No. 823,264. PATENTED JUNE 12, 1906.

H. DEL MAR.

WATER TUBE BOILER.

APPLICATION FILED MAR. 10, 1906.

2 SHEETS—SHEET 1.

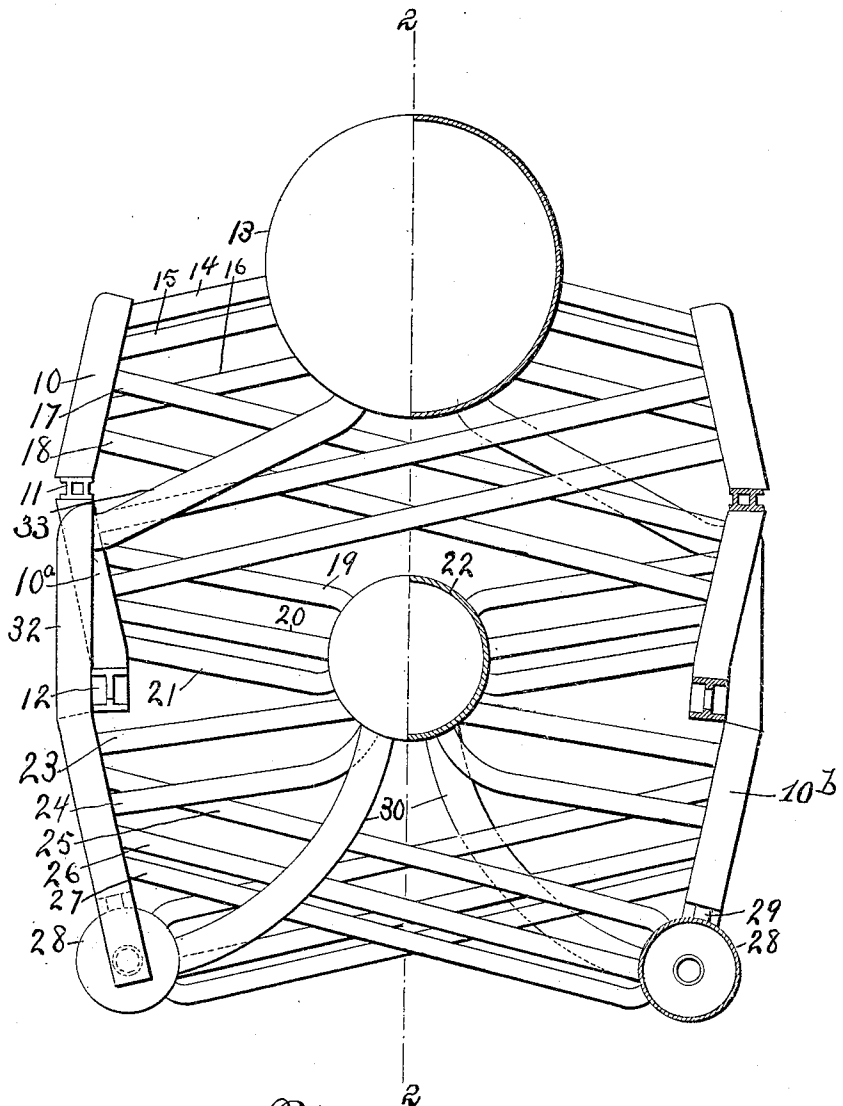

Fig. 1

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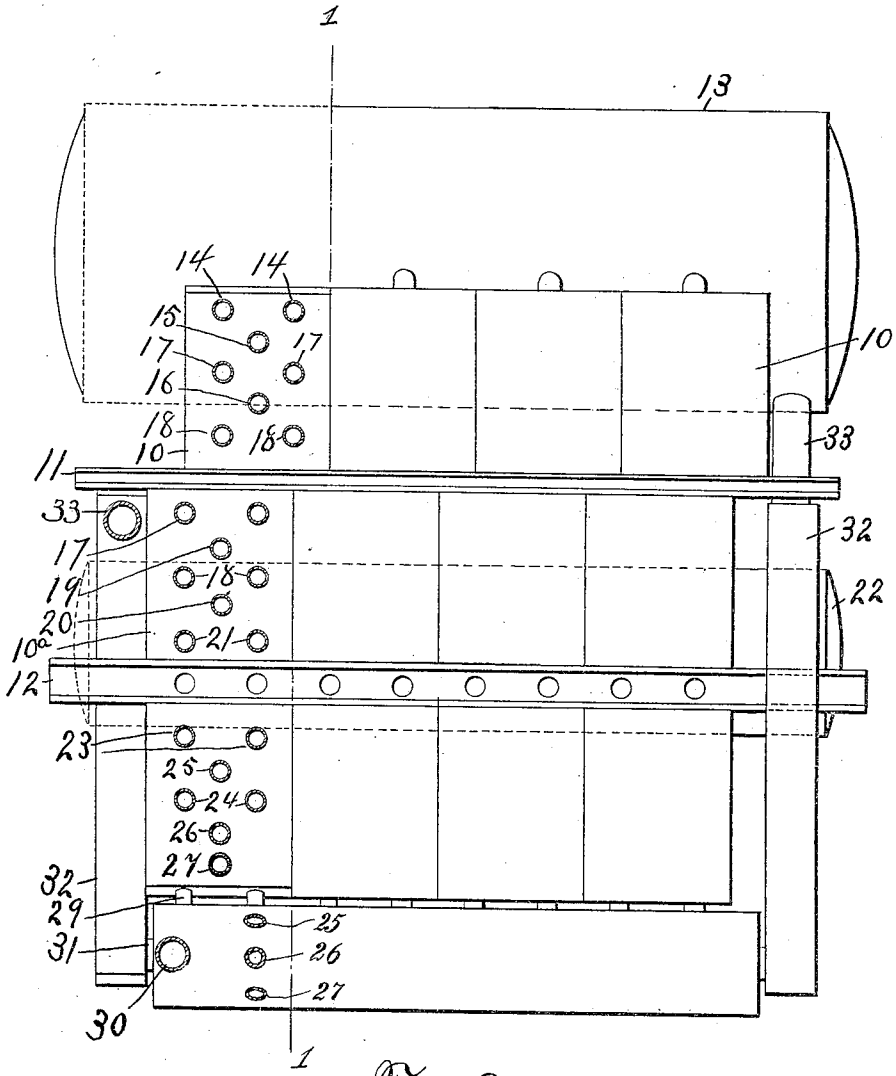

Fig. 2.

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UNITED STATES PATENT OFFICE.

HARRY DEL MAR, OF NEW YORK, N. Y., ASSIGNOR TO BOILERS AND ENGINEERING COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

WATER-TUBE BOILER.

No. 823,264. Specification of Letters Patent. Patented June 12, 1906.

Application filed March 10, 1906. Serial No. 305,199.

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 boiler in which the tubes are arranged so as to promote rapid and direct circulation, and thereby equalize the temperature of different parts of the boiler. The arrangement is intended also to avoid conflicting currents in the water circulation, to obtain compactness of structure, and to provide each tube which crosses the fire-box with a sufficient outlet area to discharge its contents rapidly and take care of its sediment; also, to provide a sufficient inlet area to keep the water in good circulation, thereby allowing the sediment to settle in the drums constructed for that purpose, from which it can be blown off when necessary.

In general my invention is intended to provide a compact quick-steaming and efficient boiler of the kind described.

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 figures of reference indicate corresponding parts in both the views.

Figure 1 is a view, partly in end elevation and partly in vertical cross-section, on the line 1 1 of Fig. 2; and Fig. 2 is a view, partly in vertical section on the line 2 2 of Fig. 1 and partly in elevation.

The sides of the boiler are made up of the headers 10, 10^a, and 10^b, which are superposed in series, one above the other, the two upper rows being supported on the beams 11 and 12, which can be in turn supported in the usual manner. The boiler is provided with the usual type of steam-drum 13 at the top, and this connects on both sides with the upper headers 10 by means of the short tubes 14, 15, and 16. The headers 10 also connect by the inclined cross-tubes 17 and 18 with the headers 10^a below, and the latter connect by the tubes 19, 20, and 21 with the middle or water drum 22. From this drum extend the downwardly-inclined tubes 23 and 24, which connect with the lower headers 10^b. These headers 10^b are connected also by the downward-extending cross-tubes 25, 26, and 27 with the mud-drums 28 at the bottoms and sides of the boiler, and the mud-drums are connected also with the headers 10^b by the nipples 29. The mud-drums 28 are also connected with the water-drum 22 by the downflow-pipes 30, and the mud-drums connect at the end by means of nipples 31 with the vertical water-legs or feed-pipes 32 at the corners of the boiler. These pipes or water-legs connect with the steam-drum by means of the downflow-pipes 33.

From the foregoing description and by special reference to Fig. 2 of the drawings it will be seen that I provide for a very full and free circulation and that the several receiving and discharging parts, such as the water-drum, mud-drums, and the several headers, have an equalized arrangement of inlet and outlet tubes, so that there is nothing to impede the circulation, and, further, that the arrangement is such as to promote the settling of sediment in the mud-drums.

The circulation is as follows: From the steam-drum the water flows through the downflow-pipes 33 into the vertical feed-pipes or water-legs 32, thence into the mud-drums 28, thence through the cross-tubes 25, 26, and 27 to the headers 10^b, thence through the next series of tubes 23 and 24 to the middle or water drum 22, thence through the tubes 19, 20, and 21 to the headers 10^a, thence through the tubes 17 and 18 to the headers 10, and from these through the tubes 14, 15, and 16 to the steam-drum. Here the steam is separated from the water, and the colder body of water again takes up the course just described. It will be seen that this circulation is amply provided for and that steam can be very easily made.

In the drawings I have not shown the usual boiler attachments; but it will be understood, of course, that the boiler can be provided with suitable blow-off valves, water-column, pressure-gage, and other accessories. It will be obvious that the headers may be made of different shapes and may be somewhat differently disposed and that headers might be substituted for the mud-drums 28 without

seriously affecting the principle of this invention.

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

1. A water-tube steam-boiler comprising a steam-drum, a water-drum below the steam-drum, mud-drums, and headers on the sides of the boiler, the steam-drum, water-drum and mud-drums being connected by means of suitable tubes and through the headers with each other and the inlets and outlets of the several drums being of approximately equal area.

2. A water-tube steam-boiler comprising a steam-drum, a water-drum and mud-drums, vertical feed-pipes or water-legs at the corners of the boiler, and headers forming the boiler sides, the several drums being connected with the headers and the steam-drum and mud-drums connecting also with the aforesaid feed-pipes and water-legs.

3. A water-tube steam-boiler comprising a steam-drum, a water-drum below the steam-drum, and mud-drums below the water-drum, a series of superposed headers forming the boiler sides, connections by means of suitable tubes between the mud-drums the lower headers and the water-drum, tube connections between the water-drum, the upper headers and the steam-drum, and a downflow connection between the steam-drum and the mud-drums.

4. The combination with the steam-drum and water-drum, of the superposed headers on the sides of the boiler, connections between the upper headers and the steam-drum, cross-tube connections between the upper headers and the next lower headers, and cross-tube connections between the said next lower headers and the water-drum.

5. A water-tube steam-boiler comprising a steam-drum, a water-drum below the steam-drum, mud-drums at the boiler sides, a series of superposed headers above the mud-drums, tube connections between the upper headers and the steam-drum, cross-tube connections between the upper headers and the next lower headers, tube connections between the said second headers and the water-drum, tube connections between the water-drum and the lower or third series of headers, connections between the lower headers and the mud-drums, and downflow connections between the steam and mud drums.

6. In a boiler such as described, the combination with the water-drum, mud-drums and lower headers, of tube connections between the water-drum and said lower headers, connections between the said lower headers and the mud-drums, and direct tube connections between the mud-drums and the water-drum.

HARRY DEL MAR.

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