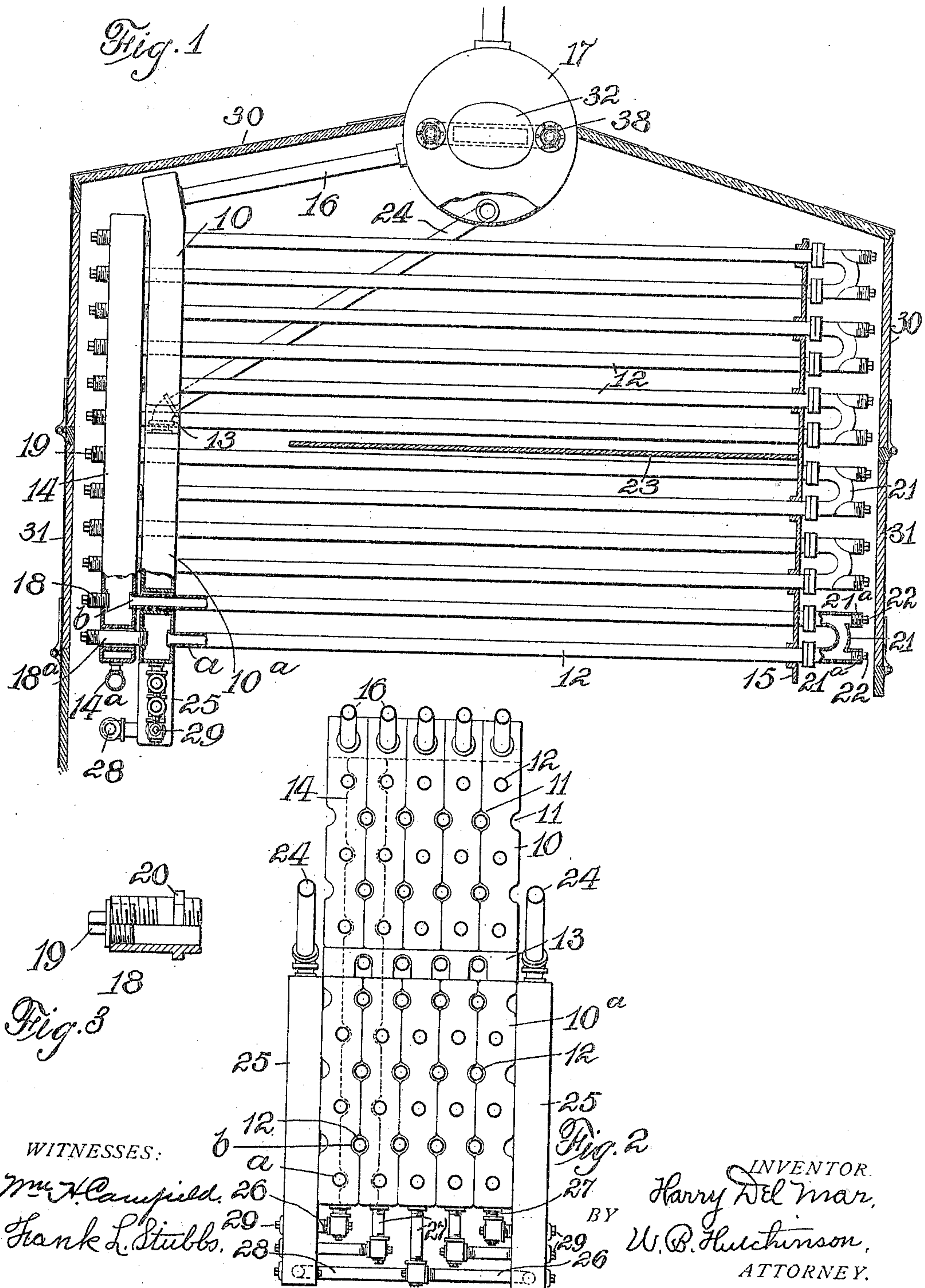


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PATENTED APR. 10, 1906.

H. DEL MAR.
STEAM BOILER.

APPLICATION FILED APR. 22, 1905.



UNITED STATES PATENT OFFICE.

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

STEAM-BOILER.

No. 817,418.

Specification of Letters Patent.

Patented April 10, 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 Steam-Boiler, of which the following is a full, clear, and exact description.

My invention relates to improvements in steam-boilers of the water-tube type; and the object of my invention is to produce a sectional water-tube boiler which is safe and durable, in which the parts are readily accessible, and which has high evaporative efficiency.

My invention is also intended to produce a boiler which economizes space, while of liberal proportions in grate and heating surface.

My boiler is in its interior construction readily accessible from the outside for examination, cleaning, or repairs.

Another object of the invention is to have all the tubes in the furnace directly over the fire and exposed to the effect of heat, to arrange the water-ways so that the movement of the water in the boiler is natural, constant, and rapid, to provide and arrange headers so that they will form walls to the furnace, to have short tubes, so as to reduce tubular expansion, and, further, to construct and arrange the tubes and accessory parts so that the tubes can be plugged or kept closed while the boiler is in operation or easily cleaned when necessary.

With these ends in view 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 side elevation of my improved boiler with parts in section and with the housing in section. Fig. 2 is a cross-section showing the back part of the boiler in elevation. Fig. 3 is a detail of one of the nipples of a header.

The boiler has at one end, and preferably at the rear end, a double series of headers, the front headers comprising the upper and lower sections 10 and 10^a, which are similar and superposed, and these have in the sides notches or recesses 11, so that when placed together side by side to form an end wall for the boiler they will leave spaces through which tubes may pass to the rear headers, as presently described. The boiler has the cus-

tomary tubes or pipes 12, which connect with the front and rear headers, as presently described, and the two series of headers 10 and 10^a are spaced apart by a row of bricks 13 or similar spacing medium.

The rear headers 14 extend the full height of the tube-bank and while of the same width as the front headers 10 and 10^a they are of double the height, as shown in Fig. 1 and as will appear by the single header 14, as shown in dotted lines in Fig. 2.

The tubes 12 are staggered in couples, as shown at *a* and *b* in Figs. 1 and 2, so that, as shown in the section in Fig. 1, the circulation will be from the rear header 10^a, through the tube *a*, and back through the tube *b* to the front header. This arrangement is preserved through the whole boiler, except the couples are in reverse relation at the top—that is to say, the circulation will start from the front header in the upper part of the boiler and return to the rear header 10. The tubes 12 at the front end of the boiler are supported in a plate 15, which can be of cast-iron and which has suitable holes for the passage of the tubes, as shown in tubular boilers.

The inner and upper headers 10 of the boiler connect by the pipes 16 with the steam-drum 17, which is of the usual type and may be of any preferred kind.

The several headers are provided with nipples 18 and 18^a, and these are closed by plugs 19, and the nipples also have preferably a faceted and thickened portion 20, to which a wrench may be applied. The nipples 18^a are longer than the nipples 18, so as to connect with the inner or front headers 10 and 10^a, and the several nipples are placed opposite the several tubes 12, so that by removing the plugs from the nipples access can be had to the tubes to clean them, and the arrangement is also intended for the application of a special tool, by means of which the tubes can be plugged or capped without removal when the boiler is in use. This tool is arranged to go over the outside of the nipple and allow the removal of the plug and the substitution of a stopper for the pipe at an interior point in case of leakage without any lessening or removing of the steam-pressure. This tool I am perfecting and intend to patent in a later application.

As above stated, the tubes 12 are in couples and at the front end. The tubes of each couple connect by the return-bends 21, which are unique in that each bend has an integral nip-

ple 21^a, arranged in alinement with a tube 12, and the nipples are closed by plugs 22. By removing the plugs the tubes can in this way be gotten at from the front end of the boiler.

5 I have shown a baffle-plate 23 separating the upper and lower series of tubes; but this arrangement is common to water-tube boilers, and I do not claim novelty for it.

From the steam-drum 17 extend the downwardly-inclined water-legs 24, which are outside the banks of tubes, and they connect with the vertical mud-drums 25. These drums 25 are unusual in that they are vertical, and they extend downward below the banks of headers, as shown clearly in the drawings, and this makes a compact arrangement and also permits of very compact arrangement of connections between the lower portion of the mud-drums and the lower portion of headers 10^a. These connections are best shown in Fig. 2, where the connections are in the form of elbows 26 and 27 and have caps opposite the straight pipes, as shown, to provide for cleaning. The lower portions of the mud-drums are also connected by the pipe 28 to promote circulation. Opposite the horizontal parts 26 of the connections just referred to and in the outer parts of the mud-drums are removable caps 29, which enable the drums and pipes to be easily cleaned.

The whole system of tubing, headers, &c., is covered by the housing 30, as usual, and to permit easy access to the boiler I provide doors 31 in the housing.

35 I have shown the steam-drum 17 provided with the usual manhole or hand-hole, which is closed by a manhole-cover 32, which, except for the accessories, is as usual.

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

1. A water-tube boiler, comprising inner and outer headers arranged at one end of the boiler, water-tubes arranged in couples with each couple connected to both series of headers, vertical mud-drums at the sides of one series of headers, connections between the mud-drums and the headers, a steam-drum, connections between a series of headers and the steam-drum, and connections between the steam-drum and the mud-drums.

2. In a water-tube boiler, the combination

of the inner and outer headers forming one wall of the boiler, the inner headers being in separate upper and lower series, and water-tubes arranged in couples, each couple having one tube connected to an inner header and the other tube connected to the outer header.

3. In a water-tube boiler, the combination of the tube-banks, and the steam-drum having indirect connection therewith, of the vertical mud-drums at the sides of the tube-banks, and water-legs connecting the mud-drums and steam-drum.

4. In a water-tube boiler, the headers forming one wall, one set of headers being placed inside the other, forming a double wall, and water-tubes arranged in couples, one tube of each couple being connected to an inner header and the other tube connected to the outer header, return-bends on the other ends of the tubes and connecting the tubes of each couple, and a projecting nipple on each return-bend and in line with each tube, said nipple being constructed to receive an inner plug, and provided with an external screw-thread.

5. In a water-tube boiler, the combination of the tube-banks, an external header, a pair of headers arranged on the inner side of the external header and having no connection with one another, water-tubes arranged in couples, each couple having one tube connected to an inner header and the other tube connected to the outer header, and return-bends on the ends of the tubes opposed to the headers the return-bends having projections in line with the tubes, said projections being arranged to receive a plug or a cap.

6. In a water-tube boiler, the combination with the water-tube arranged in couples, of the return-bends connecting the couples, each bend having a projection in alinement with the tubes, the projection extending beyond the body of the return-bend and having a plug in each projection and an external screw-thread on the projections for the affixing of a plugging-tool.

HARRY DEL MAR.

Witnesses:

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