

(No Model.)

M. MILLER.
VERTICAL WATER TUBE BOILER.

No. 567,913.

Patented Sept. 15, 1896.

Fig. 1

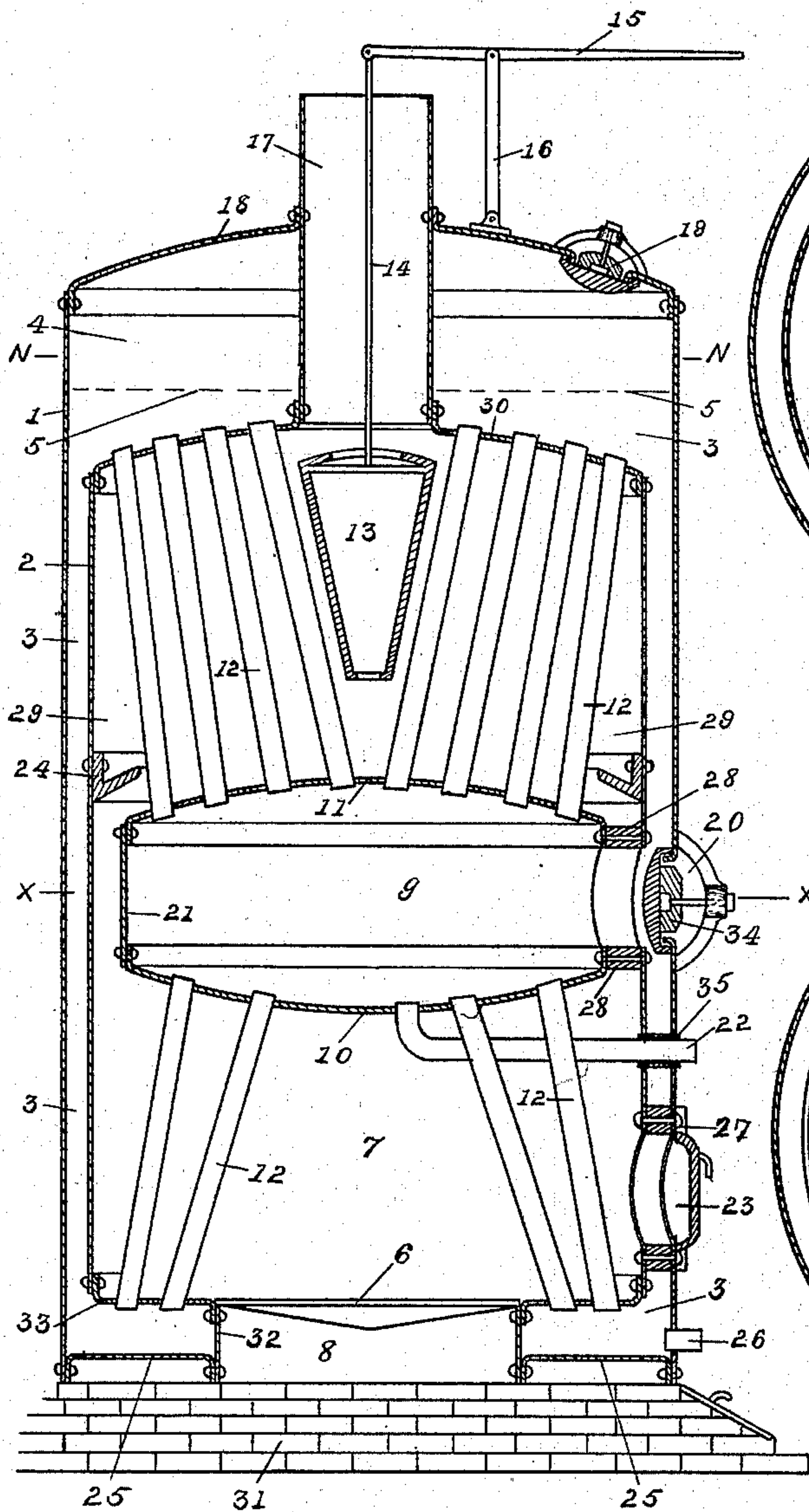


Fig. 2

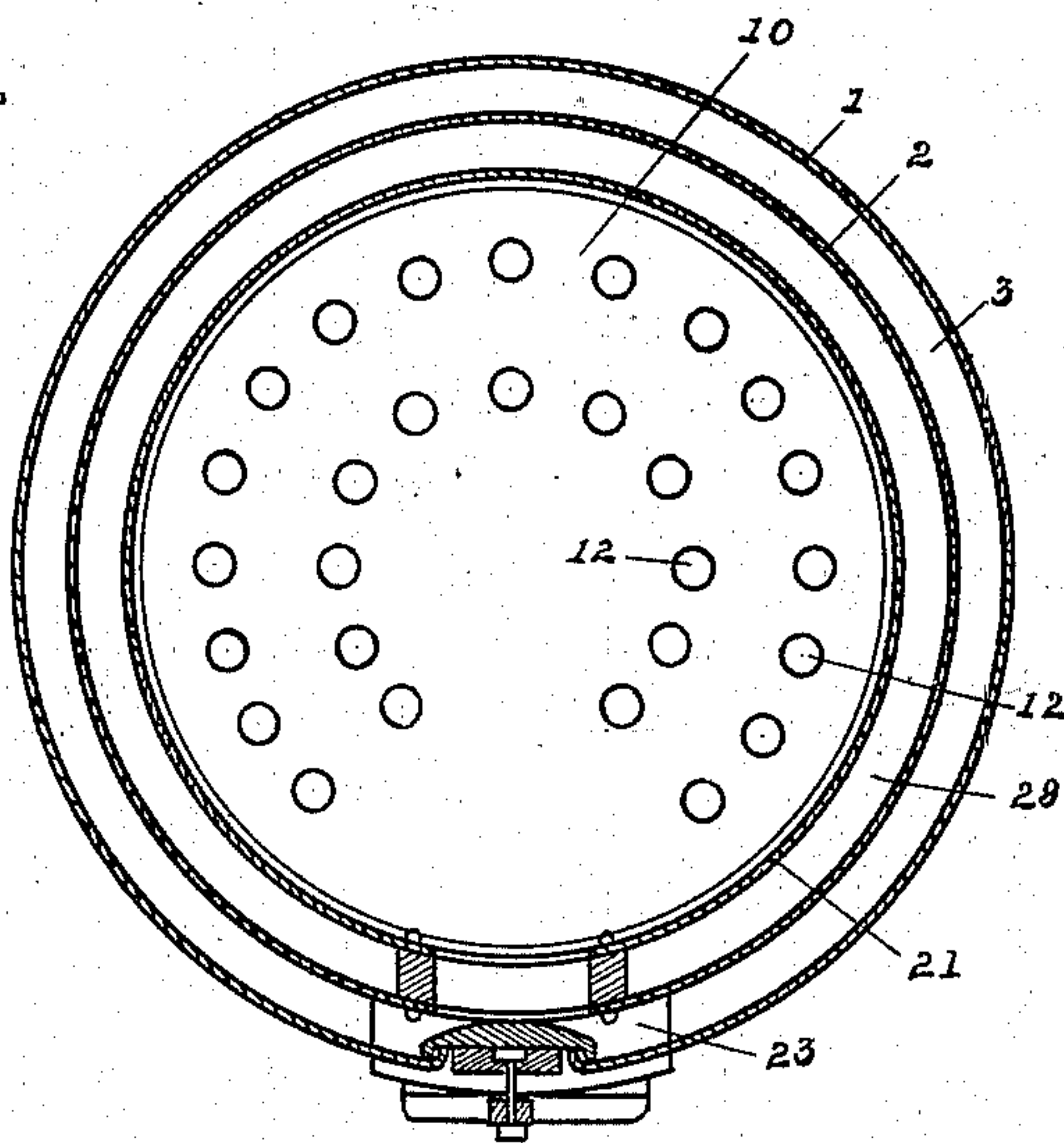
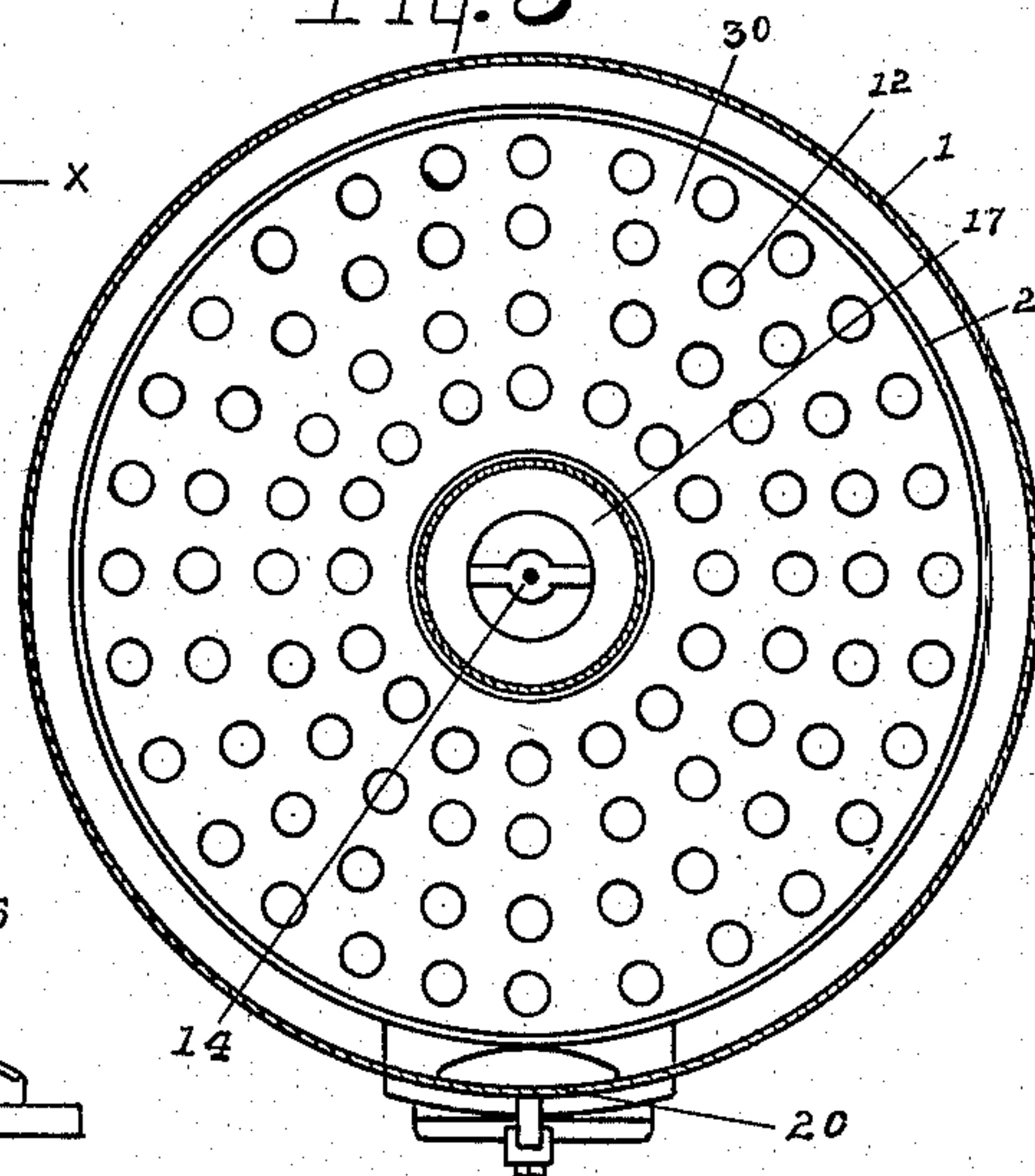


Fig. 3



WITNESSES:

N. Webster Schlater
James H. Power

Mathias Miller

INVENTOR

BY Chapin & Denny

his ATTORNEYS.

UNITED STATES PATENT OFFICE.

MATHIAS MILLER, OF AUBURN, INDIANA.

VERTICAL WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 567,913, dated September 15, 1896.

Application filed May 28, 1896. Serial No. 593,384. (No model.)

To all whom it may concern:

Be it known that I, MATHIAS MILLER, a citizen of the United States, residing at Auburn, in the county of De Kalb, in the State of Indiana, have invented certain new and useful Improvements in Vertical Water-Tube Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in vertical water-tube boilers designed to utilize the waste heat from furnaces and by presenting an extended heating-surface in contact with the water to quickly and economically generate steam.

The object of my invention is also to provide a steam-generator for marine and stationary engines having a large area of heating-surface, and which can be placed in a plant without the necessity of building brick arches or to incase the boiler with brick.

A further object is to arrange the water-tubes in connection with an inner water-drum to secure the best circulation of heat within the boiler.

I accomplish these objects by the device described in the following specification, and illustrated by the accompanying drawings, in which—

Figure 1 is a view in vertical section of the boiler embodying my invention. Fig. 2 is a transverse sectional view of Fig. 1 through the line *x x*, and Fig. 3 is a transverse sectional view through the line *N N*.

Similar figures refer to similar parts in the several views.

The small numeral 1 represents the outer shell of the boiler, cylindrical in form and resting upon a brick foundation 31 and having a crown-shell 18.

2 is an inner shell concentric with the outer shell 1.

Both the outer and inner shell have a circular central opening at the bottom, inclosed by the cylindrical casing 32, which is united to the base 25 of the outer shell at the bottom and to the base 33 of the inner shell at the top, thus practically forming a part of the

boiler and a support for the inner shell, with a water-space 3 between the two bottoms, which communicates with and forms an extension of the water-space 3 between the sides of the two shells.

The tops or crowns of both the inner and outer shells have central circular openings for a smoke-flue 17, which is united at its base to the crown 30 of the inner shell, and at its top to the crown 18 of the outer shell, thus affording a draft-opening from the interior for the escape of the smoke.

Above the ash-pit 8 at the base of the boiler are the fire-grates 6 and the fire-box 7.

9 is a cylindrical inner drum suspended midway between the top and bottom of the boiler, having a bottom 10, a crown 11, and vertical sides 21.

28 is a ring or sleeve which is riveted to the drum 9 and the wall of the shell 2 and open in its center and thereby giving a free communication between the water-space 3 and the interior of the drum 9.

Secured to the bottom 33 of the shell 2 in concentric rows around the fire-grates are the water-tubes 12, which are preferably inclined inwardly at their upper ends, where they are united to the bottom 10 of the drum 9. These tubes communicate at their lower ends with the water-space 3 and at their upper ends with the interior of the drum 9. Above this drum are also a plurality of concentric rows of water-tubes 12, secured at their lower ends to the crown 11 and preferably inclining outwardly, also secured at their upper ends in the crown 30, and thus communicate with the interior of the drum 9 and the water-space above the crown 30.

The drum 9 is less in diameter than the inner diameter of the shell 2, thus leaving a space between their walls for the ascent of the heat from the fire below the drum to the spaces 29 above the same and having the draft-exit through the flue 17.

Above the crown of the drum 9 a circular angle-iron 24 is secured to the inner wall of the shell 2 to deflect the heat as it rises around the exterior of the drum toward the center of the inner space of the boiler. This iron 24 while not absolutely essential is preferable.

A manhole 20 is placed in the side of the

boiler opposite the opening through the ring 28, which has a manhole door or plate 34, secured in the outer shell by the ordinary bridge and bolt, so as to make it water-tight.

5 Through the opening 20 and the coincident opening through the ring 28 a free access is afforded to the interior of the drum 9 for the purpose of cleaning and repairing the said drum when the water is drawn from the boiler.

10 22 is a blow-off pipe communicating with the bottom of the drum 9 and projecting at its outer end through a sleeve 35 to the outside of the boiler. The sleeve 35 is secured to the outer and inner shells of the boiler so
15 as to be water-tight.

23 is an ordinary fire-door mounted within the solid ring 27, which ring is also secured to the outer and inner shells. By this means access is given to the fire-box and there is
20 free communication between the water-space below and above the fire-door around the exterior of the ring 27.

13 is a metallic cone suspended centrally in the shell 2 by a rod or chain 14 from the lever
25 15, pivoted upon the standard 16. This cone divides the heated air in its ascent, and it is thus diffused among the upper tubes 12, and by raising it against the base of the flue 17 or lowering it it regulates the draft.

30 19 is a manhole in the crown 18, secured by a manhole-plate in the usual manner.

29 and 29 are hot-air spaces in the interior of the inner shell.

26 is wash-out plug at the base of the boiler
35 and there can be any number of them placed at different points in the outer circumference.

The dotted line 5 indicates the height of the water above the top of the crown 30, which of course can be varied, and 4 is the steam-
40 space above the water-line.

By this construction it will be perceived that the water fills the entire space between the outer and inner shells up to and covering the top of the inner shell and also fills the
45 upper and lower series of tubes 12 and the drum 9.

In very large boilers central draft-tubes may also be made through the drum 9 for the heated air to ascend from the fire to the air-
50 space above the drum.

By this device a very equal distribution of the heat is secured and the hot air surrounds the water-tubes and the drum as well as giving a heating-surface to the whole of the in-
55 ner shell. No brick walls or casing are necessary for inclosing the boiler. The fire-grate surface may be quite small and a great saving of fuel effected. The boiler can be made ready for use in the shop before shipping and
60 can be set for use by any ordinary mechanic.

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

1. In a vertical water-tube boiler the com-
65 bination of an external and an inner shell having a water-space between the shells at

the bottom, sides, and top, and having a central circular opening at the base for an ash-pit, a fire-box above the ash-pit, a central circular water-drum suspended midway between 70 the base and the top of the inner shell of less diameter than the interior diameter of the inner shell, a plurality of concentric rows of water-tubes communicating with the water-space beneath the bottom plate of the inner 75 shell and the interior of the said water-drum and supporting said drum, a plurality of concentric rows of water-tubes connected at their lower ends with the crown of the said water-drum and at their upper ends with the crown 80 of the said inner shell thereby forming a water communication between the water-space in the interior of said drum and the space above the crown of the inner shell, a central vertical flue connected with and opening 85 through the crown-sheets of both the outer and inner shells into the heat-chamber in the interior of the boiler and an inverted conical damper adapted to close said flue with means for regulating said damper all arranged as 90 shown and described.

2. In a vertical water-tube boiler, the combination of an external cylindrical shell and an inner concentric cylindrical shell having a water-space between them, a fire-box in the 95 interior of the base of said boiler, with means to feed fuel into said fire-box through an opening in said shells, a central circular water-drum suspended midway between the base and the top of the said inner shell and having a 100 less diameter than the said inner shell and having communication by water-tubes between the water-space at the lower part of the inner shell and the interior of said drum, a plurality of water-tubes connecting at their lower ends 105 with the said water-drum, and at their upper ends with the water-space between the outer and inner shells, a central vertical flue communicating with the hot-air space of the inner shell, a draft-damper adapted to regulate 110 the draft and diffuse the heat in the said air-chamber, a steam-chest above the water-lines in said boiler, and means for communicating with said steam-chest, and also means for communicating with said inner drum from 115 the exterior all arranged as shown and described and for the purpose stated.

3. In a vertical water-tube boiler, the combination of an outer shell, an inner concentric shell so arranged as to leave a wa- 120 ter-space between it and the outer shell, a smoke-flue and draft-damper as shown, a centrally-arranged inner water-drum suspended as shown and connecting with said water-space by a series of fixed water-tubes ar- 125 ranged as described and the said inner drum being provided with a suitable opening coincident with an adjacent manhole, thereby affording access from the exterior to the interior of said inner drum for cleaning and 130 repairs, all substantially as described and shown and for the purpose stated.

4. In a vertical water-tube boiler an inner
heating-drum centrally fixed in an inner heat-
ing or furnace shell and communicating with
the water-spaces surrounding said shell by a
5 series of fixed water-tubes constructed and
arranged as described, the said drum being
provided with a suitable opening coincident
with an adjacent manhole of the heating-
shell, thereby affording access from the ex-

terior to the interior of said drum for clean- ing and repairs.

Dated at Fort Wayne, Indiana, this 25th
day of May, 1896.

MATHIAS MILLER.

Witnesses:

ALBERT L. BOND,
HENRY J. MILLER.