Jan. 22, 1935. E. H. McCATHRON 1,988,503

HEATING BOILER

Filed Feb. 25, 1933 2 Sheets-Sheet 1

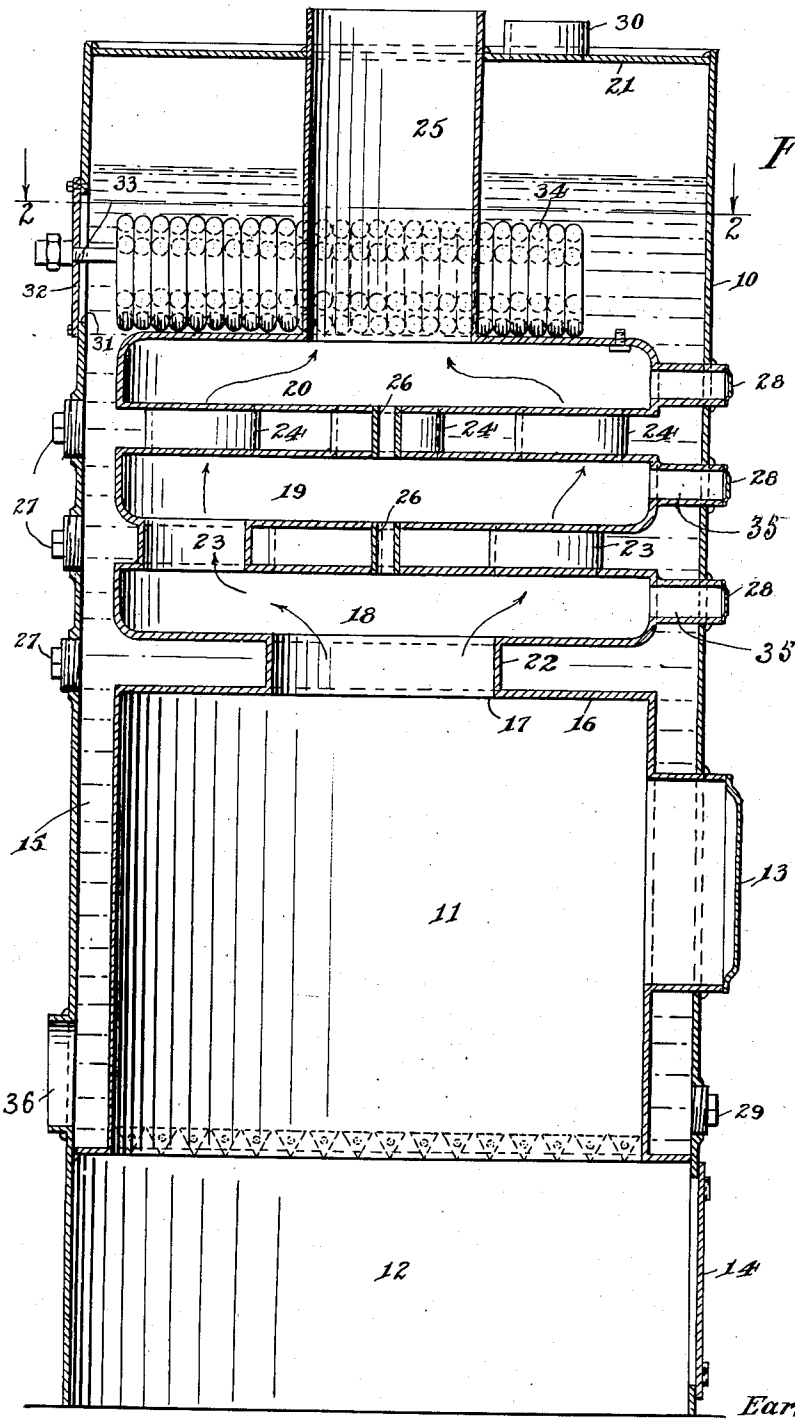


Fig. 1

INVENTOR.
Earl H. McCathron

BY
Christian M. Neumann
ATTORNEY

Jan. 22, 1935. E. H. McCATHRON 1,988,503

HEATING BOILER

Filed Feb. 25, 1933 2 Sheets-Sheet 2

Fig. 2

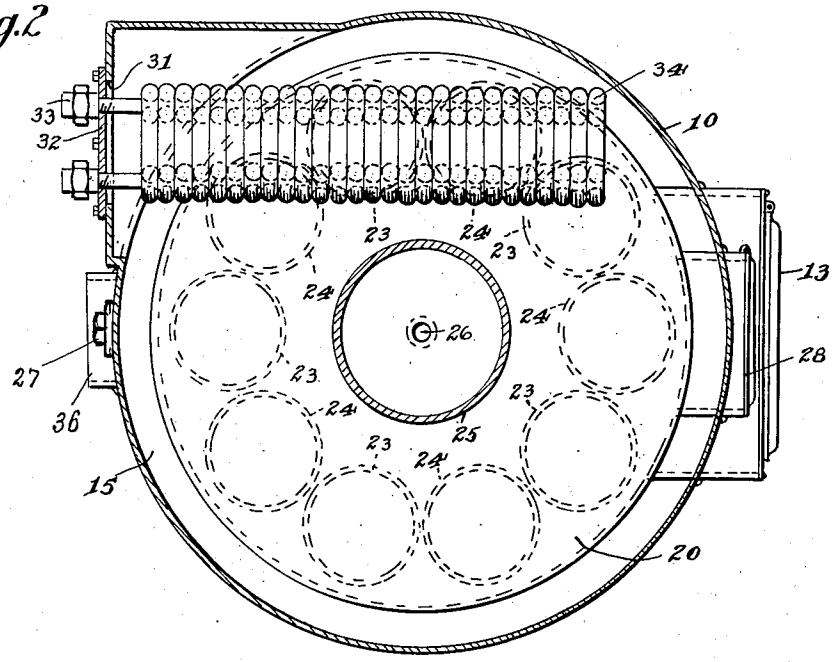
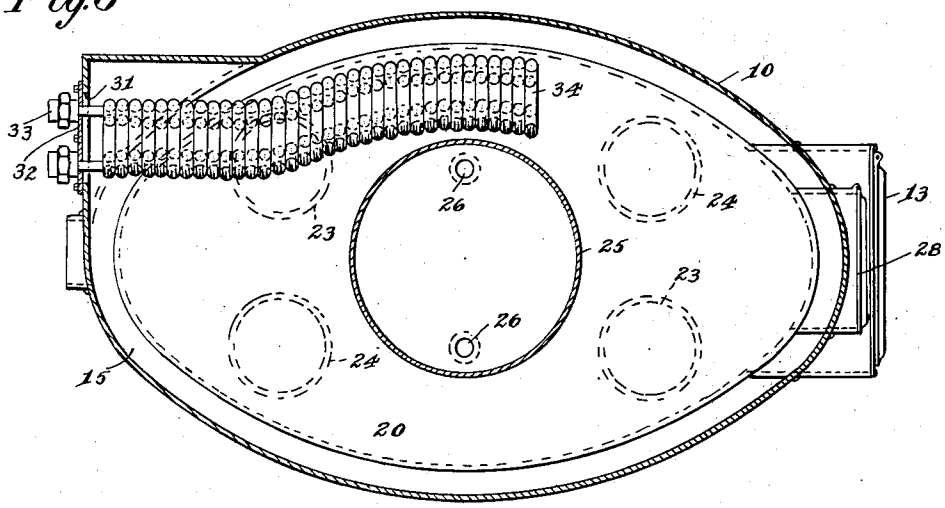


Fig. 3



INVENTOR.
Earl H. McCathron

BY
Christian M. Nemmon
ATTORNEY

Patented Jan. 22, 1935 1,988,503

UNITED STATES PATENT OFFICE

1,988,503

HEATING BOILER

Earl Henry McCathron, Bridgeport, Conn.

Application February 25, 1933, Serial No. 658,515

1 Claim. (Cl. 122—155)

This invention relates to boilers such as are used for steam, vapor or hot water heating, and is designed to be made of sheet steel welded together to form a single unit.

The purpose of the invention is to design a steel boiler in a way which will be especially adapted for the use of oil burners, and which will not be materially affected by the frequent and excessive changes in temperature as caused by the use of an oil burner, and which I find has proven destructive to many of the boilers formed of cast iron, as well as some makes of boilers formed of steel plate.

With the above object in view, I have produced a boiler, the fire passages of which are made of heavy boiler plate, assembled and welded together to form a series of relatively flat heat chambers arranged one above the other and connected by short pipes that are staggeringly arranged above and below said flat heat chambers and which when assembled, are arranged somewhat in the form of a bellows that is supported between the crown sheet of the fire chamber and the top plate of the boiler. This forms a flexible design in a way to better withstand the expansion and contraction that is especially produced by oil burners and stokers, due to the intermittent operation.

The boiler, as designed, is entirely assembled in the factory, forming a finished unit, and is thus adapted to be readily transported, rolled into the building, stood up on its end in place, and in readiness for connecting the water supply and heat piping.

With these and other objects in view, the invention resides and consists in the construction and novel combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claim hereto appended, it being understood that various changes in the form, proportion, size, and minor details of construction within the scope of the claim may be resorted to without departure from the spirit, or sacrificing any of the advantages of the invention.

Similar characters of reference denote like or corresponding parts throughout the several figures of the accompanying drawings forming a part of this specification and upon which

Fig. 1 shows a central vertical section through my improved boiler, which, as shown, is of a general elongated cylindrical shape and adapted to be set upright for heating purposes;

Fig. 2 is a sectional plan view taken on line 2—2 of Fig. 1; and

Fig. 3 shows a similar cross section of an oval shaped boiler.

Referring in detail to the characters of reference marked upon the drawings, 10 represents the outer casing of the boiler which is of an elongated cylindrical form, though may obviously be of any other preferred shape, and serves to form the outer water jacket of the boiler, and which may be covered with an asbestos jacket or other suitable covering, not shown. This casing, as well as other parts of the boiler, is fabricated of sheet steel, being welded together to form my novel structure.

The boiler includes a combustion chamber 11 in which an oil burner, not shown, may be positioned and which is also adapted for grates for burning coal. An ash pit 12 is formed beneath the combustion chamber, a door 13 being provided for the latter, and a door 14 for the ash pit. The side walls of the combustion chamber are cylindrical in form and arranged in spaced relation to the outer jacket so as to form a water space 15 therebetween. The top wall 16 of the combustion chamber is flat and provided with a central opening 17 through which the products of combustion pass from the said combustion chamber.

18, 19 and 20 represent shallow cylindrical heat chambers which are of a pan-like form, being relatively flat, arranged one above the other, and in spaced relation to the outer jacket of the boiler. While it will be understood that there may be any desired number of these flat chambers employed in my boiler, yet for convenience of illustration, I have shown but three, the same being of approximately the same size, and connected together and supported as between the top plate 16 of the combustion chamber and the top plate 21 of the boiler, to form heat passages from the combustion chamber to the smoke outlet.

The central portion of the lower wall of the bottom chamber 18 is connected by a relatively large pipe 22 with the opening in the top wall 16 of the combustion chamber so as to freely take the products of combustion therefrom. This chamber 18 and the next one 19 above it are connected by a series of relatively smaller pipes 23 that are arranged between the outer adjacent faces of the two chambers so as to form heat passages from the lower to the upper chamber, and whereby the heat, as it comes into the lower chamber, is caused to spread out radially to enter the said smaller pipes. The top wall of the intermediate chamber 19 and the bottom wall of the

top chamber 20 are also connected with somewhat similar pipes 24 which are arranged in staggered relation, see Fig. 2, to the pipes 23 below. This arrangement is again for the purpose of insuring a further and better distribution of the heat as it passes up through the unit.

With the same object of more complete distribution of heat, I preferably provide a single centrally arranged smoke outlet pipe 25, one end of which is connected with the heat chamber 20, and the other with the top plate 21 of the boiler so that the assembled heat unit within the boiler is supported by and between the said top plate 21 and the top plate 16 of the combustion chamber, which leaves the unit free to expand both vertically and horizontally, enabling it to function in its contracting and expanding movements somewhat like a bellows and whereby less strain is brought to bear upon the seams and connected parts, thus minimizing the possibility of the boiler leaking.

I also provide two relatively small centrally positioned and aligned pipes 26 as between the several flat heat chambers which are primarily for the purpose of allowing a freer escape of gas from the combustion chamber, which sometimes accumulates when the oil is turned off, and which often serves to blow the door off of the combustion chamber, when again lighted and if no provision for the escape of gas is made. These aligned openings also serve to permit of the proper testing of the unit, after being assembled, though before being installed, by permitting a rod, not shown, to be extended down through the said chamber and pipes 26 to support and secure a plate, not shown, against the ends of the pipes 22 and 25.

Plugs 27 are suitably positioned in the side of the boiler casing to permit a cleaning brush to be inserted and used, when necessary, as between the parts of the several units, whereas the plugged openings 28 upon the front side of the boiler are designed to serve a somewhat similar purpose, as for cleaning the several pan-like heat chambers. These openings include short pipes 35 as between the pan-like heat chambers and the boiler casing. These short pipes are necessarily light and sufficiently flexible to readily yield to such slight movements of the centrally positioned unit as may occur, due to changes of temperature. The cleanout plug 29 serves to close an opening that is used as a cleanout for bottom of water space of boiler, and 30 represents a service outlet for hot water or steam to the radiators, not shown. 36 is an opening through which condensed steam or cold water is returned to the boiler from the radiators.

In addition to the foregoing, I also provide a hot water supply unit which is adapted for domestic purposes and which according to the construction can be supported and submerged within the boiler below the water line in a way to provide an ample water supply without the use of a storage tank. This coil is inserted through an opening 31 that is closed by a plate 32, and to which the nipple ends 33 of the double coil 34 are connected. This coil is preferably formed of copper tubing and is in the form of a double coil arranged one within the other, though a continuation of the one pipe. It is arranged to be supported on the top plate of the top pan-like heat passage 20 and may be relatively straight, as shown in Fig. 2, or deflected as shown in Fig. 3, better to conform to the shape of the boiler and its assembled unit supported therein.

The modified form or oval type of boiler shown in Fig. 3 is obviously well within the scope of the invention and is designed for larger installations where the sizes of the doorways or openings into basements are limited. Practically the only difference of this design of boiler, from the cylindrical type, is that it is longer and narrower and that the domestic heating coil carried therein is bent to better accommodate itself to the oval shape of the boiler. Owing to the fact that the boiler is relatively long and narrow, it can be constructed to carry more water and include greater heating areas, and thus comprises a boiler of relatively greater heating capacity than is possible to produce in a cylindrical boiler that could be carried through a limited-sized doorway.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

A sheet-steel boiler welded together to form a single unit and comprising an outer water jacket, an enclosed fire chamber in the base portion of and in spaced relation to the said outer water jacket, a series of relatively flat disk-like heat chambers arranged one above the other, a centrally arranged relatively large pipe connecting the central portion of the uppermost one of the heat chambers with the top of the water jacket, a single centrally arranged relatively large pipe connecting the fire chamber with the lower one of the heat chambers, a series of pipes connecting the outer adjacent face portion of the heat chambers, relatively small aligned pipes connecting the central portions of the adjacent walls of the different heat chambers, flexible clean-out pipes positioned in the water jacket and connected with the heat chambers, the said connected heat chambers forming a unit that is supported between the top of the water jacket and the top of the combustion chamber by a single central pipe connection to each, and free to expand and contract both vertically and horizontally without affecting the outer wall of the boiler.

EARL HENRY McCATHRON.