April 3, 1928. 1,664,914

C. B. BOYNTON

BOILER

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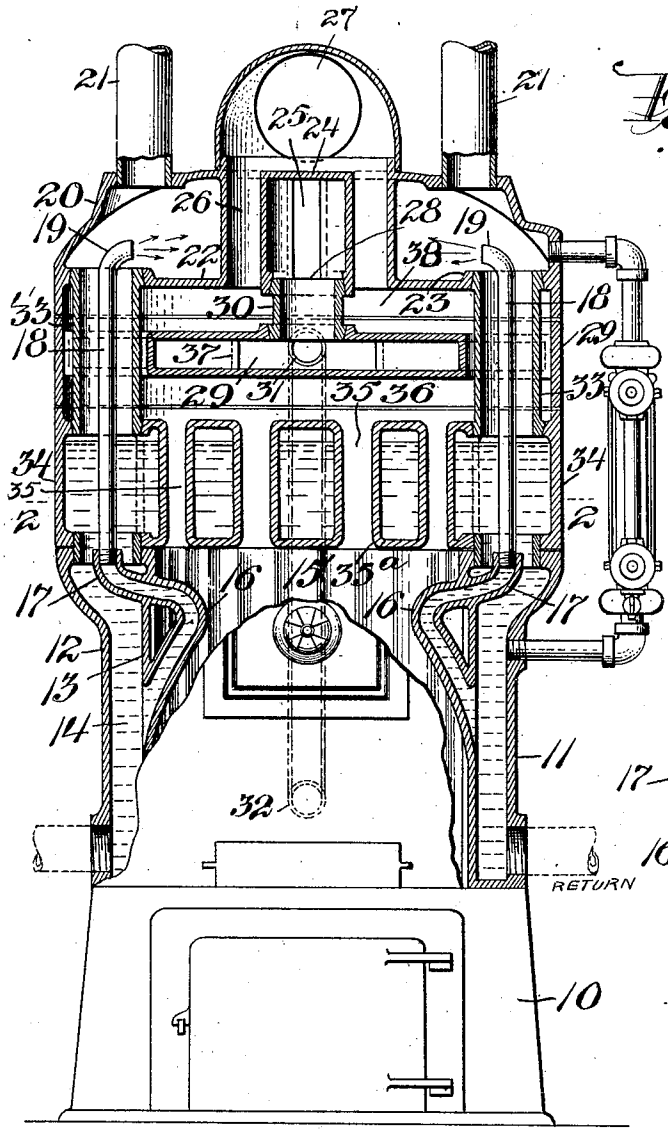


Fig. 1

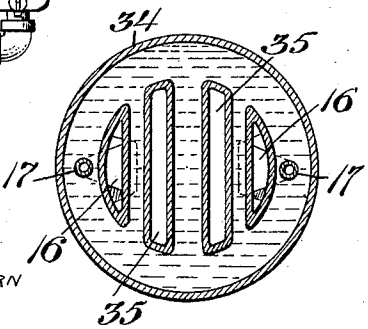


Fig. 2

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BOILER.

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This invention relates to boilers, particularly house-heating boilers and is designed to provide a boiler that quickly vaporizes the water into steam and with a minimum amount of fuel and at the same time is of a simple and economical construction.

The invention is particularly directed to that type of boiler that includes a percolating tube or tubes and is designed to quickly and intensely heat the water in the boiler and tube but the parts are disposed so that a constant supply of water is assured to the very top of the percolating tube thus increasing the efficiency and also preventing the burning out or cracking of parts of the boiler.

The invention also relates to certain details of construction which will be hereinafter more fully described and finally embodied in the clauses of the claims.

The invention is illustrated in the accompanying drawing in which Figure 1 is a vertical section of a boiler made according to my invention, the front lower part thereof being shown in elevation and Figure 2 is a section on line 2—2 in Figure 1.

The boiler comprises any suitable form of base 10 within which is the usual ash pit which also supports the grate and the lower boiler section 11 rests on the base and is annular in the form shown but, of course, can be square or of any other suitable form in cross-section, the outer wall 12 and the inner wall 13 providing the water chamber 14 between them and the inner wall 13 inclosing the fire box 15.

The lower section also forms at a part thereof the lower portion of the percolating tube or tubes and in the form shown I show two tubes which, while they may be made of piping, are preferably made integral with the lower section. These lower portions consist of return elbows 16 which project into the fire box and are adapted to receive water at the lower end adjacent to the inner wall 13 and they have their outlet ends 17 arranged within the annular space or chamber 14 and at the top thereof. In extension of these outlet ends 17 I arrange the pipes 18 which complete the percolating tube and have their upper ends 19 bent to direct the water, which ascends through the percolating tube, to the desired point in the top section.

One form of top section is shown at 20 having sufficient area therein for a reservoir of steam and having connections for the steam pipes 21. The bottom 22 of the top section is adapted to contain a shallow body of water, the rim 23 acting as the edge of the water containing part and a central chamber 24 is arranged in the centre being connected by the passages 25 with the main chamber of the top section, the intervening space between the central portion 24 and the main portion of the top section forming a passage 26 for the heat and smoke from the fire box and which escapes through the smoke pipe 27.

The lower edge 28 of the passage 25 is lower than the rim 23 but is slightly higher than the top face of the bottom 22 so that the water in the top section overflows through the passage 25 on its return to the lower section. I prefer to use a supplemental top section 29 which is preferably flat and shallow and which is connected by a nipple 30 to the top section and has an outlet pipe 31 which passes outside the heater and has its lower end 32 entering into the lower section 11.

Where the pipe 31 leaves the supplemental top section 29 it is disposed at a slight distance above the bottom thereof so that there is always a small quantity of water in the section 29 and the water must rise to the level of the lower edge of this pipe 31 before there is any overflow. Of course, with the heater in operation this flow of water in the top section and supplemental top section is constant since while these shallow bodies of water are quickly heated and converted into steam my construction of boiler insures a constant and ample supply of hot water through the percolating pipe due to the fact that the part of the percolating pipe above the water line is not subjected to the direct heat from the fire box as it is surrounded by a steam pipe 33 which conveys steam from the main body of water in the heater to the top section.

One of these pipes 33 surrounds each of the percolating tubes and while they may be directly connected with the bottom section I show in the drawing an intermediate section 34 which acts as an equalizer in that it insures an ample supply of water when the heater is being forced and thus insures the percolating tube always having a full

supply. This intermediate section has the flue openings 35 and the bottom 35ª thereof forms the top of the fire box.

The heat passes through the flue openings 35, through the space 36 between the intermediate section and the supplemental top section and through the flue openings 37 placed in the supplemental top section 29, into the space 38 between the top section and the supplemental top section and then out through the space 26.

The advantages of this construction will be evident when it is noted that it has been found in the ordinary type of percolating boiler than when it is being forced and when the fire is very hot the percolating tube becomes so hot that the water therein is converted into steam and often all that issues from the top of the percolating tube is steam. This has resulted in dry top sections which have burned out or have cracked when water is finally deposited on them and many replacements of sections have therefore been necessary, making the repair and the boiler expensive to say nothing of the inconvenience of having the boiler out of commission.

In this form of boiler as at present made the water in the percolating tubes is thoroughly heated at the bottom of the tube and thereby forced positively upward to the percolating tube but the upper part thereof is shielded or separated from the main heat flues or passages of the boiler so that the water is not vaporized or if vaporized at all is vaporized but little and the percolating tubes deposit water near the boiling point on the plate 22 of the top section. There it is quickly converted into steam on account of its being very shallow and what overflows is further subjected as a shallow body to vaporization in the supplemental top section 29.

In addition to this the water in the intermediate section 34 is boiling and the steam therefrom passes through the tube or tubes 33 into the top section. The number of connections necessary in a boiler of this form is small and the manufacture therefor is inexpensive.

It will also be noted that the tubes 33 pass up through openings in the supplemental top section 29 with sufficient clearance to permit heat to pass up around the tubes 33 so that the tubes 33 are not only kept hot thus minimizing condensation in the tubes 33 but the shielding of the percolating tubes 18 from the direct heat is enough to assure the full capacity of water passing up through the percolating tubes without such water being converted into steam before it arrives in the top section.

It will be evident that minor changes can be made in the arrangement of the parts without departing from the scope of the invention.

I claim:

1. A boiler comprising a lower water chamber inclosing a fire box, an upper section, a percolating tube forming a return bend in the fire box and having its upper portion disposed so as to deposit water into the upper section, and a tube to convey steam from the lower part of the boiler to the upper section, said last mentioned tube inclosing the percolating tube above the water line.

2. A boiler comprising a lower section and an upper section for containing water, the lower section having an annular water chamber inclosing a fire box and having return elbows extending from the inner walls thereof into the fire box and pipes to conduct water from the upper outlets of such elbows to the upper section whereby the direct outlet for water from the lower section to the upper section is provided, the upper and lower sections having openings for the return of water to said lower section.

3. A boiler comprising a lower section and an upper section, the lower section having an annular water chamber inclosing a fire box, the inner walls of the lower section having return elbows integral therewith, said elbows projecting into the fire box and having their upper ends arranged at the upper end of the section and pipes seated in said upper ends to conduct water from the elbows into the top section.

4. In a boiler, a lower section comprising an annular water chamber and a return elbow projecting from the inner wall thereof into the fire box, said return elbow having its inlet communicating with the annular water chamber and its outlets situated so as to conduct water from said section.

5. A boiler comprising a lower section including an annular water chamber inclosing a fire box and having a return elbow extending into the fire box with its outlet end in the water chamber, a percolating tube on the end of the elbow, a top section in which the upper end of the percolating tube is situated, the top section comprising a shallow water retaining bottom and a central outlet spaced therefrom to form a smoke passage and having a water passage to permit escape of the overflow, a supplemental top section to receive said overflow and having an outlet slightly above its bottom to insure a shallow body of water therein, a connection between the supplemental section and the lower section, and a steam pipe connecting the lower section with the top section of said steam pipe surrounding the percolating tube.

6. A boiler comprising a lower section including an annular water chamber inclosing a fire box and having a return elbow extending into the fire box with its outlet end in the water chamber, a percolating tube on the end of the elbow, a top section in which the

upper end of the percolating tube is situated, the top section comprising a shallow water retaining bottom and a central outlet spaced therefrom to form a smoke passage and having a water passage to permit escape of the overflow, a supplemental top section to receive said overflow and having an outlet slightly above its bottom to insure a shallow body of water therein, a connection between the supplemental section and the lower section, an intermediate section of relatively large capacity on the lower section and in communication therewith, and a steam pipe connecting the top of the intermediate section with the top section and enclosing the percolating tube.

In testimony whereof I affix my signature.

CHARLES B. BOYNTON.