Sept. 6, 1932. G. SURPRENANT 1,875,828

BOILER

Filed Sept. 12, 1930

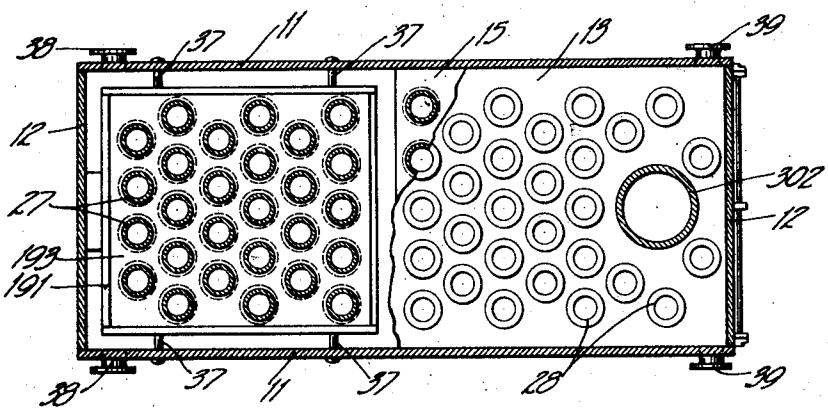

FIG. 2

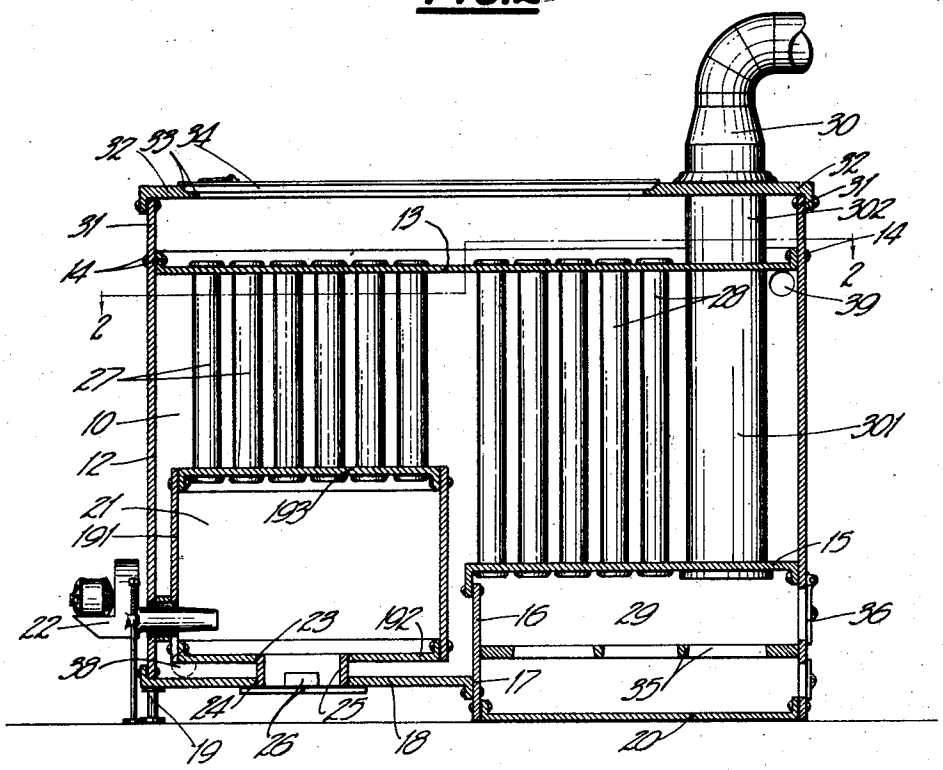

FIG. 1

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BOILER

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My invention more particularly relates to a boiler of the fire tube type, although it is not necessarily limited thereto.

My invention will best be understood by reference to the accompanying drawing, in which I have illustrated a preferred embodiment of my invention, and in which Fig. 1 is a vertical section through the boiler, and Fig. 2 is a sectional plan view taken along the line 2—2 of Fig. 1.

Like reference characters indicate like parts throughout the drawing.

Referring now to the drawing, 10 is a water space of the boiler defined by side walls, 11, end walls, 12, an upper tube sheet, 13, which is secured to the side and end walls by any process of assembling, for example, by rivets, 14, to form a water-tight joint, a lower tube sheet, 15, spaced from said upper tube sheet which also forms a water-tight joint with the side and end walls of the boiler and, in the embodiment illustrated, with a vertically disposed plate, 16, which, in turn, forms a water-tight joint, 17, with a bottom plate, 18, which, in turn, is joined by a water-tight connection to the side walls and to the front end wall.

The front end of the bottom plate, 18, which may be spaced above the foundation as indicated, may be supported on legs, 19. A base plate, 20, is located beneath the lower tube sheet, 15.

The boiler is provided with a furnace, 21, which is fired, in the embodiment illustrated, by an oil burner, 22, which is illustrated as a jet type or what is commonly known as a "cannon" type of burner, and which projects through the front end wall, 12, of the boiler and through the front wall, 191, of the furnace, the space between the tubular burner and the opening through which it extends being filled with any suitable material.

The lower wall, 192, of the furnace is provided with an opening, 23, and the lower plate, 18, is provided with a registering opening, 24, an annular member, 25, being inserted through the two openings and being welded or otherwise secured both to the bottom wall, 192, of the furnace and the plate, 18, to form a water-tight joint. The opening formed in the annular member, 25, is normally closed by a cover plate, 26. If it is desired to use a spinner type oil burner, it is preferably mounted within the opening formed in the annular member, 25, and in a vertical position, in which case the burner, 22, would be removed and the opening in which it is located closed.

The furnace is supported in position by a first section, 27, of fire tubes, the upper and lower ends of which are secured, as by expanding or welding, in openings in the tube sheet, 13, and the upper wall, 193, of the furnace, respectively, the gases from the furnace passing upwardly through the first section of tubes. The furnace is prevented from lateral movement by stay bolts, 37, secured to the side walls, 11, and the side walls of the furnace. The fire tubes, 28, of a second section are expanded or otherwise secured in openings in the tube sheet, 13, and in the lower tube sheet, 15, respectively. A space, 29 is provided beneath the lower tube sheet, 15, through which the gases pass, after flowing downwardly through the tubes, 28, of the second section to the stack, 30, the lower end of which passes through the tube sheet, 15, as illustrated. The inlets and outlets to the boiler are indicated at 38 and 39, respectively.

The side walls, 11, and the end walls, 12, of the boiler are preferably extended upwardly above the tube sheet, 13, as at 31, and a cover plate, 32, is suitably secured over such upward extensions. The cover plate, 32, is preferably provided with an opening, 33, which is adapted to receive a readily removable cover, 34. When the cover, 34, is removed, the opening, 33, provides access to the upper ends of the sections, 27 and 28, of the fire tubes, through which opening any accumulation of dust or other foreign material may readily be cleaned from the space above the fire tubes and the tubes.

The lower portion, 301, of the stack, 30 is normally surrounded by water in the boiler, and an intermediate portion thereof, 302, between the cover plate, 32, and the tube sheet, 13, is exposed to the hot furnace gases in the space between the cover plate and the upper tube sheet.

A grate, 35, is preferably provided beneath the lower tube sheet, 15, for the reception of refuse which may be inserted through a door, 36, and on which such refuse may be incinerated.

I have found in practice that in starting the boiler cold, the heating of the section, 302, of the stack by the gases to which it is exposed creates a draft sufficient to draw the gases upwardly through the first section of fire tubes, 27, and downwardly through the second section of fire tubes, 28, through the space, 29, and into the stack, 30. By surrounding the lower portion of the stack with boiler water in the manner illustrated, the heating of the stack thus surrounded with the boiler water further promotes suction in the stack and further assists in inducing a flow of gases through the first and second sections of the fire tubes.

I have also found in practice that the space, 29, beneath the lower tube sheet, 15, with the grate, 35, provides a convenient incinerator for refuse or other material.

The operation of the boiler embodying my invention will readily be understood from the foregoing description, and is as follows:

Assuming that the boiler is cold, when the fire is started in the furnace, the gases passing upwardly through the fire tubes and into the space between the cover plate, 32, and the upper tube sheet, 13, and which surround the portion 302 of the stack, heat the stack to produce a sufficient suction to induce a downward flow of the hot gases through the second section, 28, of the fire tubes and into the lower portion of the stack.

The water surrounding the portion 301 of the stack further heats the gases therein which, together with the heated portion 302 of the stack, draws the furnace gases upwardly through the first section of boiler tubes and downwardly through the second section of boiler tubes into the stack.

In case it is desired to incinerate material, it is inserted through the door, 36, into the space, 29. I have found in practice that the hot gases passing through the first section of fire tubes, 28, and through the material, and thence into the stack, 32, effectively consume the material.

While I have described my invention in its preferred embodiment, it is to be understood that the words which I have used are words of description and not of limitation and that changes within the scope of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is—

1. In combination, a furnace, a steam boiler comprising an up-pass for gases from said furnace and a down-pass communicating with said up-pass, the gases through said passes engaging boiler heating surface, and a stack for the gases communicating with the lower end of said down-pass, a portion of said stack being surrounded by boiler water and another portion thereof exposed to gases between the up-pass and the down-pass.

2. In combination, a fire tube boiler comprising upper and lower spaced tube sheets, a furnace, a first section of fire tubes connected at their ends into openings in the top wall of said furnace and into said upper tube sheet, respectively, and through which the gases flow upwardly, a second section of fire tubes through which the gases flow downwardly, a space being provided above said first and second sections, and a stack communicating with the lower ends of said second section of fire tubes and having a portion surrounded by boiler water and another portion passing through said space and exposed to the hot gases.

GEORGE SURPRENANT.