(No Model.)

J. THURELL.

STEAM BOILER FURNACE.

No. 458,042. Patented Aug. 18, 1891.

Fig. 1.

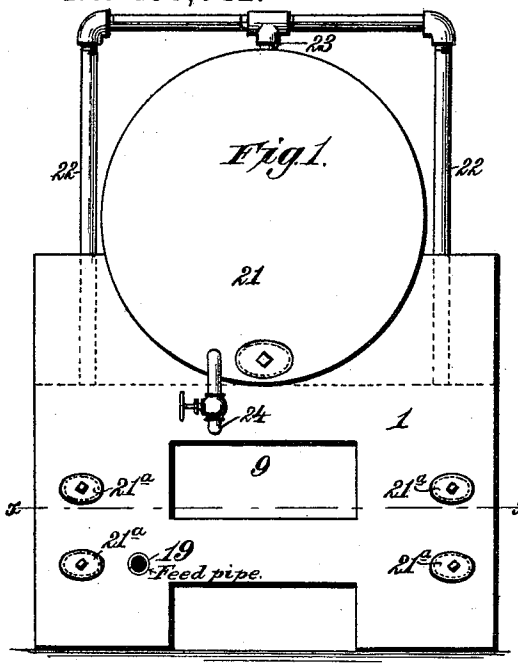


Fig. 3.

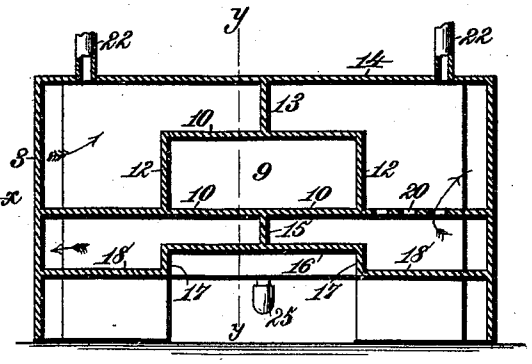


Fig. 2.

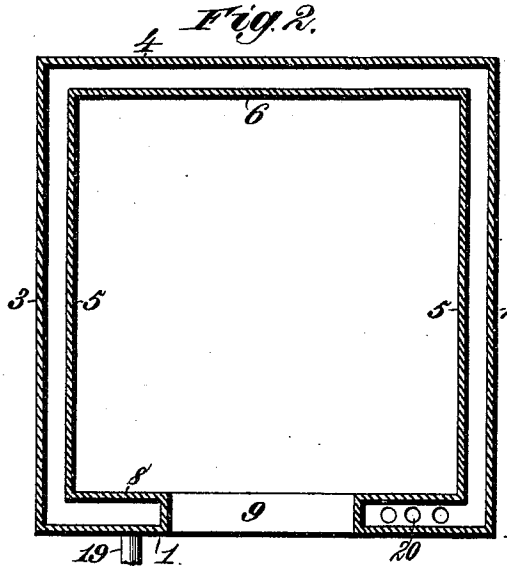
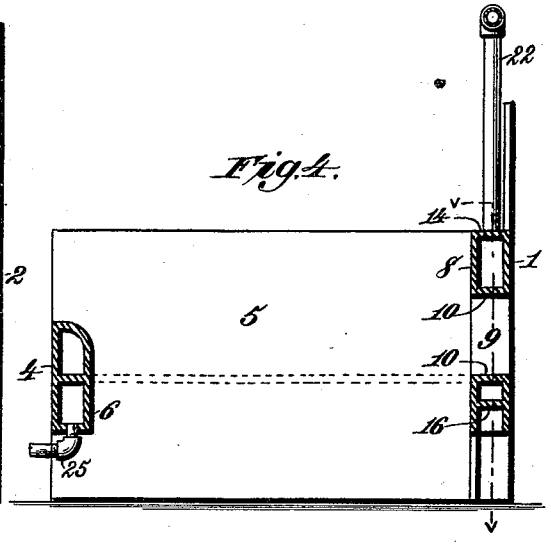


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN THURELL, OF ZYLONITE, MASSACHUSETTS.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 458,042, dated August 18, 1891.

Application filed December 27, 1890. Serial No. 375,973. (No model.)

To all whom it may concern:

Be it known that I, JOHN THURELL, a citizen of the United States, residing at Zylonite, in the county of Berkshire and State of Massachusetts, have invented new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

It is the purpose of my invention to provide a furnace for steam-boilers wherein the maximum yield of steam shall be obtained with the least possible consumption of fuel.

It is my further purpose, also, to provide a simple construction whereby a furnace of this character shall be provided with water chambers or spaces within its vertical side walls, said chambers or spaces being so divided horizontally that the circulation in one of the furnace-walls shall be from right to left and in the other from left to right.

It is my purpose, also, to combine the vertical side walls of the furnace, having the divided water-chambers referred to, with both the end walls having a similar division horizontally, the chamber in the front wall, however, being divided by a central vertical partition to prevent the water from circulating from end to end thereof, and to permit the steam generated to pass from either half of the chamber in the front wall into the steam-space in the top of the boiler.

My invention also has for its object to provide means for removing the mud, silt, and other deposits of foreign matter from the water-chambers.

To these ends my invention consists in the several novel features of construction and new combinations of parts hereinafter fully set forth, and then definitely pointed out in the claims following this specification.

To enable others skilled in the art to understand and make and use my invention, I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a furnace embodying my invention. Fig. 2 is a horizontal section taken on the line x x, Fig. 1. Fig. 3 is a front elevation of the furnace, the outer wall being removed to show the interior. Fig. 4 is a vertical longitudinal section on the line y y, Fig. 3, showing the water-circulation.

In the said drawings, the reference-numeral 1 designates the front outer wall of the furnace, the numerals 2 and 3 denoting the right and left hand outer walls, respectively, while the numeral 4 indicates the rear outer wall. The furnace is provided with any suitable pattern of grate, either single or double, and may be used with any preferred construction of boiler. Each side wall contains a horizontally-divided water-chamber inclosed between the outer walls 2 and 3 and parallel inner walls 5. The rear end wall, though of less height than the side walls, is also composed of two parallel walls 4 and 6, also divided by a horizontal partition into an upper and lower water-chamber. These chambers communicate with the upper and lower chambers in both the side walls.

The front of the furnace consists of double parallel walls 1 and 8, each having an opening 9 for access to the fire-chamber, said opening being closed by the usual furnace-door. Between the two parallel walls are inserted partitions 10 and 12, closely joining the walls and entirely surrounding the opening 9. From the central part of the upper partition 10 rises a vertical partition 13, which joins the upper horizontal wall 14, closing the top of the chamber, and from the center of the lower partition 10 drops a vertical partition 15, its lower end engaging the horizontal wall 16, lying a little below the lower partition 10. From the ends of the wall 16 vertical walls 17 descend to and engage the ends of the horizontal walls 18, forming the lower inclosure of the two water-chambers contained in the front double wall of the furnace.

The reference-numeral 19 denotes a portion of the water-feed pipe leading from the pump. It enters the lower water-chamber in the front of the furnace to the left of the central division, thereby causing the water to flow through the lower chamber in the left-hand wall of the furnace from the front toward the rear, thence through the lower chamber in the rear wall, and then through the lower chamber in the right-hand wall in a direction from the rear to the front, where it enters the lower chamber, which is the counterpart of that into which it was first introduced. The water then passes through openings 20 in the partition-wall, separating the front lower compartment or chamber from

the upper, and flows from the latter through the upper chamber in the right-hand side wall from front to rear, then through the upper chamber in the rear wall, through the upper chamber in the left-hand side wall from rear to front, and enters the left-hand chamber in the front wall, whence it may pass through the feed-pipe 24 to the boiler 21.

The numeral 22 indicates steam-pipes rising from the top wall 14 of the water-chambers in the front wall, one of said pipes opening into each of the chambers formed by the separating-partitions 12 and 13. These pipes extend upward and then inward, or to each other, their ends being united by a T-union 23, the vertical arm of the latter entering the top of the boiler and having communication with its steam-space. These pipes admit steam in order to balance the pressure upon the water in the heater-chambers of the furnace-walls and offset the resistance to the entrance of water by the pipe 24. Moreover, should steam be generated in the heating-chambers and become of a pressure greater than that in the boiler, it can flow into the boiler and be carried to the engine-cylinders, thus relieving the interior pressure.

In the front wall of the furnace I form openings for removable plugs 21^a, by which the silt and mud or other foreign matter settling or accumulating in the chambers may be removed. Similar openings are formed in the rear end outer wall and closed by mud-plugs in the ordinary manner. In other respects, aside from the novel features set forth, the construction may be of any ordinary or preferred form.

It will be seen that by the double and oppositely-directed circulation of the water the heat of the furnace is fully utilized, the largest possible volume of steam is generated with the least possible consumption of fuel, and the warping of the inner walls is prevented.

I propose that the feed-pipe 24 shall enter the boiler a little to one side of the central line, as shown in Fig. 1, or a little to one side of the man-hole.

A blow-off pipe 25 is connected to the lower water-chamber of the rear or bridge wall 6, as shown in Fig. 4.

What I claim is—

1. A steam-boiler furnace having its four walls provided with the upper and lower chambers divided by horizontal partitions, the front wall having an opening closed by the furnace-door and being centrally divided by vertical partitions, a feed-pipe entering one of the lower chambers in the front wall, the horizontal partition upon the other side of the vertical partition in the front wall separating the upper and lower chambers being provided with openings to permit the water to pass to the upper chamber and flow completely around through the four walls, and a pipe leading from the upper chamber to the boiler, substantially as described.

2. In a steam-boiler furnace, the combination, with double walls inclosing the fire-box and having a space between said walls, of horizontal partitions separating said spaces into upper and lower water-chambers, the front wall having an inclosed opening passing through the double walls to give access to the interior, the water-chambers in said front wall being centrally separated from each other, a feed-pipe entering one of the lower chambers in the front wall and a boiler with which the latter communicates, openings being provided in the horizontal partition separating the upper and lower front chambers, whereby the water may pass, after one complete circulation through the lower chambers, to the upper chambers, and thence, after a second circulation in the opposite direction, pass to the pipe communicating with the boiler, substantially as described.

3. In a steam-boiler furnace, four inclosing walls having four communicating upper chambers and four communicating lower chambers, the chambers in the front wall being separated vertically, means for introducing water into one of the lower front chambers and forcing the same through the four lower chambers and thence in an opposite direction through the corresponding upper chambers and to the boiler, substantially as described.

4. In a steam-boiler furnace, the combination, with four inclosing-walls having an upper and lower water-chamber in each wall communicating with corresponding chambers in the adjacent walls and with upper and lower chambers in the front walls centrally divided by vertical partitions, the lower chamber on one side of said partitions communicating with the one above it by openings in the horizontal wall between the upper and lower chambers, of a water-supply pipe leading from the upper chamber on the other side of the central vertical partition to the boiler to supply water to the latter, and steam-pipes, one of which enters the top of each upper chamber in the front wall and communicates with the steam-space in the boiler, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

JOHN THURELL. [L. S.]

Witnesses:
ED. GUNTON,
JAMES H. KEUM.