

UNITED STATES PATENT OFFICE.

HANS O. KEFERSTEIN, OF NEW ORLEANS, LOUISIANA.

VERTICAL BOILER.

No. 925,107.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HANS O. KEFERSTEIN, a subject of the Emperor of Germany, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Vertical Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to vertical boilers provided with fire-tubes; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a vertical section through a boiler constructed according to this invention. Fig. 2 is a sectional plan view taken on the line $x-x$ in Fig. 1. Fig. 3 is a vertical section through one of the steam and water tubes and one of the fire-tubes, drawn to a larger scale. Fig. 4 is a cross-section taken on the line $y-y$ in Fig. 3.

A is a cylindrical supporting shell provided with a lining B of fire-brick or other similar material which forms a heating-chamber C.

D is the furnace arranged to one side of the chamber C and provided with a fire-grate d . The upper parts of the furnace and heating-chamber are connected together by a passage c . A door b is provided at the lower part of the chamber C for the purpose of cleaning it.

E is a drum which rests on the top of the shell A. This drum is provided with an upper head f and a lower head e .

F is the smoke-stack which is supported above the upper head f .

G are the vertical fire-tubes, the upper end portions of which are secured in the head f in any approved manner. These fire-tubes depend from the head f through the drum and extend into the heating-chamber. As many fire-tubes as desired are used, but only a few are shown, by way of illustration.

H are the steam and water tubes, the upper end portions of which are secured in the head e . These tubes H encircle the tubes G and also extend into the heating-chamber. Caps h are secured around the lower end portions of the tubes G to close the lower ends of the tubes H. Nuts g' and h' are preferably screwed on the upper and lower end portions of the tubes G, but the tubes may be secured

and kept steam-tight by any other approved means.

I is a partition which extends vertically in the annular space between the tubes G and H for the greater part of the length of the tubes H. A steam delivery pipe or nozzle i is formed on or secured to each tube H on one side of its partition, and this nozzle projects within the drum E.

J is a plate secured to the drum E and which extends upwardly from its lower head e , but not so much as the nozzles i . A space j for mud is formed between the shell of the drum E and the plate J.

K is the feed-water pipe secured to the drum and delivering the feed-water into the space j .

L is the steam pipe connected to the upper part of the drum E. A superheater coil m is supported in the middle part of the heating-chamber C around the tubes, and the steam from the pipe L is passed through this coil before being used to drive engines or for other purposes; but this superheater coil may be dispensed with if desired.

The products of combustion from the furnace pass through the passage c into the upper part of the heating-chamber, thence downward between the steam and water tubes, and upward through the fire-tubes to the smoke-stack.

The feed-water having deposited its solid matter in the mud-space j , flows over the plate J, and down the water and steam tubes on one side of their partitions I. The steam formed in the tubes H flows upward through the nozzles i into the drum E.

What I claim is:

1. The combination, with a heating-chamber, of a drum supported above the said chamber and provided with an upper head and a lower head, fire-tubes open at each end and depending from the said upper head into the said heating-chamber, and steam and water tubes encircling the said fire-tubes and secured in the said lower head and provided at one side of their upper ends with inlets for water which communicate with the water space of the drum and provided also at their other side portions with outlets for steam arranged above the level of the said inlets for water and communicating with the steam space of the drum, said steam and water tubes being closed at their lower ends.

2. The combination, with a heating-chamber, of a drum supported above the said chamber and provided with an upper head and a lower head, fire-tubes open at each end
5 and depending from the said upper head into the said heating-chamber, and steam and water tubes encircling the said fire-tubes and secured in the said lower head and provided with radial partition plates which divide
10 them into inlet sections for water and outlet sections for steam, said inlet and outlet sections having separate openings which communicate with the water and steam spaces of the drum respectively, and said steam and
15 water tubes being closed at their lower ends.

3. The combination, with a heating-chamber, of a drum supported above the said chamber and provided with an upper head and a lower head, fire-tubes open at each end
20 and depending from the said upper head into the said heating-chamber, steam and water tubes encircling the said fire-tubes and having their upper ends open and secured in the said lower head and having their lower ends
25 closed, vertical partitions secured in the annular spaces between the said tubes, and

steam nozzles projecting from the steam and water tubes on one side of their partitions into the steam space of the said drum.

4. The combination, with a heating-chamber, of a drum supported above the said chamber and provided with an upper head and a lower head, fire-tubes open at each end and depending from the said upper head into the said heating-chamber, steam and water
30 tubes encircling the said fire-tubes and having their upper ends open and secured in the said lower head and having their lower ends closed, vertical partitions secured in the annular spaces between the said tubes, a plate
35 projecting from the lower head and forming a mud-space, a feed-water pipe connected to the said mud-space, and steam nozzles projecting from the steam and water tubes on
40 one side of their partitions into the steam
45 space of the drum.

In testimony whereof I have affixed my signature in the presence of two witnesses.

HANS O. KEFERSTEIN.

Witnesses:

W. S. REYNOLDS,

H. LAINE.