

No. 626,118.

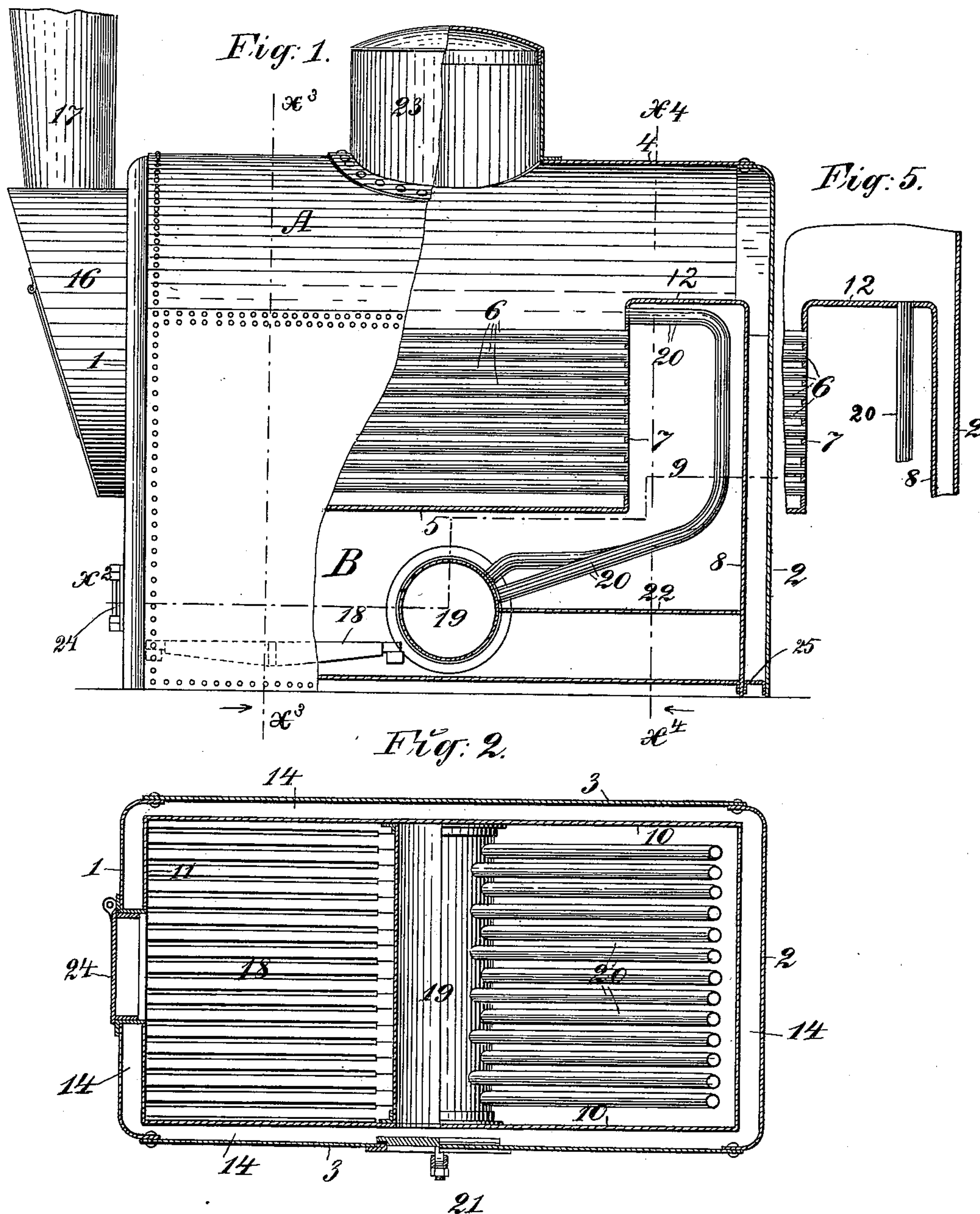
Patented May 30, 1899.

R. WHITE.
STEAM BOILER.

(Application filed Jan. 20, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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2 Sheets—Sheet 2.

Fig. 3.

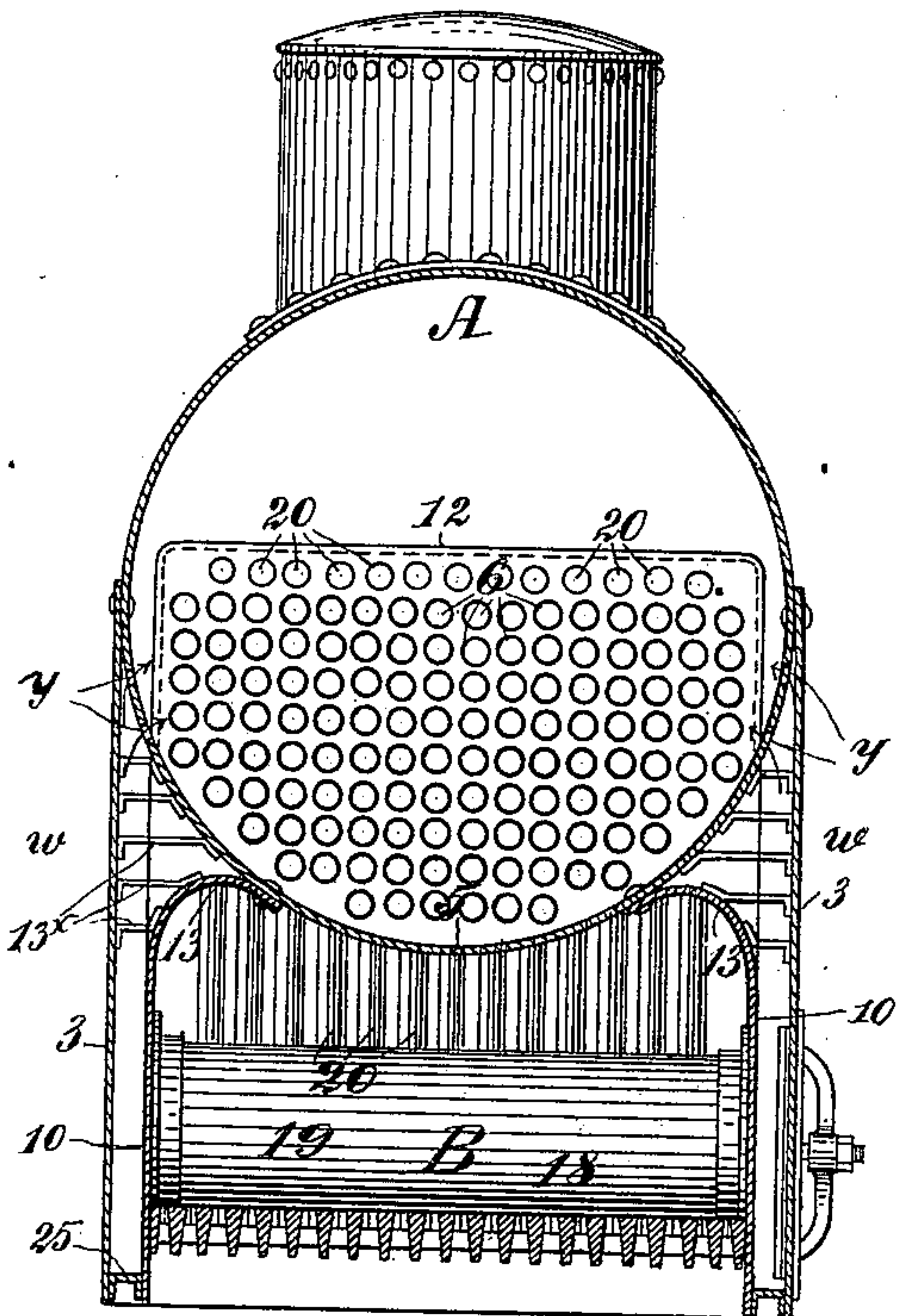


Fig. 4.

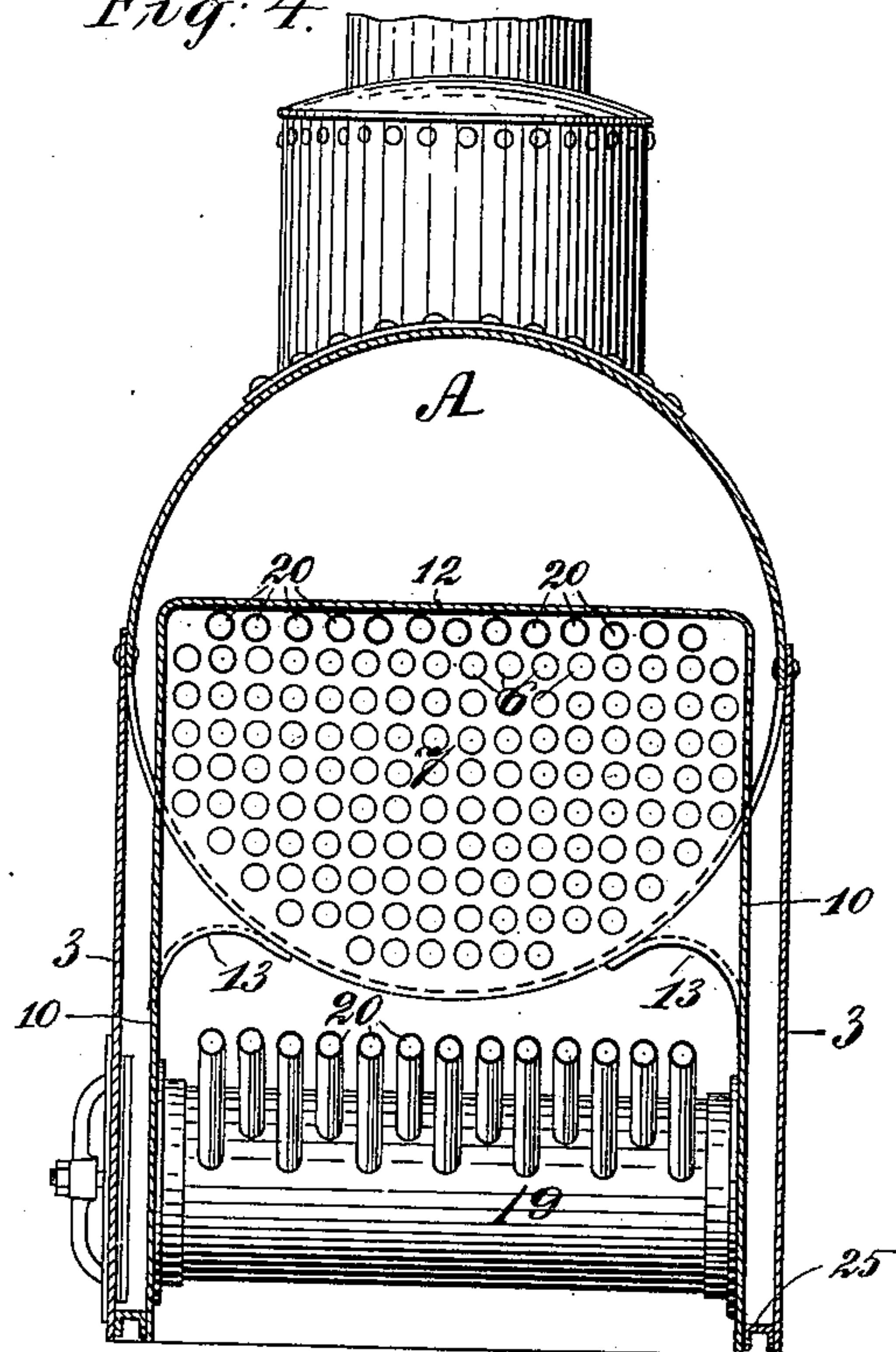
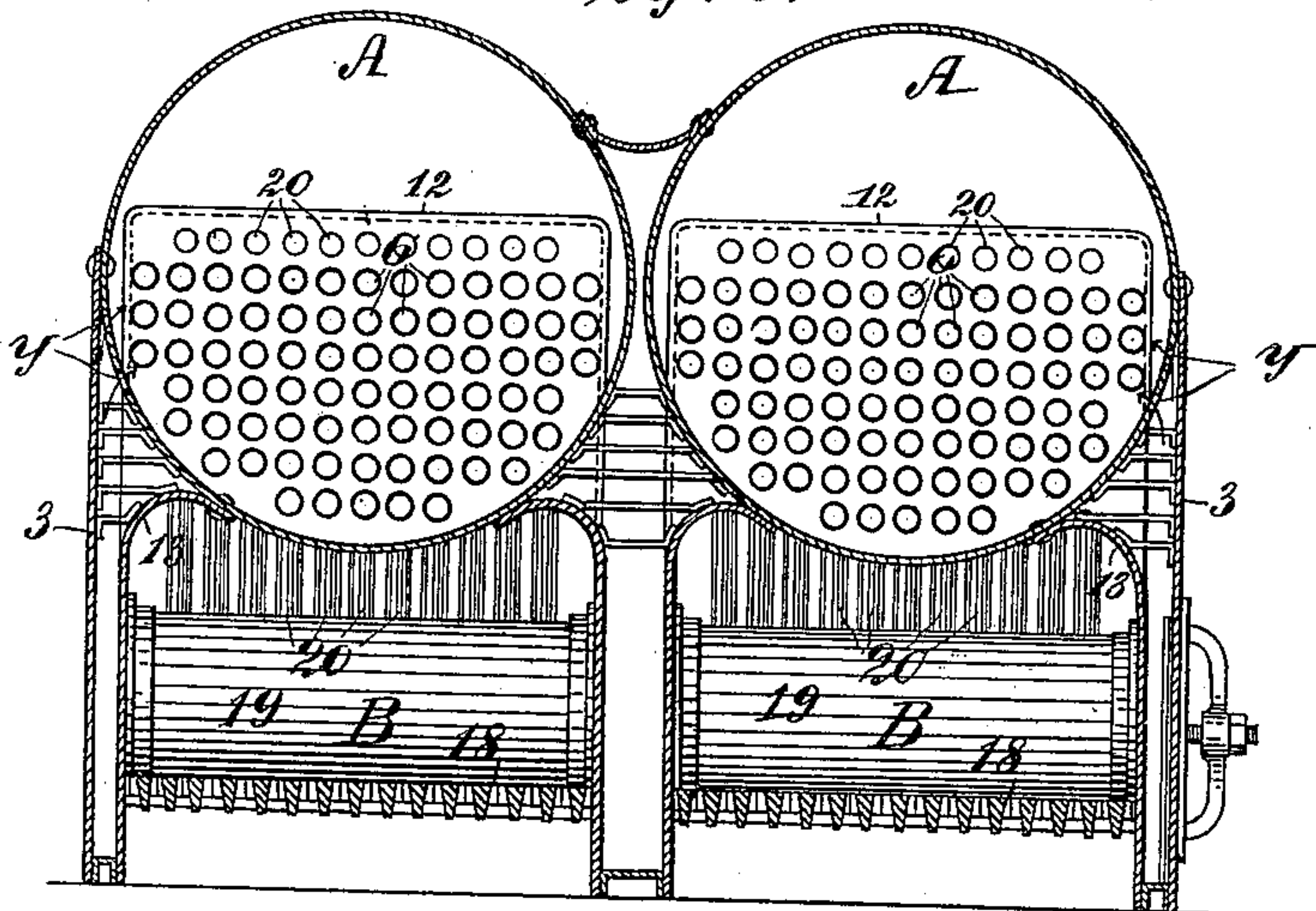


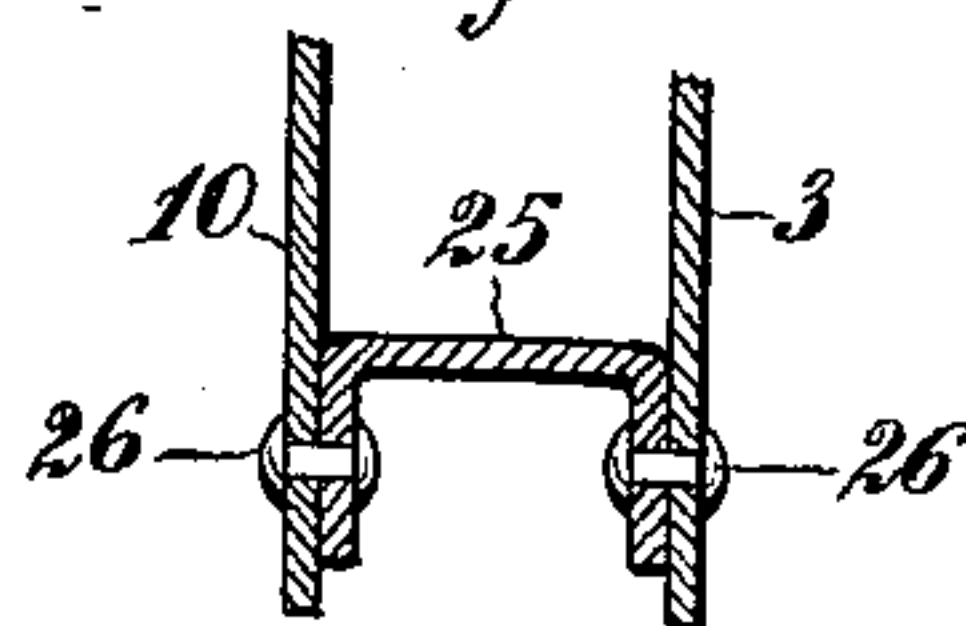
Fig. 6.



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Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT WHITE, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 626,118, dated May 30, 1899.

Application filed January 20, 1898. Serial No. 667,281. (No model.)

To all whom it may concern:

Be it known that I, ROBERT WHITE, a citizen of the United States, residing in the borough of Brooklyn, in the county of Kings and city
5 and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to the class of re-
10 turn-flue boilers; and the object of the invention is to provide a boiler of relatively cheap construction, great strength, relatively great steaming capacity, and one which has
15 less weight than ordinary boilers of the same class. These objects are obtained partly from the special construction of the boiler, whereby strength and lightness are attained, together
20 with facility for cleaning the boiler, and partly from means which will be hereinafter described for increasing the heating-surface of the boiler.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure
25 1 is a side view of the boiler, the front portion at the left being in side elevation and the rear portion in longitudinal vertical mid-section. Fig. 2 is a horizontal section in the plane of line x^2 in Fig. 1. Fig. 3 is a vertical
30 transverse section in the plane of line x^3 in Fig. 1, looking to the rear. Fig. 4 is a vertical section in the plane of the line x^4 , looking to the front. Fig. 5 is a fragmentary sectional view showing how the pipes 20 may
35 extend up through the roof-plate 12 instead of forward through the tube-sheet 7. Fig. 6 is a view similar to Fig. 3, illustrating the application of the invention to a battery of
40 boilers. Fig. 7 illustrates in detail the bottom of the water-leg.

In general the boiler has the well-known
45 "wagon" shape or form, being rectangular in plan, vertical at its sides and ends, and arched or semicircular in form at the top. The products of combustion pass back and
50 up to the rear tube-sheet, enter the tubes or flues at their rear ends, flow toward the front through the tubes, and pass thence into the breeching and to the stack.

The outer shell of the boiler has an up-
50 right front plate 1, an upright back plate 2, upright side plates 3 3, and an arched crown-

plate 4, which is formed of the upper half of a cylinder A, the lower portion of which forms, Fig. 3, the pendent convex heating-surface 5 over the fire-box B. The cylinder A extends
55 from the front plate back to the back plate 2 as to its upper half; but at its rear end it is cut away at the under side up to near its axis, so that the whole or complete cylinder terminates
60 at the rear tube-sheet 7. There is a double vertical wall about the entire lower part of the structure, formed by an outer and inner shell, the said inner shell comprising the inner
65 back plate 8, the inner side plates 10, and the inner front plate 11. These inner and outer plates form water walls or legs 14. Between the inner back plate 8 and the rear
70 tube-sheet 7 is a combustion-chamber, which is closed in above by a roof-plate or crown-sheet 12. The inner side plates 10 extend up to meet the roof-plate 12 from the tube-sheet
75 7 back to the plate 8; but from the inner front plate 11 back to the tube-sheet 7 (where the full or complete cylinder A terminates) these plates are curved inward to form arched an-
80 gle-plates 13, which extend to and are riveted to the cylinder A. Preferably the arched plates 13 are integral with the plates 10; but they might be constructed separately and riveted to the upper edges of said plates 10.
85 The water-legs are stayed in the usual manner, and at the points w in Fig. 3 where spandrel water-spaces are formed along the sides between the upright outer side plates 3 and
90 the arched plates 13 the stays 13^x extend across, as shown, from the outer side walls to the curved plates within, thus strengthening all of the parts perfectly with short stays. No stays are needed in the cylinder A among
95 the tubes and none are used, thus giving room for a closer arrangement of the tubes 6 than can be ordinarily employed.

To connect the water-spaces within the cylinder A with that in the water-legs 14, and thus provide the proper circulation, apertures
95 are formed in the cylinder A at y , Fig. 3, below the points where the outer side plates 3 are riveted thereto.

The construction described forms a combustion-chamber 9, Fig. 1, back of the rear
100 tube-sheet 7, into which the hot gases rise and flow into the rear ends of the tubes 6 in

the cylinder A, passing thence forward to the breeching 16, and from it to the stack or uptake 17.

In the fire-box B is the usual grate or fire-bed 18, and back of same and forming a bridge-wall therefor is a transversely-arranged water-drum 19, which is fixed at its ends in the inner side plates 10, so that its interior connects directly with the side water-legs.

From the drum 19 water-tubes 20 extend back, upwardly, and thence forward through the rear tube-sheet 7, opening into the water-space above the tubes 6.

The drum 19 and tubes 20 extend the heating-surface of the boiler very greatly, and so increase its steaming capacity. As here shown, there are two tiers or sets of the tubes 20, but there may be one or more sets of such tubes. In the side walls of the boiler-shell there is a manhole 21 opposite the end of the drum 19, in order to afford access for cleaning it and inspecting its interior.

The four corners of the outer shell of the boiler are rounded, as best seen in Fig. 2, to impart strength and avoid the necessity of corner-stays; and this rounding is also extended over the arch of the boiler at the front and back, as seen in Fig. 1.

Back of the drum 19 the lower and relatively ineffective part of the combustion-chamber 9 may be cut off by a horizontal plate 22, but this is not essential to the invention.

On the top of the cylinder A is the ordinary steam-dome 23, and in the boiler-front is the usual charging-door 24.

Instead of carrying the tubes 20 forward through the tube-sheet 7 they may extend directly upward through the plate 12, as shown in Fig 5.

This boiler is well adapted for use in battery, as illustrated in Fig. 6, where two boilers are represented as arranged side by side. This form is especially useful under circumstances where a high boiler cannot be used, as on some vessels. In that case the cylinders A may be reduced in diameter and two or more boilers placed side by side.

It will be readily understood by those skilled in the art that the employment of the cylindrical shell A, its lower part forming the furnace-crown, avoids the use of braces or ties from the furnace-crown to the arched top sheet of the boiler and also the use of the ordinary side braces for bracing the main shell, thus effecting a material saving in the cost of the boiler besides reducing its weight. The boiler is also rendered much more accessible for cleaning than where the ordinary construction is used. Being stronger than the ordinary construction it follows that the boiler is well adapted for generating steam at high pressure.

As there are no braces or stays in the main portion of the cylinder, opportunity is given for inserting more tubes 6 than could otherwise be employed, as before stated.

In order to facilitate the riveting in the process of construction and to facilitate the cleaning of the water-legs 14 by avoiding interiorly-situated rivet-heads and calking edges, the flanged plates 25, which close the bottoms of the legs, are turned with their flanges downward and outward, Fig. 7. Thus the rivets 26 are wholly exterior, easily inserted, and no obstruction is offered on the inside for cleaning.

It will be obvious that the cylinder A may end at the tube-sheet 7 and that the inclosed space back of said tube-sheet may constitute a combustion-chamber. This will be apparent to any boiler-maker and will not require illustration.

Having thus described my invention, I claim—

1. A steam-boiler having a combustion-chamber 9 in its rear end, water-legs 14 at the sides, a cylindrical water-drum 19, extending across and its interior communicating with the interiors of said side water-legs, and water-tubes 20 extending from said drum back to the said chamber 9 and entering the rear tube-sheet of the boiler thereat, substantially as set forth.

2. In a steam-boiler, the combination with the cylinder A, having flues opening at the rear into a combustion-chamber 9, the said chamber connecting with the fire-box, the fire-box, the grate or fire-bed therein, the side water-legs, communicating with the water-space of the cylinder, the transversely-arranged water-drum 19, forming a bridge-wall back of the fire-bed and communicating at its ends with the respective water-legs, and the water-tubes 20, extending from said drum back through the combustion-chamber and communicating with the water-space in the cylinder, substantially as set forth.

3. In a return-flue steam-boiler having side water-legs, the combination with the said water-legs, of a water-drum 19, extending transversely of the combustion-chamber back of the fire-bed and communicating at its respective ends with the water-legs, and a series of water-tubes 20, extending from said drum rearward and upward back of the rear tube-sheet of the boiler and thence forward and through the said tube-sheet above the tubular flues, substantially as set forth.

4. A steam-boiler having side water-legs 14, a transverse drum forming a bridge-wall and communicating with said side water-legs at its ends, and a manhole in the outer face of the water-leg opposite the end of said drum, substantially as set forth.

In witness whereof I have hereunto signed my name, this 18th day of January, 1898, in the presence of two subscribing witnesses.

ROBERT WHITE.

Witnesses:

HENRY CONNETT,
PETER A. ROSS.