

Feb. 6, 1940.

A. A. KUCHER

2,189,365

BOILER

Filed March 13, 1937

2 Sheets-Sheet 1

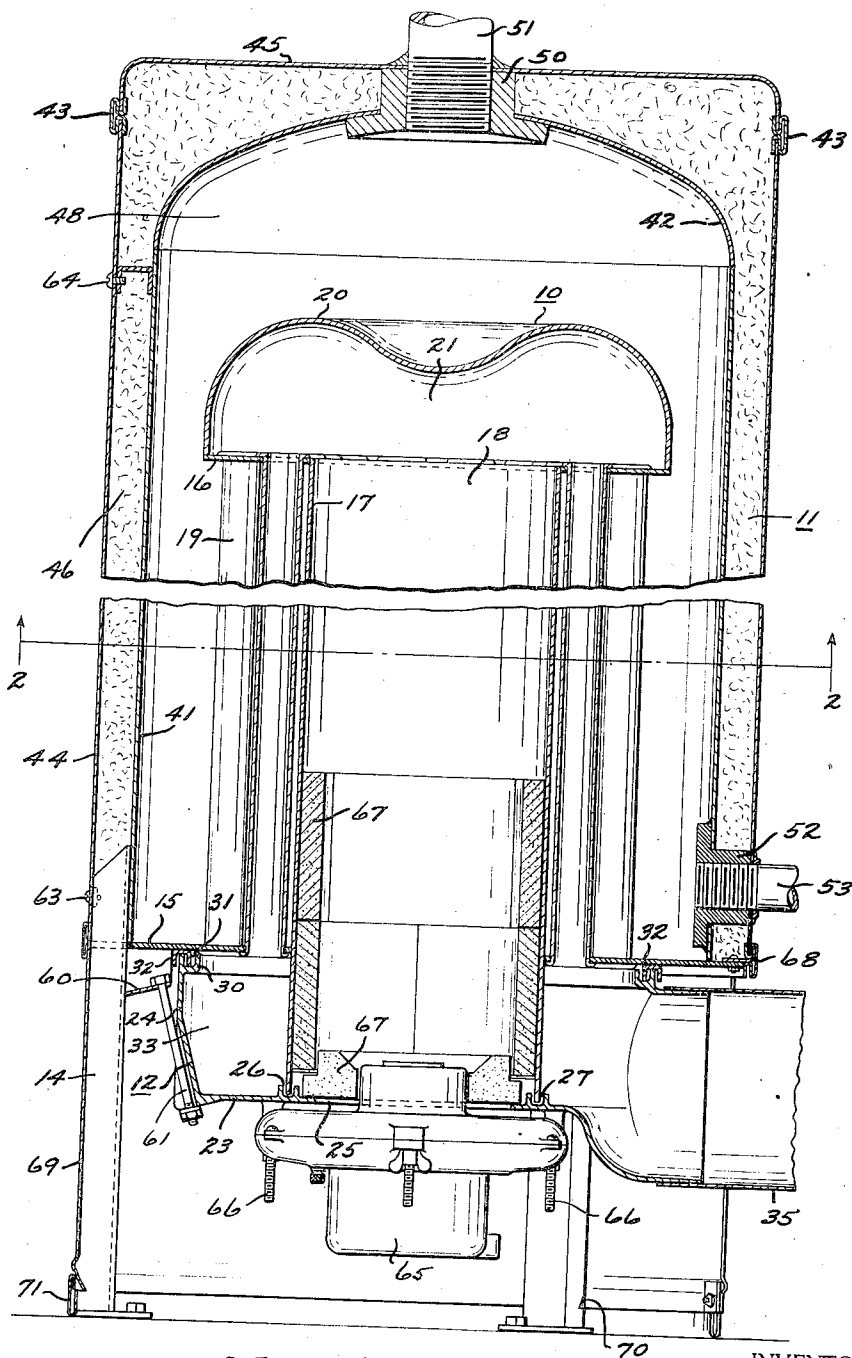


Fig. 1

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Fig. 2

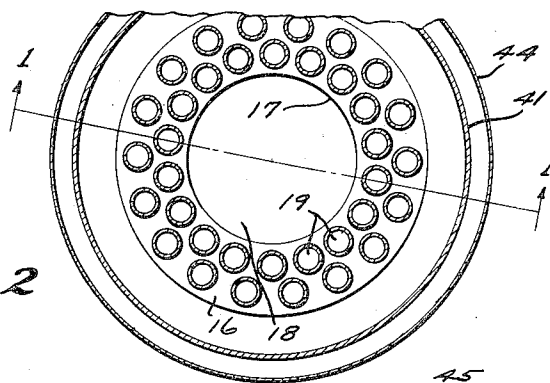
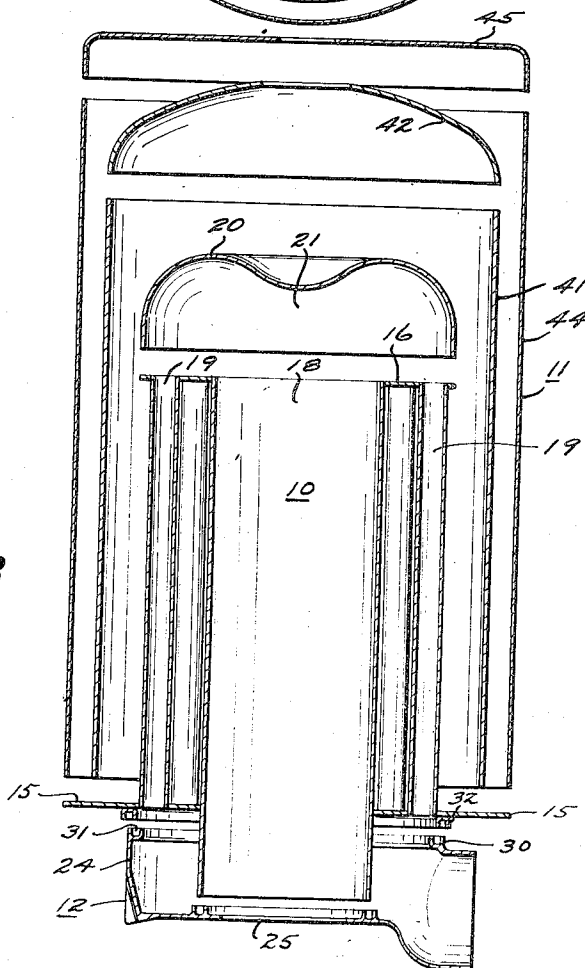


Fig. 3



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BOILER

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1 Claim. (Cl. 122—182)

My invention relates to boilers or boiler heaters for use in heating systems.

The primary object of my invention is to provide an improved boiler, which, by reason of its arrangement of parts, greatly facilitates the manufacture thereof, and improves the efficiency thereof. Incident to this primary object of my invention are numerous more specific objects, the achievement of which materially contributes to the attainment of the primary object. Included among these more specific objects, are the following:

1. To provide a boiler wherein the arrangement of parts is such that the major number thereof are identical both in size and shape regardless of the capacity of the boiler desired. Thus, according to my invention, the size or capacity of the boiler may be varied by merely varying the height thereof, and this variation in height may be accomplished by merely changing the length of the sheet metal side walls and the length of certain tubes. As will be more fully apparent from the specification and claim, such an arrangement simplifies the manufacture and assembly of the various parts to form boilers of different sizes.

2. To provide a boiler wherein the exhaust manifold is supported below the heat exchange tubes in such a manner that it may be easily removed to expose the heat exchange tubes for cleaning purposes.

3. To provide a boiler wherein all the parts thereof are symmetrically arranged about a vertical axis. This arrangement not only improves the appearance of the boiler, but results in a very efficient device wherein all the heat of combustion is passed directly in contact with surfaces contacting the heat exchange fluid. Thus, my improved boiler is not only symmetrical from the standpoint of mechanical design, but may be said to be symmetrical from the standpoint of heat distribution.

4. To provide a boiler wherein the exhaust manifold is supported below the heat exchange unit, the burner is supported below the manifold, and all the elements are supported on common supporting legs.

Other more specific objects will be apparent from the following specification and claim, taken in conjunction with the drawings, wherein:

Fig. 1 is a view, partly in vertical section, and partly in elevation, of my improved boiler construction;

Fig. 2 is a section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a view showing the various units separated and in position to be assembled to form my improved unitary boiler construction.

Referring to the drawings, I have shown my improved boiler as consisting of three units adapted to be assembled to form a unitary structure of greatly simplified construction. These three units include the heat exchange unit, generally indicated at 10, the outer wall construction, generally indicated at 11, and the exhaust manifold unit, generally indicated at 12. These three units are assembled together as a unitary structure and the entire structure is supported by the supporting legs 14, as more fully described hereinafter.

The heat exchange unit 10 includes the lower and upper walls 15 and 16 respectively, each provided with a relatively large central aperture in which is secured a cylindrical wall 17 forming the combustion chamber 18. Surrounding the central aperture, both the upper and lower walls 16 and 15 are provided with aligned openings of smaller diameter than the diameter of the central opening, and in these openings are hermetically secured a plurality of tubes 19. The upper wall 16 has hermetically secured to its outer edge a closure member 20 forming with the upper wall 16, a header chamber 21 with which all of the tubes 19 and the combustion chamber 18 communicate.

The exhaust manifold 12 consists of a cylindrical box-like structure having a lower wall 23 and an upright side wall 24. The lower wall 23 is provided with a central opening 25 surrounded by the upstanding annular projections 26 forming a channel 27 into which the lower end of the cylindrical wall 17 of the heat exchange unit 10 is adapted to extend. The exhaust manifold 12 is open at its upper end and the side wall 24 is provided at its upper edge with an annular curved flange 30 forming the annular channel 31 adapted to receive one leg of an annular U-shaped member 32 secured to the underside of the lower wall 15 of the heat exchange unit 10.

When assembled to the heat exchange unit 10, the exhaust manifold 12 forms therewith a header chamber 33 communicating with the lower ends of all of the tubes 19. This header chamber 33, by reason of the channel constructions 26 and 30, is sealed except through the flue 35 which communicates with the chamber 33 through an opening formed in the vertical cylindrical wall 24.

The outer wall construction unit 11 includes the upright cylindrical side wall 41 hermetically

secured at its lower end to the perimeter of the lower wall 15 of the heat exchange unit 10 and having secured to its upper edge the closure member 42.

5 Surrounding and spaced from the wall 41 and the closure member 42 is the outer cylindrical side wall 44 provided at its upper end with a closure member 45 held in position by the annular trim strip 43, and in the space between these
10 members is located insulating material 46 adapted to insulate the chamber 48.

When assembled with the heat exchange unit 10, the outer wall unit 11 forms a chamber 48 for the heat exchange fluid. This chamber 48
15 is provided with an outlet formed by the sleeve 50 secured to the closure member 42 and internally threaded to receive the conduit 51. Chamber 48 is, likewise, provided with an inlet opening formed by sleeve 52 secured to the wall
20 41 and internally threaded to receive the conduit 53.

The three units 10, 11 and 12 are supported as a unitary structure by means of the supporting legs 14. To this end, the legs 14 are secured
25 to the walls 41 and 15 and are provided with lugs 60 from which the exhaust manifold 12 is suspended by means of the hanger bolts 61. The outer wall 44 is made in two sections and extends the full height of the boiler. The upper
30 section 44 is secured at its upper end to the spacer 64 attached to the wall 41, and at its lower end fits into the upper slot of the annular strap 68 attached to the lower wall 15. The
35 lower section 69 at its upper end fits into the lower slot of the strap 68 and at its lower end is bent inwardly into a notch 70 formed in the legs 14 and is held in place by the finishing strip 71. In this manner, the lower section 69 may be removed, permitting access to the burner
40 65 and manifold 12. While not shown on the drawings, it should be understood that the lower section 69 is provided with openings for the passage of air therethrough.

The form of boiler herein shown may employ
45 either a gas or oil heater. As shown, the burner 65 is suspended below the exhaust manifold 12 by means of the hanger bolts 66. Herein, I have shown the burner diagrammatically only, for the details thereof form no part of my present invention.

50 By reason of this arrangement, the burner 65 is in communication with the lower end of the combustion chamber 18 through the central opening 25. As shown, the combustion chamber 18 and burner 65 may be insulated by the fire brick or clay 67.

One important feature of my improved construction is the fact that many of the individual parts thereof may be used regardless of the size or capacity of the particular boiler desired. For
60 example, to increase the size or capacity of my boiler, all that is necessary is to increase the height thereof. To this end, longer tubes 19, longer side walls 41 and 44, and a longer combustion chamber 18, are all the changes necessary. The same closure members 20, 42 and 45,
65 the same lower wall 15, the same upper wall 16, the same supporting legs 14, and the same exhaust manifold 12 may be used, regardless of the size desired. Such a construction results

in greater simplicity in manufacture and in much less tool cost, and obviously decreases the inventory necessary to supply the demand for various sized units.

Further, by reason of the location of the header 21 near the top of the body of heat exchange fluid, almost instant vaporization of a portion of the fluid is obtained.

Another important feature of my invention is the ease with which the boiler may be assembled
10 and cleaned as desired. As shown in Fig. 3, my boiler consists essentially of the three units 10, 11 and 12. The ease of assembling is quite obvious from the drawings, particularly Fig. 3 thereof, for after the closure member 20 is
15 welded to the top wall 16 of the heat exchange unit, this entire unit may be welded to the outer wall construction including the upright side wall 41 and closure member 42, to form the hermetically sealed chamber 48. After these units have
20 been assembled together, the exhaust manifold 12 may be easily assembled beneath the heat exchange unit by means of the hanger bolts 61 and below the exhaust manifold, the burner itself may also be easily mounted. From the
25 standpoint of cleaning, obviously the exhaust manifold may be readily dropped from beneath the heat exchange unit by removing the hanger bolts 61. Thus, not only may the exhaust chamber be cleaned, but the tubes 19 themselves may
30 be readily cleaned from below by inserting a suitable brush therein.

Another important aspect of my invention is the coaxial arrangement of all of the parts about a common vertical axis. This results in a most
35 efficient final product, wherein all the heat of combustion is passed directly in contact with heating surfaces. In addition, air passing through the lowered section 69 of the outer wall is heated by the exhaust manifold 12 before mixing with
40 the fuel in the combustion chamber.

While I have shown what I consider to be a preferred showing of my invention, it must be understood that other forms thereof are possible and it is my intention to include such other
45 forms within the scope of the claim which follows.

I claim:

A boiler including a heat exchanger unit comprising a vertically disposed cylinder forming a central combustion chamber, a plurality of
50 spaced apart vertically disposed tubes surrounding said cylinder and a manifold connecting the upper ends of said tubes and said combustion chamber, a wall surrounding said tubes and forming a fluid containing chamber around the
55 heat exchange unit, an exhaust manifold below said heat exchange unit and communicating with the lower ends of said tubes, a burner associated with said combustion chamber, and the points of connection of said upper ends of said tubes
60 with said upper manifold and the points of communication of said lower ends of said tubes with said exhaust manifold being correspondingly spaced an equal distance from the vertical axis of said cylinder whereby said manifolds are
65 rendered interchangeable with different lengths of cylinders and tubes for providing boilers of increased or decreased capacity.

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