are set apart for the downward circulation, in a relatively cool chamber between the two walls O and P, which has no communication with the interior of the furnace, a positive and vigorous circulation through the tubes is maintained at all times, the currents ascending through the tubes B, which are exposed to the direct heat, and descending through the housed or insulated and relatively cool tubes B' at the ends of the drums.

In constructing the drums A and A' they are made of a generally cylindrical shape, with the sides which face each other cut off, replaced, or fashioned with a flat side corresponding in its plane to the chord of the circle of the drum. The object of this is to permit each and every one of the water-tubes to be exactly of the same length and perfectly straight from end to end without any bend or crook in them, thus greatly facilitating and strengthening the construction of the boiler and at the same time reducing its cost.

To strengthen the flattened sides of the drum, a series of braces B² B³ are arranged on the inside of the drum in transverse posi-

tion and are firmly riveted to the flat side. These braces are shown in Figs. 3 to 8, and each consists of a piece of heavy sheet metal pressed to shape out of a single piece (or
 5 made of malleable cast metal, if desired) and which has a U-shaped cross-section, as shown in Fig. 7, whose straight middle part b fits against the inside of the flat portion of the drum and is riveted thereto by rivets a^2 ,
 10 while its two flanges b' project into the drum and impart stiffness. At the ends b^2 the braces are bent down and around to conform to the circle of the drum, onto which they lap a short distance and are firmly riveted at a^3 .
 15 As shown, the end braces are much wider than the intermediate ones, and the downward-circulating tubes B' open through their backs and between their flanges, as seen in Fig. 4, while the narrower intermediate braces
 20 are connected between the rows of tubes B .

If desired, all the braces may be made wide or all may be narrow.

I am aware that it is not broadly new to make a drum with a flat side and that it is
 25 common to use angle-iron braces. My braces, however, are not only of peculiar shape, but are made of one piece of metal without seam or weld, are pressed into their shape, and the flat surface is very thoroughly stayed without
 30 the use of stay-bolts. These braces serve the further purpose of strengthening the drum longitudinally as well as in all other directions.

If desired, I may arrange two or more pairs of drums and sets of tubes in the same furnace, as shown in dotted line in Fig. 1. 35

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

1. In a water-tube boiler, the combination 40 of a cylindrical drum having a flat side, water-tubes secured in said flat side, and transverse braces of a U-shaped cross-section made straight through their middle parts and riveted to the interior of the flat sides of the 45 drum and having their ends curved to correspond to the circle of the drum and riveted to the circular sides substantially as shown and described.

2. In a water-tube boiler, the combination 50 of a cylindrical drum having a flat side, two sets of water-tubes connecting therewith, one for downward, and the other for upward circulation, a series of narrow braces arranged upon the inside of the flat portion of the 55 boiler and between the rows of tubes, and broad U-shaped braces arranged in the same relation to the drum but receiving between its flanges the tubes for the downward circulation substantially as and for the purpose 60 described.

CHARLES EDGERTON.

Witnesses:

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 NELSON H. GENUNG.