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W. F. McPHEE

BOILER CONSTRUCTION

Filed June 28, 1923

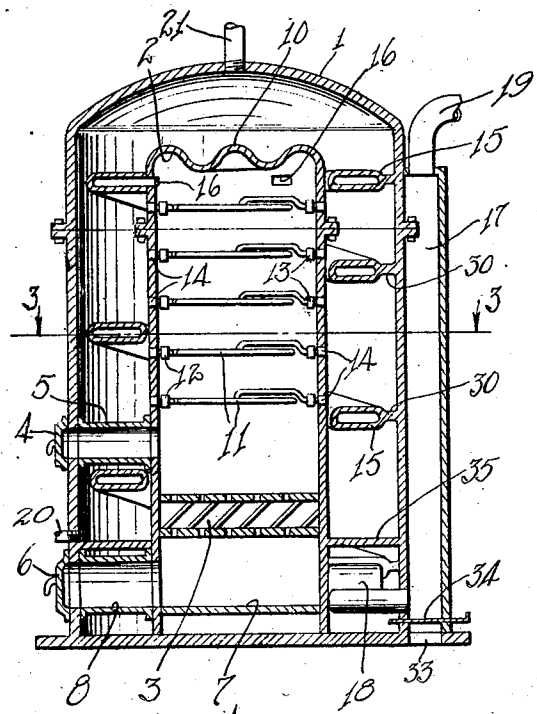


Fig. 2.

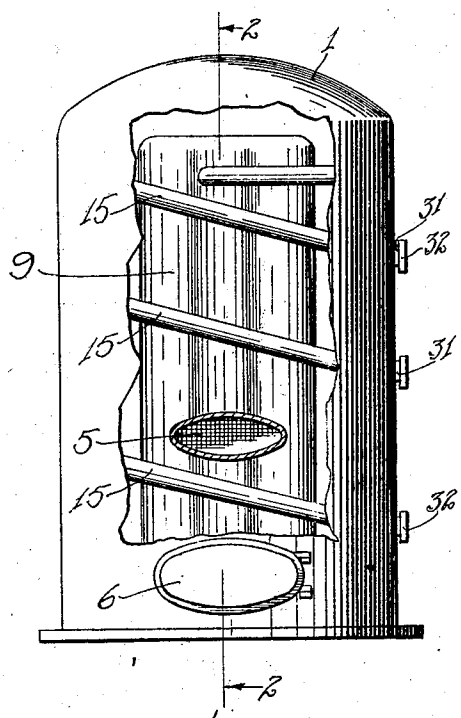


Fig. 1.

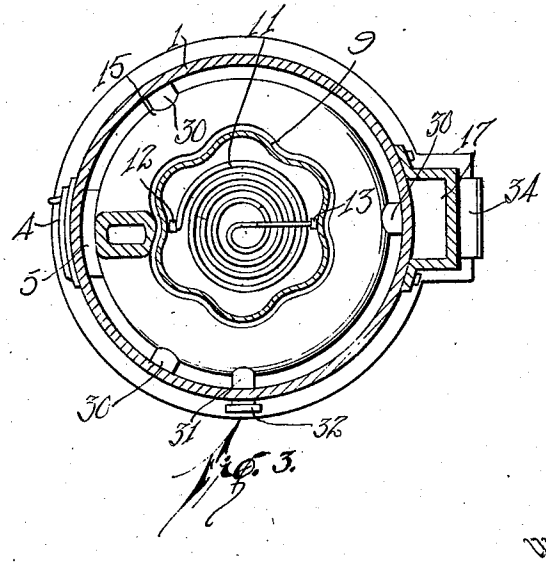


Fig. 3.

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BOILER CONSTRUCTION.

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My invention relates to improvements in boiler constructions, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a device of the type described which has novel means for drawing the gases of combustion downwardly about the combustion chamber after they have passed to the top thereof, thereby utilizing the heat that is normally carried by the gases of combustion up the chimney.

A further object of my invention is to provide a device of the type described in which the flue which carries the gases of combustion downwardly from the top of the combustion chamber is concentrically disposed around the combustion chamber, whereby the flue acts as a heat radiating fin.

A further object of my invention is to provide a device of the type described in which the combustion chamber is provided with corrugated walls, and in which the flue that conveys the gases of combustion from the combustion chamber to the chimney, is provided with an oval-shaped gas conducting passage, whereby the walls of the combustion chamber and the walls of the flue provide a relatively great heat radiating surface.

A further object of my invention is to provide a device of the type described which has water receiving means disposed within the combustion chamber, thereby providing additional water heating surface to the device.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claim.

My invention is illustrated in the accompanying drawings forming part of this device, in which—

Figure 1 is a side elevation of the device, portions thereof being broken away.

Figure 2 is a section along the line 2—2 of Figure 1, and

Figure 3 is a section along the line 3—3 of Figure 2.

In carrying out my invention I provide a water containing receptacle 1 which has a combustion chamber 2 mounted therein. The chamber 2 is centrally disposed in the receptacle 1, whereby the water within the receptacle will entirely surround the chamber 2.

In the present form of the device, the chamber 2 is adapted to burn coal, and is therefore provided with a grate construction indicated generally at 3. A fire door 4 is carried by the receptacle 1 and permits communication from the exterior of the receptacle to the chamber 2. A tubing 5 extends from the door 4 to the chamber 2 and is disposed above the grate 3. A draft or ash door 6 is disposed beneath the door 4 and is in communication with the ash pit 7 of the chamber 2 by means of the tubing 8. The combustion chamber 2 is constructed so as to afford the maximum amount of heating surface to the water within the receptacle 1. To this end I have provided the chamber with corrugated vertical walls 9, (see Figure 3), and with a corrugated top 10, (see Figure 2). In addition to this I have disposed flat water containing coils 11 within the interior of the chamber 2, (see Figures 2 and 3). The coils are of the shape shown in Figure 3 and have their ends 12 and 13 secured in nipples which in turn are carried by the wall of the chamber 2. In order to provide an easy assembly of the coils to the chamber, I provide the nipples or unions with left and right-hand screw threads, whereby the nipples need but be rotated in one direction to secure the coils to the nipples 14 and the nipples to the furnace. The nipples are in communication with the water contained by the receptacle 1, and permit the water to flow into the coils 11. It will be noted from Figure 3 that the ends 12 and 13 of the coils are disposed diametrically opposite from each other, whereby any expansion of the coils due to heat will cause the ends of the coils to more firmly engage with the nipples 14 instead of pulling away from the nipples. In this manner the joints which secure the coils to the chamber 2 are not loosened by the expansion of the coils. The water flows into the coils and is heated by the gases of combustion within the chamber 2.

In many of the boiler constructions of which I am aware, the gases of combustion are passed directly into the chimney upon leaving the top of the combustion chamber. It is obvious that a large amount of the heat will pass with the gases of combustion into the chimney. In the present form of the device I have disposed a flue 15 concentrically with the chamber 2, this flue communicating with the compartment 17 by means

of a pipe 18. The flue 15 is integral with the casing 1, and is spaced therefrom by lugs 30. It will be noted from Figure 2 that the flue is relatively flat and wide, and extends substantially from the wall of the chamber 2 to the wall of the receptacle 1, the flue being spaced slightly from the chamber and receptacle. The compartment 17 is in communication with the chimney, (not shown) by means of a pipe 19. The chimney will draw the gases of combustion from the combustion chamber 2 in the ordinary manner. The gases, however, will pass through the openings 16, will flow through the coils of the flue 15, through the pipe 18, the compartment 17, and the pipe 19 before they will pass into the chimney. In this manner, the gases are moved downwardly through the flue 15, thereby giving up all of the heat to the water in the receptacle 1 through the walls of the flue 15.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. Water is conveyed to the receptacle 1 by means of a water inlet pipe 20 and is carried away by means of the pipe 21. It is obvious that the receptacle can be used as a steam boiler if desired, the pipe 21 in this instance conveying steam from the receptacle instead of hot water.

The device is operated in the same manner as is an ordinary furnace. The coal or other combustible material is passed through the fire door 4 and is deposited on the grate 3. The ashes which accumulate in the ash pit 7 are removed through the ash door 6 when necessary. The principal advantage of this device over other devices of like construction lies in the fact that all of the heat is removed from the gases of combustion before the gases pass into the chamber. This is accomplished by the flue 15 which causes the gases of combustion to travel downwardly. In addition to the flue 15, the device is provided with the flat water coils 11, which further aid in heating the water within the receptacle 1. The chamber 2 itself is also provided with a greater heating surface, since the walls of the chamber are corrugated. The device is readily assembled, and is not likely to get out of order easily.

The flue 15 is provided with integral outwardly extending stub pipes 31, these pipes projecting through the wall of the receptacle 1 (see Figs. 1 and 3). Plugs 32 normally close the ends of these pipes. When the flue needs cleaning, it is merely necessary to remove the plugs 32 and insert a flexible wire brush through the different pipes. The brush will bend in conformance with the curvature of the flue, and will quickly remove the soot, etc., that has become lodged in the flue. The bottom of the compartment 17 opens into an ash pit (not shown), the open end 33 being normally closed by a slide 34.

The floor 35 of the receptacle 1 is disposed above the draft door 6. The water within the receptacle only surrounds the combustion chamber between the grate 3 and the top of the chamber. In this manner, the entire body of water is in contact with surfaces which are being heated.

I claim:

A device of the type described comprising a combustion chamber having corrugated walls, a water-containing receptacle enclosing said combustion chamber, spiral coils disposed horizontally in said combustion chamber and communicating with said water-containing receptacle, a flue in communication with the top of said chamber and being coiled downwardly, whereby the flue is immersed in the water of said receptacle, said flue being flat in cross section, and the inner surface thereof conforming with the wall of said combustion chamber, and means for spacing said flue away from the the wall of said combustion chamber, and said receptacle, whereby the water in said receptacle may completely surround said flue.

WILLIAM FRANCIS McPHEE.