

No. 715,580.

Patented Dec. 9, 1902.

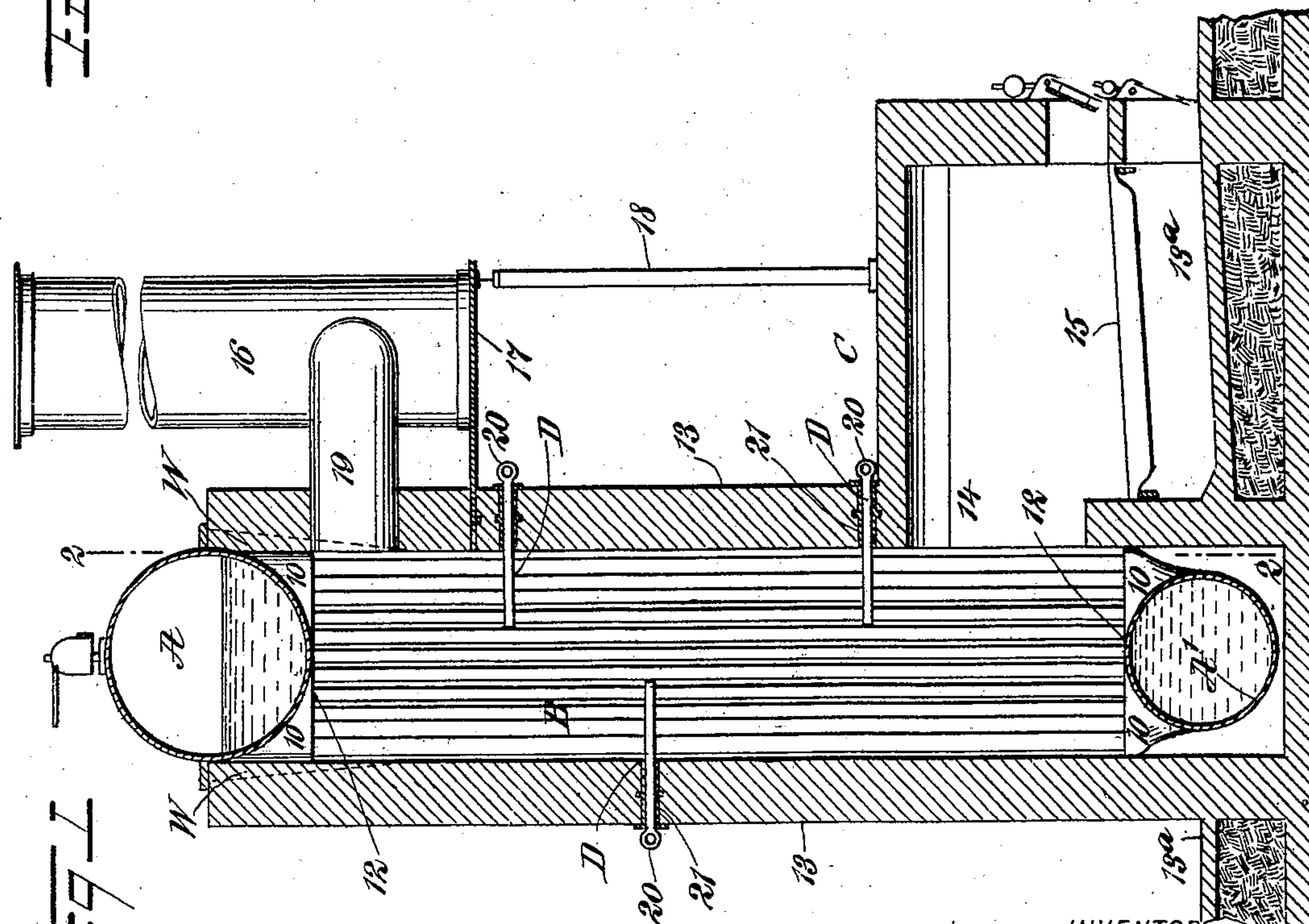
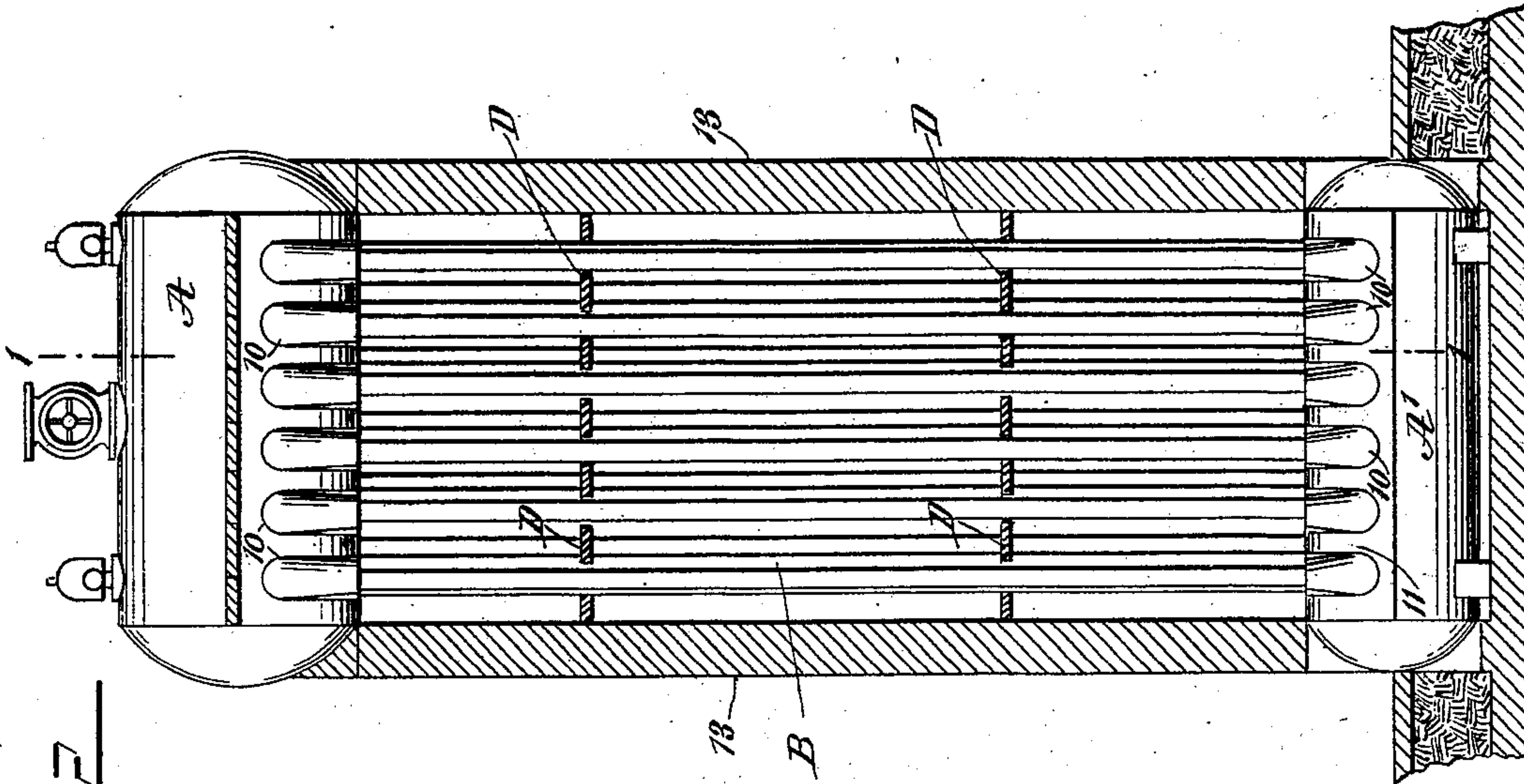
R. B. HOBSON.

BOILER.

(Application filed Jan. 18, 1902.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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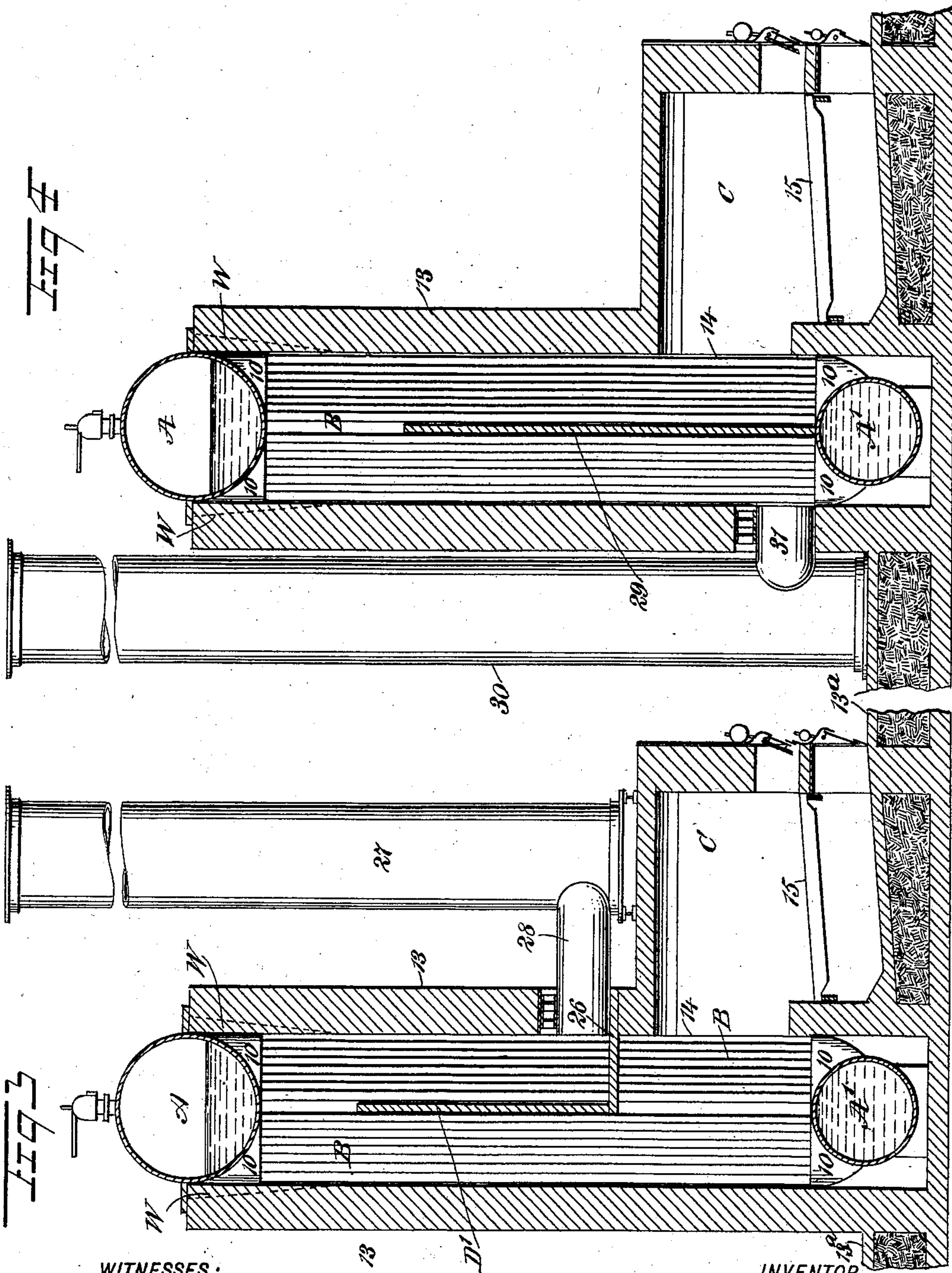
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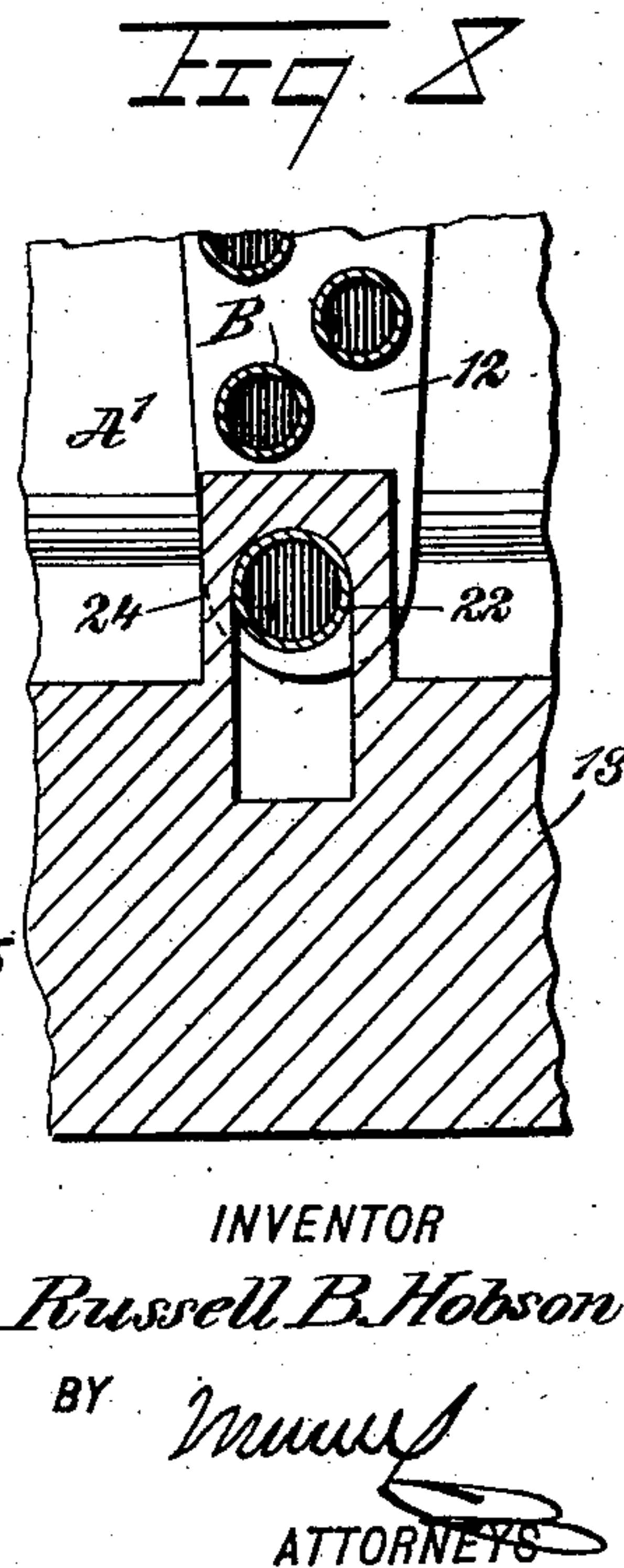
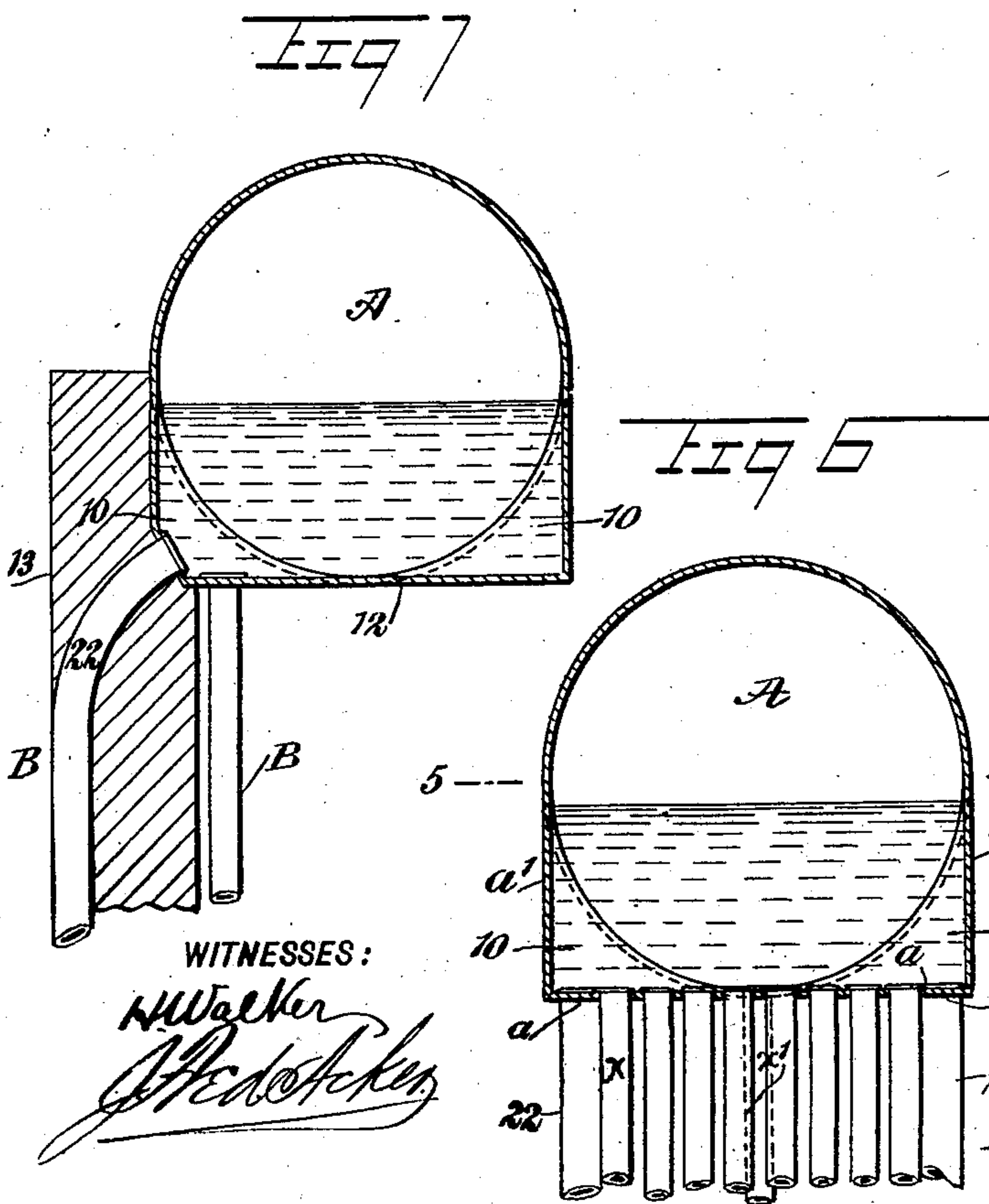
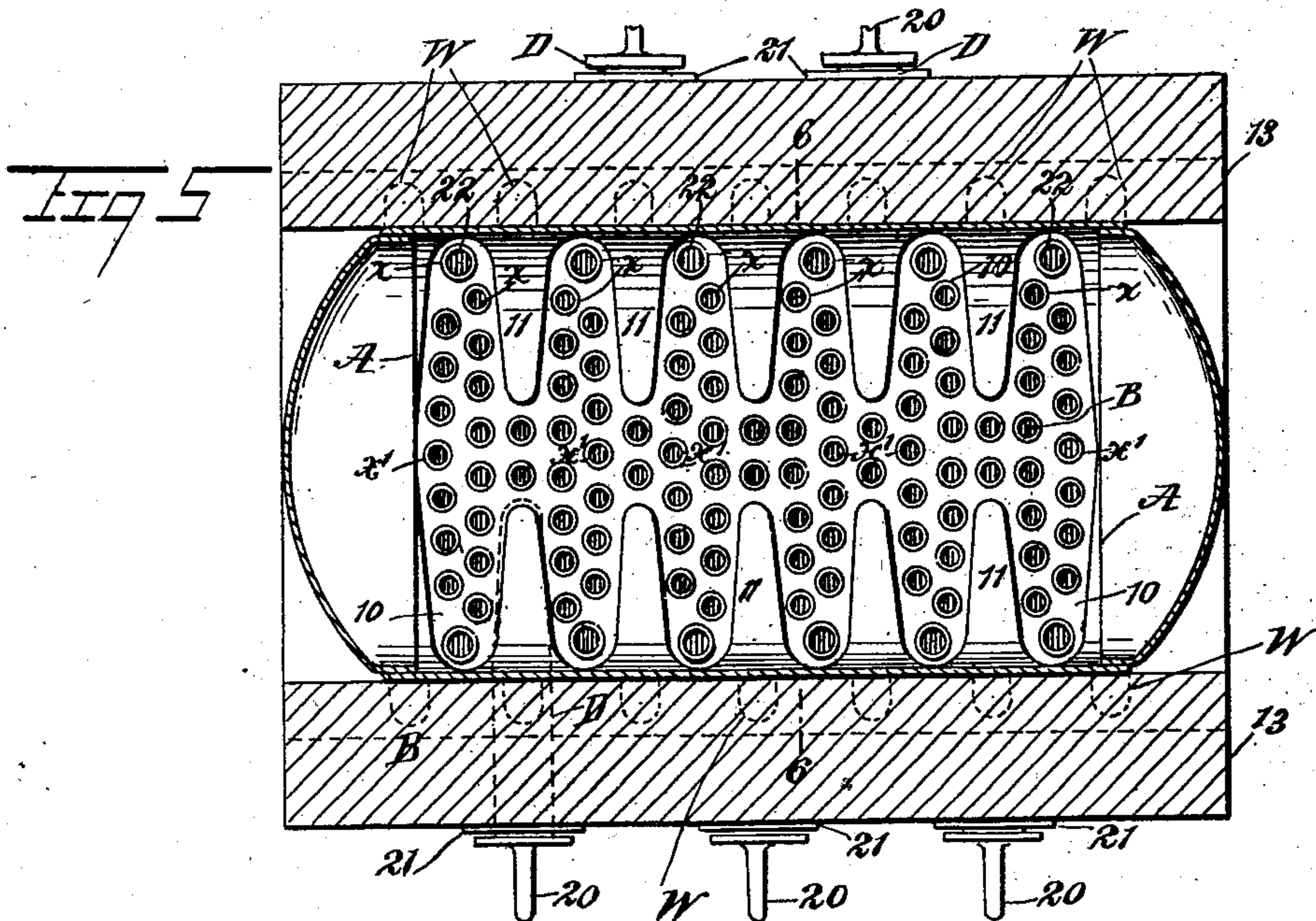
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UNITED STATES PATENT OFFICE.

RUSSELL B. HOBSON, OF PUEBLO, COLORADO.

BOILER.

SPECIFICATION forming part of Letters Patent No. 715,580, dated December 9, 1902.

Application filed January 18, 1902. Serial No. 90,338. (No model.)

To all whom it may concern:

Be it known that I, RUSSELL B. HOBSON, a citizen of the United States, and a resident of Pueblo, in the county of Pueblo and State of Colorado, have invented a new and Improved Boiler, of which the following is a full, clear, and exact description.

The invention relates to water-tube steam-boilers, and has for its object the arrangement of the tubes in such manner that the greatest possible number of tubes shall be exposed to the first contact of the products of combustion from the furnace, thus dividing the extreme boiler duty among as large a number of pipes as can be gotten into juxtaposition with the said furnace or fire-box.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical section on the line 1 1 in Fig. 2 through the improved boiler and connected furnace. Fig. 2 is a vertical section on the line 2 2 in Fig. 1 through the boiler and taken at right angles to the section shown in Fig. 1. Fig. 3 is a vertical section through the boiler and furnace, illustrating a slight difference in the construction of the boiler. Fig. 4 is also a vertical section through a boiler and furnace, illustrating a further modification in the construction of the boiler. Fig. 5 is a horizontal section through the upper drum, taken practically on the line 5 5 of Fig. 6. Fig. 6 is a transverse section through the drum, taken practically on the line 6 6 of Fig. 5. Fig. 7 is a transverse section through the drum, illustrating the application thereto of a circulating-tube independent of the regular water-tubes; and Fig. 8 is a section through a few of the water-tubes and a partial plan of the lower drum, illustrating another method of applying the independent circulating-tube to the drum.

In general I employ an upper drum A and a lower drum A' at a desired distance apart, connected by tubes B, which are expanded in a series of pockets or bumpings 10, offset from

the sides of the drums, spaces 11 occurring between the pockets, as is shown in Figs. 2 and 5. The pockets are formed by what I term a "saddle-plate" 12, attached to or made integral with a drum and forming a portion of the shell of the drum at either the top or the bottom. The saddle-plate extends longitudinally of the drum nearly from end to end, and lateral extensions *a* from the longitudinal edges of a saddle-plate constitute the bottom portions of the pockets 10, while the side walls *a'* of the pockets are carried upward from the extensions to an engagement with the outer face of the shell of the drum, as is shown in Figs. 6 and 7. The pockets 10 are in communication with the interior of the drum, to which they are affixed, as is also shown in Figs. 6 and 7.

The saddle-plate for the upper drum is at its bottom portion, while the saddle-plate for the lower drum is at its top portion, as is illustrated in Figs. 1 and 2. The tubes are disposed in such manner that a horizontal section of the boiler through said tubes or an end view of the tubes in either drum will show the tubes to be arranged in a serpentine or zigzag line, as is illustrated in Fig. 5, having more than three tubes in each curve of the serpentine or angle of the zigzag.

The tubes B are expanded in any suitable or approved manner in the saddle-plates of the drums. By the zigzag or serpentine arrangement of the tubes I am enabled to bring fifty or more tubes in a boiler of average size into the line of first contact with the products of combustion.

As will be hereinafter described, different arrangements of baffles are to be used, together with the auxiliary walls or settings, for deflecting the course of the gases or products of combustion among the tubes, according to the particular location and use of the particular boiler.

In the construction shown in Figs. 1 and 2 the casing and base-walls 13 and 13^a may be constructed in any approved manner to inclose the tubes B, except where the fire-box or furnace C is located, and to support the upper and lower drums A and A'. The fire-box or furnace C in the said views is located at the front lower portion of the boiler casing

or setting, having an opening 14 above the grate 15, communicating with the tube-chamber throughout the width of said chamber from side to side.

5 The fire-box or furnace may be of any approved type; but the stack 16 is shown resting upon a base 17, extending out from the front wall of the boiler-setting, the base being additionally supported by uprights 18, bearing upon the side walls of the furnace C. The breeching 19 extends from the top of the tube-chamber, usually from a point just below the upper drum A to a connection with the stack 16.

15 In connection with the serpentine or zigzag arrangement of the tubes B baffle-plates D are employed, and preferably, as shown in Figs. 1 and 2, these baffle-plates are removably applied. The baffle-plates D are of the same construction and each is complete in itself. The plates are usually rectangular in cross-section and are of a length sufficient to extend from the outside of the boiler-setting within the space between the elbows formed by the serpentine arrangement of the front and rear rows of tubes B, as is shown in dotted lines in Fig. 5. Each baffle-plate under the individual construction shown in Figs. 1, 2, and 5 is provided with a handle 20 at its outer end, which may be in the form of a ring or eye, and each baffle-plate D is slidably passed through a guide-sleeve 21, fitted in a wall of the boiler-setting, as is shown in Fig. 1. These baffle-plates need only be removed for cleaning, substitution, or repair or when a tube is to be taken out.

The baffle-plates D are arranged in tiers in any one side of the boiler or at the front and back. The tiers of baffle-plates consist of transverse series of plates, preferably level with one another; but the transverse series of baffle-plates at one side of the boiler are at a greater or less distance from the lower drum than the horizontal series at the opposite side of the boiler, and so are alternately placed, as is shown in Fig. 1, with the object of forcing the products of combustion from front to back of the boiler, or vice versa, insuring a greater area of direct contact with the tubes.

50 If desired, the baffles D may be omitted from the front side of the boiler, and those at the rear side are then so placed as to force the gases from side to side of each serpentine set of tubes with the object of insuring more thorough heat absorption.

The tubes 22 of the group B at the exterior outer ends of the bends or elbows, made by the zigzag arrangement of the outer series of tubes, are preferably of greater diameter than the other tubes, enabling them to better withstand the fierce heat to which they are subjected. If desired, the tubes marked x of the series of tubes B at the back of the boiler may be omitted when the form of baffles D are employed with the object of allowing a space to build a casing 24 around the back tubes marked 22 in order to pre-

vent the generation of steam in said tubes 22, and thus allow of a down current for the purpose of circulation, as shown in Fig. 8, or such tubes 22 can be bent out from the sides of the pockets 10 in such manner as to remove them to a greater distance from the heat than under the construction shown in Fig. 8, the pipes in that event being bent between their ends to a remote point in the wall of the setting or entirely without the wall, at will, as is shown in Fig. 7. In this latter instance the tubes marked x can remain as heating-surfaces. The arrangement shown in Figs. 7 and 8 will serve to keep the pockets clean and induce the generation of steam, or the tubes marked 22 may remain a portion of the heating-surface of the boiler, and other independent tubes may be provided in the manner described for the purpose of circulation between the two drums.

It will be observed that under my construction of boiler any tube can be removed and replaced by a new one without interfering with any other tube, the method being to back the tube down until its upper end is free, whereupon the upper end is made to fall over against the nearest wall and is drawn up through a slot or sweep W, left in the upper part of the wall for that purpose, the new tube being entered reversely. Of the central tubes marked x' two of them are withdrawn through the safety-valve nozzles and the remaining four through the man-holes or other special hand-holes made for the purpose at points in the upper drum A opposite each of said tubes, this latter provision being necessary only in those boilers which have no middle or transverse tile-baffles.

It will be noted that various modifications relating to such structural details as the size or shape of the drum may be made without departing from the spirit of the invention.

In Fig. 3 I have illustrated a form of boiler differing in construction from that described in that the central tubes x' are omitted to make room for a central vertical baffle-plate D', which is located between the two drums A and A', being removed from both and extending parallel with the longitudinal axes of the drums from one side of the setting to the other, meeting a horizontal baffle 26, which passes between the front series of tubes and is secured to the front wall over the furnace. The stack 27 is shown resting upon the side walls of the furnace, and a breeching 28 connects the stack with the flue-chamber of the boiler at a point just above the horizontal baffle 26.

In Fig. 4 the baffle-plate 29 extends up between the two series of water-tubes B from the lower drum to a point below the upper drum, and the stack 30 is at the rear of the boiler and is connected with the bottom portion of the tube-chamber by a breeching 31 at a point just above the lower drum, so that in the form of construction shown in Fig. 3 the products of combustion pass to the back

of the boiler below the horizontal baffle 26, thence up and above the vertical baffle D' to the front of the boiler, and out through the breeching 28. When the baffle is arranged as shown in Fig. 4, the products of combustion enter the boiler at the front of the baffle-plate 29, extend to the upper portion of the boiler, and pass across the top of the baffle-plate, thence down through the rear series of tubes and out at the back bottom portion of the flue-chamber through the breeching 31.

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

1. In boilers, a front series of water-tubes for exposure to the first contact of the products of combustion from the furnace, the said series of tubes being arranged in serpentine or zigzag position, with more than three tubes in each curve of the serpentine or angle of the zigzag, as set forth.

2. In boilers, an upper and a lower drum, a front series of straight and vertically-arranged water-tubes connecting the drums, the tubes being in serpentine or zigzag position and having more than three tubes in each curve of the serpentine or angle of the zigzag, a furnace and a direct communication between the furnace and series of tubes, whereby the greatest number of tubes in a boiler of average size is brought into the line of first contact with the products of combustion, as specified.

3. In a boiler, an upper and a lower drum, series of straight and vertically-arranged tubes connecting the drums, the tubes being in serpentine or zigzag position, a furnace being in communication with said tubes, and removable and adjustable baffles extending into all or sundry of the depressions in the line of serpentine or zigzag tubes, as described.

4. In a boiler, an upper and a lower drum, front and rear series of zigzag or serpentine tubes connecting the drums, each series of tubes having more than three tubes in each curve of the serpentine, or angle of the zig-

zag, the tubes at the outer bends or curves of the serpentine line, or points of the zigzag line of tubes being of greater diameter than the other tubes in the series, a furnace in direct communication with the tubes, and baffles in the tubes, for the purpose specified.

5. In boilers, the combination with upper and lower drums, series of straight tubes in serpentine or curved position connecting said drums, a furnace in direct communication with the tube-chamber, and baffles between all or sundry of the tubes, of circulating-tubes also connecting the drums, for the purpose described.

6. In a water-tube steam-boiler, oppositely-arranged drums, saddle-plates connected with the drums and each forming a series of pockets communicating with the interior of the respective drums, and a series of tubes in serpentine or zigzag position and having more than three tubes in each curve of the serpentine or angle of the zigzag, the end of the tubes being secured in the saddle-plates at the said pockets, as set forth.

7. In boilers, a series of straight tubes arranged in serpentine or zigzag position, with a plurality of said tubes, comprising more than three tubes, located in each curve of the serpentine or angle of the zigzag, a furnace, and a communication between the furnace and the tube-chamber, as set forth.

8. In boilers, a front and a rear series of straight water-tubes, each series being arranged in a serpentine or zigzag position and having more than three tubes in each curve of the serpentine or angle of the zigzag, drums connected by the tubes, and a furnace in communication with the tube-chamber, as described.

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

RUSSELL B. HOBSON.

Witnesses:

J. FRED. ACKER,
JNO. M. RITTER.