

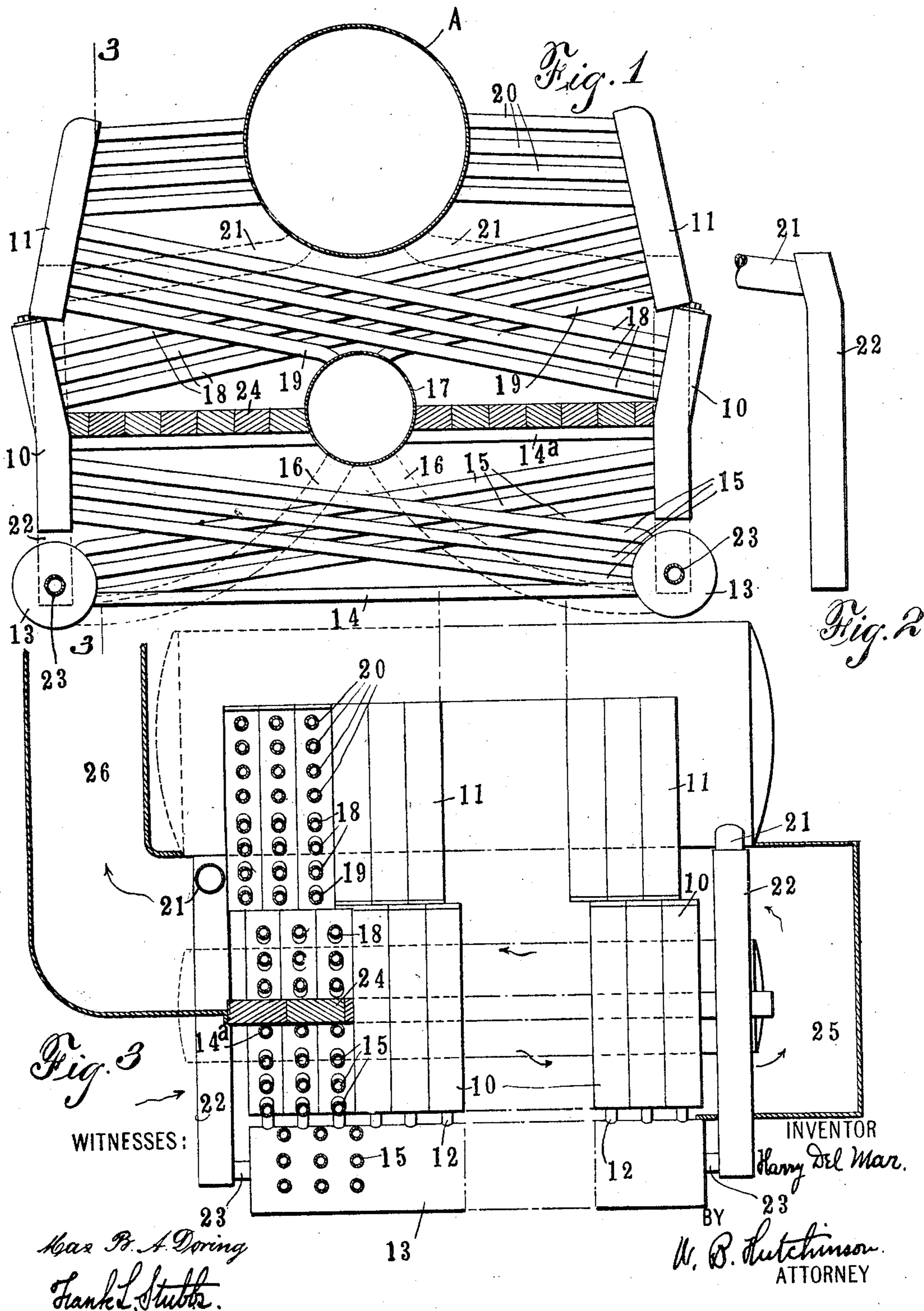
No. 828,600.

PATENTED AUG. 14, 1906.

H. DEL MAR.
WATER TUBE BOILER.

APPLICATION FILED APR. 28, 1906.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 4,

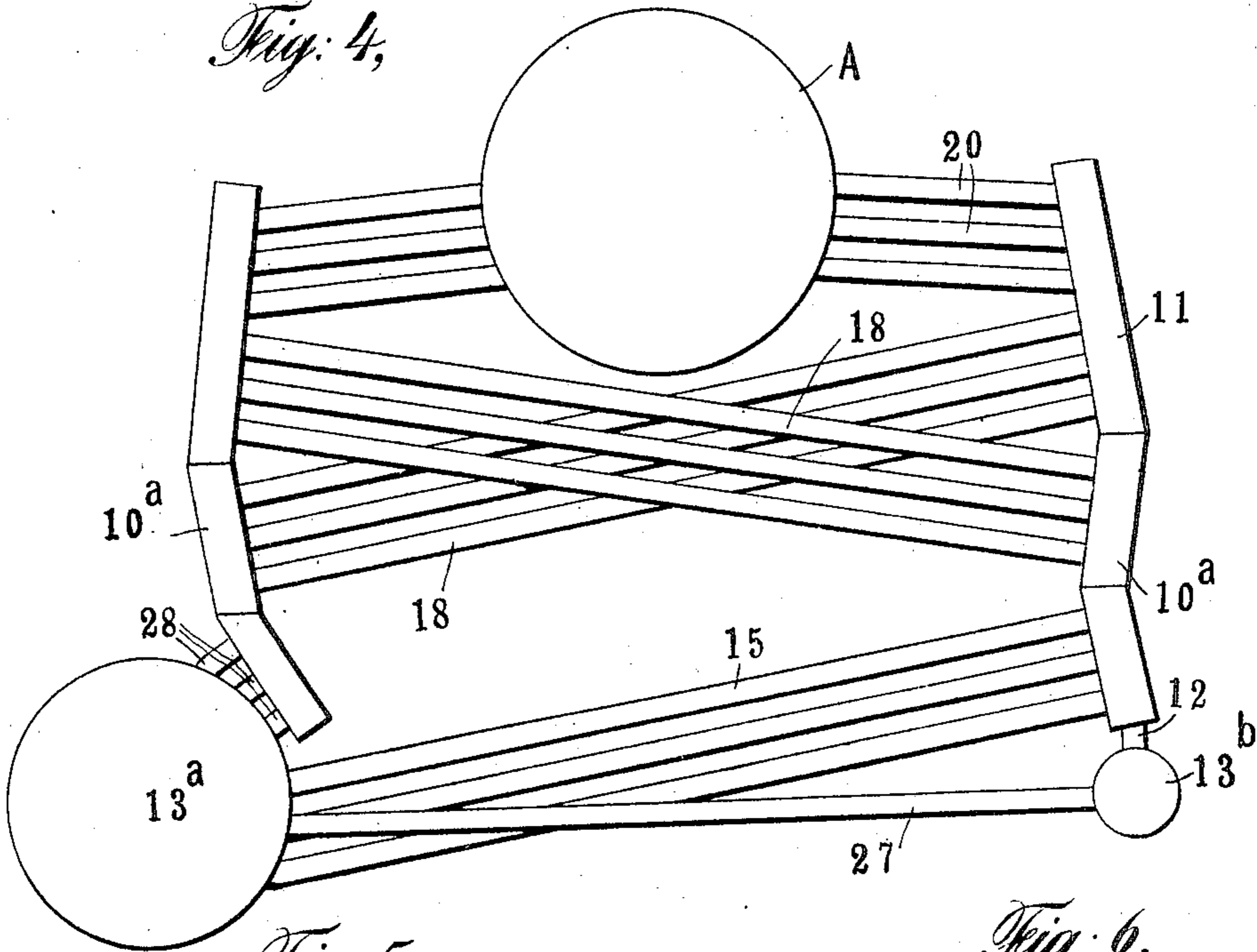


Fig. 5.

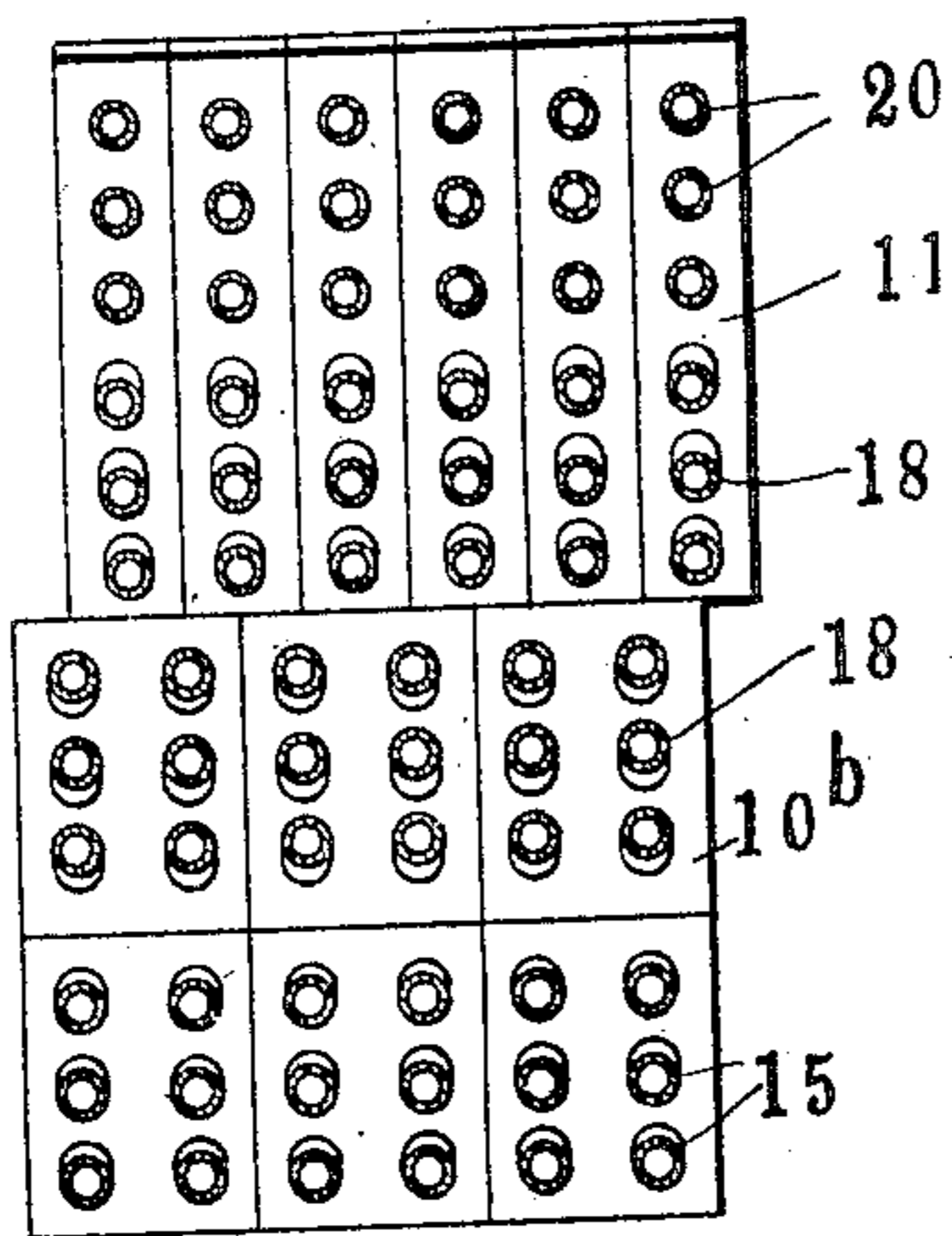


Fig. 6,

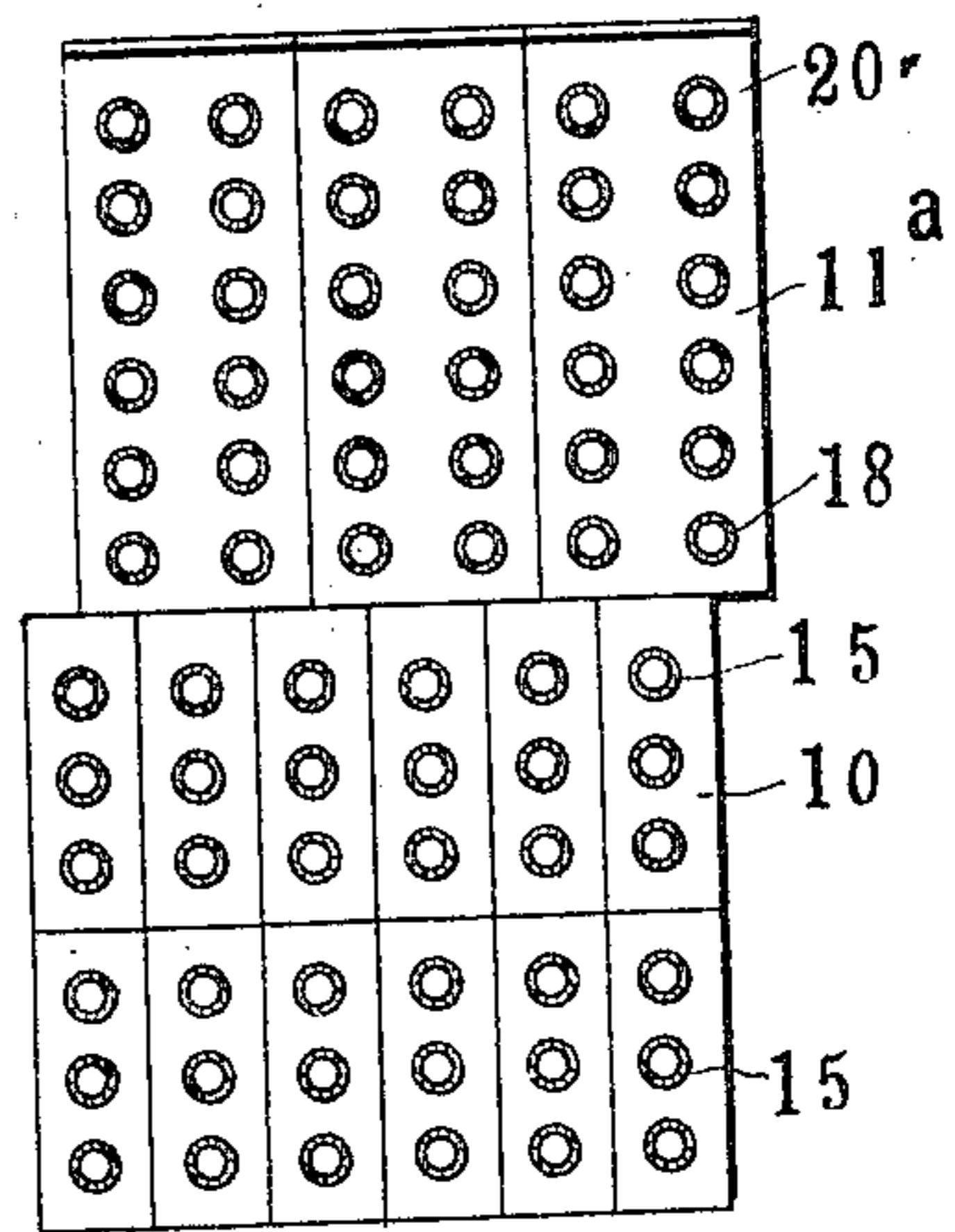
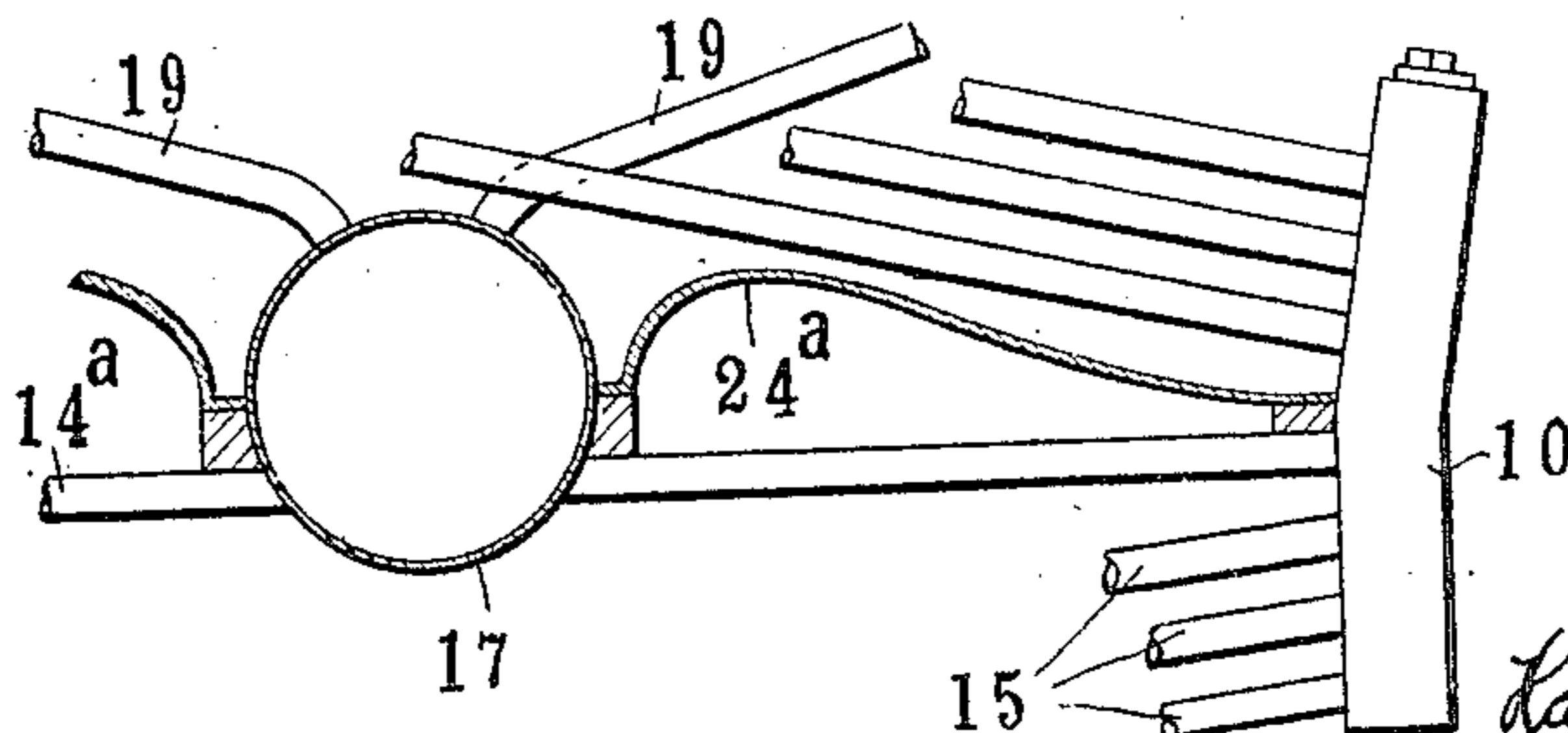


Fig. 7,



WITNESSES

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HARRY DEL MAR, OF NEW YORK, N. Y.

WATER-TUBE BOILER.

No. 828,600.

Specification of Letters Patent.

Patented Aug. 14, 1906.

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To all whom it may concern:

Be it known that I, HARRY DEL MAR, of the city, county, and State of New York, have invented a new and Improved Water-Tube Steam-Boiler, of which the following is a full, clear, and exact description.

My invention relates to improvements in sectional water-tube steam-boilers; and the object of my invention is to produce a water-tube sectional steam-boiler for low and high pressure service and to arrange the tubes so that the area thereof shall be equal in all parts of the boiler; also, to make the boiler compact, of large heating and grate surface, and to have an arrangement of the tubes so that they will be in series diagonally opposed and so that the heat and hot gases will be deflected to the rear or side of the boiler after passing up between a portion of the tubes and then enter a flue or combustion-chamber, whence they will pass over the upper half of the tube series and enter the flue or smoke-stack. The idea in this arrangement is to reduce the temperature of the flue-gases and get a greater amount of heat on the tubes. However, this boiler need not be converted into a return-flue boiler, but can be so arranged that the gases are baffled before reaching the top of the tube series and give good results. I prefer, however, to use the return-flue system, as shown.

To these ends my invention consists of certain features of construction and combinations of parts, which will be hereinafter described and claimed.

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

Figure 1 is a cross-section of the boiler embodying my invention. Fig. 2 is a detail showing the connection with the water-leg. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is an end elevation with parts omitted, showing a modified arrangement of the tubes and drums. Figs. 5 and 6 are sectional elevations showing modified forms of headers, and Fig. 7 is a broken detail cross-section showing particularly a modified arrangement of the baffle or deflecting-arch.

My invention comprises a series of headers 10 and 11, arranged one below the other and on opposite sides of the boilers, and the headers may be given different pitch or shapes to adapt them to various styles of boiler—as,

for instance, they may be single headers, as shown in Figs. 1 and 2, or the top headers may be single and the lower ones double, as shown in Fig. 5, where the lower header 10^b is double, or, as in Fig. 6, the upper headers 11^a may be double and the lower ones single, or even other forms of headers may be used without affecting the invention. The lower headers connect by nipples 12 (see Fig. 3) with the mud-drums 13 at the boiler-sides, and these are connected by equalizing-tubes 14. Each mud-drum also connects with the header on the opposite side of the boiler by a series of tubes 15, and the drums 13 also connect by the large tubes 16 with the water-drum 17, which is located, preferably, near the center of the boiler and beneath the steam-drum A. The upper portions of the lower headers 10 also connect by diagonally-arranged tubes 18 with the opposite upper headers 11, and the upper headers 11 are also connected with the water-drum 17 by the tubes 19. The upper portions of the headers 11 also connect with the steam-drum A by the cross-tubes 20, and the steam-drum connects by the downtake-tubes 21 with the vertical water-legs 22, which are arranged at the boiler-corners and connect with the drums 13 by nipples 23. The lower headers 10 are also connected by cross-tubes 14^a, which serve as equalizing-tubes and also support the baffle plate or wall 24, which can be made of brick and which deflects the hot gases to the back flue 25 at the end of the boiler, and thence the gases return, passing over the upper tubes of the boiler and into the smoke-stack 26. (See Fig. 3.)

A preferred form of baffle is shown in Fig. 7 in which the baffle-plate 24^a is made in the form of an arch on opposite sides of the water-drum 17, and this forms a sort of channel or flue which leads the gases back to the box 25. It will be noticed by reference to the drawings that I provide tubes of equal area in all parts of the boiler, so that there shall be an equal flow of steam and water, and it will also be seen that instead of using a single water-drum 17 I can use two or more, if preferred. The course of the water is as follows: From the steam-drum A through the downtake-tubes 21 and water-legs 22, through the nipples 23 to the mud-drums 13, thence up through the tubes 15 to the headers 10, and through the tubes 18 from the headers 10 to the headers 11. A part of the water will also pass up through the tube 16, water-drum 17,

and tubes 19 to the headers 11, and from these headers it passes through the tubes 20 to the steam-drum.

Instead of using two mud-drums, one mud-drum 13^a can be used, as in Fig. 4, and in this case I use a small drum 13^b on the opposite side of the boiler, which simply serves as a settling-drum, and this connects with the mud-drum by tubes 27. In this construction I can also dispense with the water-drum 17. In this type of boiler the headers will naturally be shaped a little differently from those described; but I do not here claim any particular shape of header. As shown, the lower headers 10^a on one side of the boiler connect with the mud-drum 13^a through the series of tubes 15, while the lower headers on the opposite side of the boiler connect with the mud-drums by means of the short tubes 28. This boiler is practically the same in operation as that already described, and it can have the same arrangement of water-legs and downtake-tubes at the corners.

From the foregoing description it will be seen that I thus provide a boiler having an equal flow of steam and water in all its parts, that the tubes are arranged to be easily heated, that I have a large grate-surface, and that the arrangement is such as to utilize the heat from the products of combustion to a very great extent.

I wish to call attention to the fact that in my improved construction I make practically a double boiler—that is, I have a double series of cross-tubes divided by a baffle, and in this way I utilize heat to advantage. I wish, further, to call attention to the fact that the baffle can be perforated, if desired, so that a part of the hot gases can go up through it.

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

1. A boiler of the kind described having a steam-drum water-drums and mud-drums connected together by headers acting as intermediaries, and series of upper and lower cross-tubes diagonally opposed, the upper headers connecting to the steam-drum and the lower headers connecting with the water-drum mud-drums and upper headers.

2. A boiler of the kind described having a steam-drum and mud-drum, opposed headers on opposite sides of the boiler, and opposed diagonally-arranged cross-tubes con-

necting the mud-drum with the headers and connecting the headers with each other and with the steam-drum.

3. A boiler of the kind described having a steam-drum, an upper and lower series of cross-tubes diagonally opposed, a water-drum, a mud-drum, and opposed headers each header connecting with the water-drum and the upper series of headers connecting to the steam-drum while the lower series connect to a mud-drum.

4. A boiler comprising a steam-drum, a water-drum and mud-drums, a series of opposed upper and lower headers, and a series of diagonally-opposed tubes arranged to connect the upper headers with the steam-drum and water-drum and to connect the lower headers with the mud-drums and water-drum.

5. A boiler having upper and lower series of cross-tubes, the two series being spaced apart, a combustion-chamber at the end of the boiler, and a deflector arranged between the upper and lower series of tubes and extending the width and length of the boiler, whereby the draft is carried from the lower tubes through the combustion-chamber and back to the upper tubes.

6. A boiler having upper and lower series of diagonally-opposed cross-tubes, a middle or water drum, and a deflector arranged transversely and longitudinally of the boiler at a point adjacent to the water-drum thereby forming a baffle and return-flue.

7. In a boiler of the kind described, the combination of diagonally-opposed upper and lower headers connected by cross-tubes, one header of each series receiving plural rows of tubes, and the opposed header a single row of tubes.

8. A boiler comprising a steam-drum, mud-drums and opposed upper and lower headers, a water-drum, cross-tubes connecting the lower headers and mud-drums, water-tubes connecting the water-drum and mud-drums, cross-tubes connecting the water-drum and upper headers, cross-tubes connecting the lower headers and upper headers, and tubes connecting the upper headers and steam-drum.

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