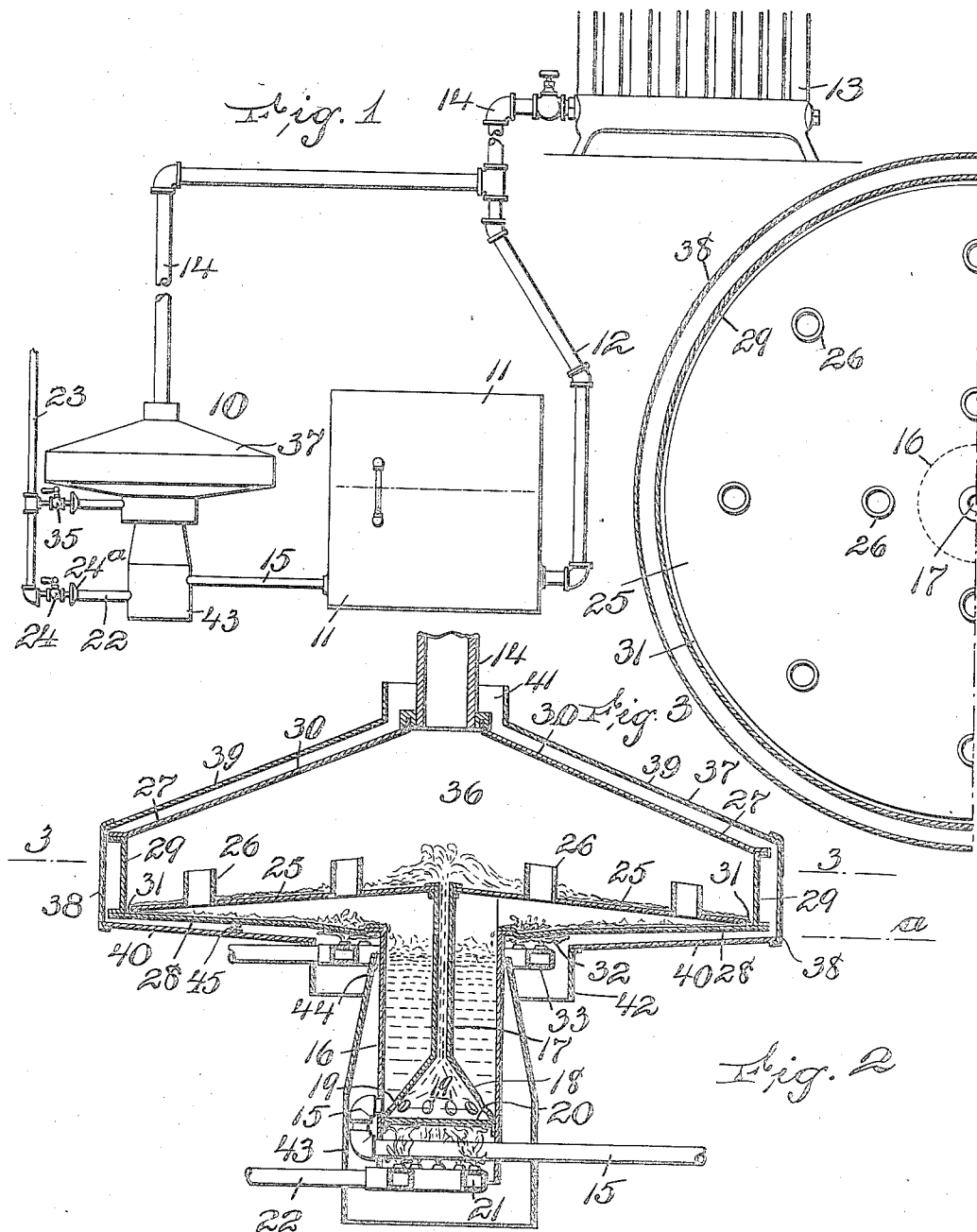


C. Z. & E. S. ALEXANDER.
STEAM BOILER.
APPLICATION FILED OCT. 31, 1916.

1,240,804.

Patented Sept. 25, 1917.



INVENTOR
Carl J. Alexander, and
E. S. Alexander,
By
Dykes Campbell,
ATTORNEYS.

UNITED STATES PATENT OFFICE.

CARL Z. ALEXANDER AND EARL S. ALEXANDER, OF NEWARK, NEW JERSEY.

STEAM-BOILER.

1,240,804.

Specification of Letters Patent.

Patented Sept. 25, 1917.

Application filed October 31, 1916. Serial No. 128,674.

To all whom it may concern:

Be it known that we, CARL Z. ALEXANDER and EARL S. ALEXANDER, citizens of the United States, and residents of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to an improved steam boiler which is adapted for use with gas or oil as a fuel, since the boiler needs a small heating surface.

The boiler is particularly adapted in heating systems employing steam, the water being boiled in comparatively small quantities, such quantities being supplied in quick succession so as to make a practically continuous supply of water converted quickly into steam.

The boiler is constructed so as to spread the water out in thin sheets or streams passing over the flame of the burners, the feeding of the water being automatic and of proper quantity to insure the major portion of it being converted into steam and at the same time keeping the heating surface of the boiler covered at all times.

The invention is further designed to provide a steam boiler that occupies comparatively little space and can be operated with an economy of fuel.

The invention is susceptible to many changes in the details of its construction, but in order to clearly illustrate our invention we show, in the accompanying drawing, one form of boiler.

In said drawing, Figure 1 illustrates parts of a heating system sufficient to show how the parts cooperate. Fig. 2 is an enlarged vertical section through the center of the boiler shown in Fig. 1, and Fig. 3 is a horizontal section taken on line 3—3, in Fig. 2.

The boiler 10 is arranged so that it is connected to a suitable source of water supply which is controlled so as to maintain an approximately constant and predetermined level of water in the boiler. In the drawing such source is shown in the form of a reservoir 11 which receives water from the return pipe 12 of the heating system. The radiator 13 is illustrated to show one form of heating unit receiving steam from the steam pipe 14 which receives steam from the boiler 10. The feed pipe 15 conducts water from the source of supply, as the tank or reservoir 11 to the base portion 16 of the

boiler, the base portion being in the form of a small reservoir with an open top and having a geyser tube 17 in it. The geyser tube has a base 18 having perforations 19 to permit water to enter the tube 18, the tube 18 being situated just above the bottom 20 of the base portion 16. The base portion 16 is heated by means of a bottom burner 21 fed by a pipe 22 from the fuel pipe 23, the cock 24 regulating the amount of fuel supplied. In the drawing gas burners are shown and the ordinary type of mixing valve 24^a is illustrated.

The top of the geyser tube is arranged to deposit the water issuing from it on a spreading or distributing plate 25 which inclines slightly downward toward its outer edge and the preferred shape of the plate is circular. The water thus flows in a relatively thin and even sheet over the plate 25, the plate being inclined just enough to give a positive flow to the water but not one that will cause it to run too quickly. The plate 25 has steam outlets 26 for purposes to be described hereinafter. The top of the base portion is attached to the bottom of the body portion 27 of the boiler, the body portion having a bottom plate 28, a side wall 29 and a top plate 30, which top plate is constructed so that it conducts steam to the steam pipe 14. The water running off the edge of the plate 25 passes onto the bottom plate 28, the boiler illustrated having the plate 25 made smaller in diameter 90 than the side wall 29 to form the space 31 through which the water flows. Other forms can be devised for allowing the water to descend to the plate 28. The plate 28 has a trough 32 formed in it, under which trough the upper burner 33 is placed to further heat the water in the trough. In the drawing the trough or deepened portion 32 is shown adjacent to the edge of the base portion 16, but it can be made of larger diameter if desired. The trough causes an accumulation of water at that point, thereby insuring a sufficient body of steam without danger of burning out the boiler over the burner 33. The burner 33 is preferably regulated independently of the burner 21, the cock 35 being installed to control the amount of fuel passing into the burner 33.

The water that is forced up through the geyser tube contributes steam to the steam chamber 36 of the body portion 27 and the water boiled on the bottom plate 28 and in

the trough 32 is also converted into steam, passing into the steam chamber 36 through the openings 26. The water on the plates 25 and 28 is passed over them by gravity and in shallow layers or sheets, being thus quickly and economically converted into steam which passes from the steam chamber 36 into the steam pipe 14 and thus to the heating units. The water that is not vaporized in the trough 32 passes over the edge of the trough and into the open top of the base portion 16. The feed pipe 15 is preferably passed over the burner 21 to heat the water on its way to the boiler. The tank or reservoir 11 maintains the water at a level to insure the trough part 32 being covered with water when the heater is started, that is, at about the level shown by the line *a* in Fig. 2. It will be understood that means can be employed for controlling the level of water in the boiler other than the tank 11, and any of the well known devices for this purpose, float-operated or otherwise, can be employed if necessary.

We prefer to direct and control the heat from the burners so as to secure a maximum of heating of water, the drawing illustrating one form of structure to bring this about. The shell or casing 37 is formed with a side wall 38 and a top and bottom wall 39 and 40, respectively, all spaced from the body portion of the boiler so as to form a heat conducting passage ending in the outlet 41. A ring 42 depends from the bottom of the casing to protect the burner from drafts. A thimble 43 incloses the base portion 16 and while it protects the burner 21 it also serves to confine the heat within the thimble and to economize the fuel supply, the top of the thimble being open and adapted to conduct the heat from the burner 21 to the inside of the casing 37 preferably as at 44 inside the ring 42. Suitable baffle-plates 45 can be staggered or otherwise arranged to interrupt or to outline a circuitous path for the heat passing under the casing 37.

This boiler occupies but little space, is easily controlled and it economizes fuel while permitting the utilization of gas or oil for purposes of fuel.

Having thus described our invention, we claim:

1. A steam boiler comprising a geyser tube, a container for said tube, plates to conduct water from the top of the geyser tube back to the container, the plates being but slightly inclined and of relatively large diameter, means for heating the container, and means for heating the plate from which the water flows into the container.

2. A steam boiler comprising a geyser tube, a base portion containing water in which the geyser tube is arranged and from

which it projects, a body portion of considerably larger diameter than the base portion and with a downwardly inclined bottom to conduct water to the inside of said base portion, and means for conducting water from the top of the geyser tube to the outer edge of the bottom aforesaid.

3. A steam boiler comprising a body portion forming a steam chamber and having an inwardly and slightly downwardly inclined bottom with a central opening, a plate within the body portion and less in diameter, the plate being slightly inclined outwardly, the plate having openings with raised rims to permit the passage of steam and prevent the passage of water through the openings, a geyser tube projecting through the center of the plate, means for conducting water from the open bottom of the body portion to the geyser tube, means for heating the water in the conducting means to force it through the tube, and means for heating the bottom of the body portion near the opening therein.

4. A steam boiler comprising a body portion forming a steam chamber and having an inwardly and slightly downwardly inclined bottom with a central opening, a plate within the body portion and less in diameter, the plate being slightly inclined outwardly, the plate having openings with raised rims to permit the passage of steam and prevent the passage of water through the openings, a geyser tube projecting through the center of the plate, means for conducting water from the open bottom of the body portion to the geyser tube, means for heating the water in the conducting means to force it through the tube, and means for heating the bottom of the body portion near the opening therein, the bottom of the body portion being depressed above the last-mentioned heating means to provide for a slightly greater depth of water.

5. A steam boiler comprising a geyser tube, a base portion containing the tube, means for heating the base portion and thus forcing water through the geyser tube, plates arranged with a slight incline and adapted to receive water from the geyser tube and to retard the gravity flow of said water, a body portion inclosing said plates to form a steam chamber, the body portion having open communication with the base portion, and means for heating the lower of said plates.

6. A steam boiler comprising a geyser tube, means for heating water and thus forcing it through the geyser tube, plates arranged with a slight incline and adapted to receive water from the geyser tube and to retard the gravity flow of said water, a body portion inclosing said plates to form a steam chamber, one of said plates having

a depressed portion forming a trough to provide for an increased depth of water, and a burner under said trough.

7. A steam boiler comprising a base portion with an open top, a geyser tube in said base portion, a body portion supported on said base portion and in communication therewith, a geyser tube in the base portion with its outlet end within the body portion, means for conducting water in a shallow sheet from the tube to the bottom of the body portion on which bottom it flows back toward the base portion, and means for heating the base portion and the bottom of the body portion.

8. A steam boiler comprising a base portion having a geyser tube extending from the top thereof, a body portion resting on the base portion and in communication therewith, the bottom of the body portion being inclined toward said base portion, an inclined plate within said body portion and onto which water from the geyser flows, the plate being adapted to conduct water to the inclined bottom of the body portion, and means for heating the base portion and the body portion.

9. A steam boiler comprising a base portion having a geyser tube extending from the top thereof, a burner under the base portion, a body portion resting on the base portion and in communication therewith, the bottom of the body portion being inclined toward said base portion, an inclined plate within said body portion and on the top of the geyser and adapted to conduct water to the inclined bottom of the body portion, said inclined bottom having a trough therein adjacent to the top edge of the base portion, and a burner under said trough.

10. A steam boiler comprising a base portion having a geyser tube therein, a burner under the base portion, a body portion on

the base portion, a steam pipe in communication with said body portion, the bottom of the body portion being inclined toward the base portion, a plate within said body portion to receive water from the geyser tube and conduct it in a shallow stream to the inclined bottom of said body portion, and a burner under the inclined bottom of said body portion.

11. A steam boiler comprising a base portion having a geyser tube therein, a burner under the base portion, a body portion on the base portion, a steam pipe in communication with said body portion, the bottom of the body portion being inclined toward the base portion, a plate within said body portion to receive water from the geyser tube and conduct it in a shallow stream to the inclined bottom of said body portion, a burner under the inclined bottom of said body portion, and a casing surrounding said body portion and adapted to conduct heat around said body portion from said last mentioned burner.

12. A steam boiler comprising a body portion having a downwardly and inwardly inclined bottom, a downwardly and outwardly inclined plate within the body portion directly above the bottom thereof and slightly smaller in diameter than the inner diameter of the side walls of the body portion to provide a passage for water, a base portion at the bottom of the body portion and in communication therewith, a geyser tube in the base portion and adapted to deposit water on the top of the outwardly inclined plate, a burner under said body portion, and a burner under the base portion.

In testimony that we claim the foregoing, we have hereto set our hands, this 28th day of October, 1916.

CARL Z. ALEXANDER.
EARL S. ALEXANDER.