

Oct. 17, 1950

B. D. FIGG ET AL
WATER HEATER

2,526,015

Filed Jan. 31, 1946

2 Sheets-Sheet 1

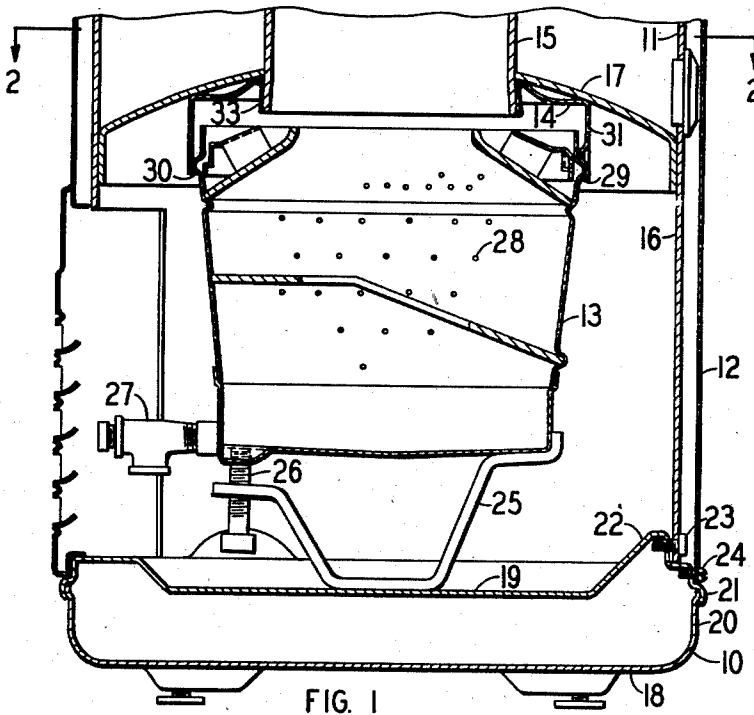


FIG. 1

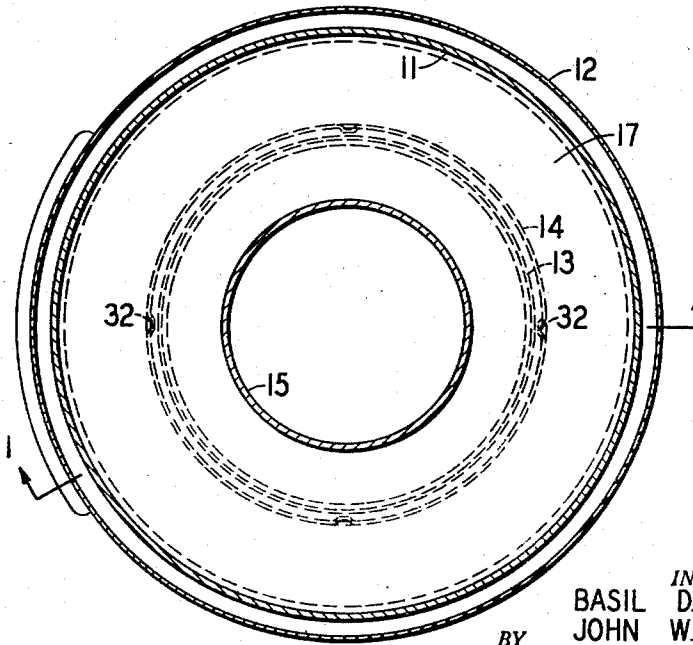


FIG. 2

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WATER HEATER

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2 Sheets-Sheet 2

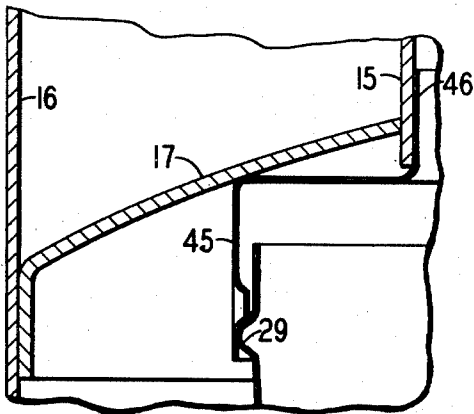


FIG. 5

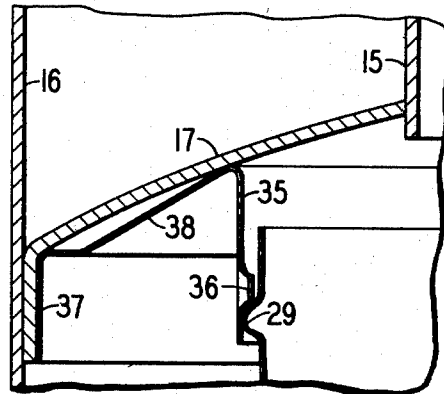


FIG. 6

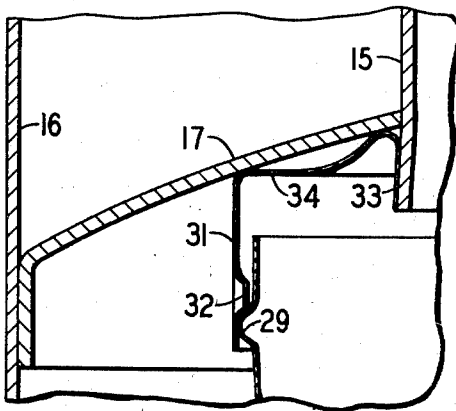


FIG. 3

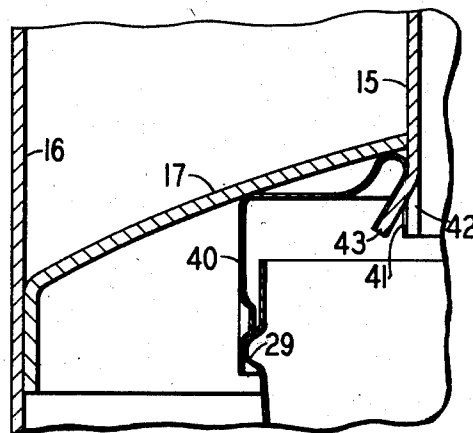


FIG. 4

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2,526,015

WATER HEATER

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Application January 31, 1946, Serial No. 644,612

4 Claims. (Cl. 158—91)

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This invention relates to water heaters embodying vaporizing pot type burners, and more particularly to the connections between the burners and the boilers in such heaters.

In one well known type of water heater, the boiler comprises a tank having a central flue through which the flames and products of combustion pass upwardly from a vaporizing type burner mounted below the boiler adjacent the lower end of the central flue. The boilers in such heaters are commonly formed from galvanized iron or steel tubes and sheets. Since the boilers are usually fabricated from a plurality of such parts and it is difficult if not impossible to weld the sheets together after they are galvanized, it is usually the practice to weld the parts of the boilers together and then coat the surfaces thereof with galvanizing material. The galvanizing may be done by dipping in the molten coating material.

Burners of the vaporizing type employed with such burners are extremely sensitive in operation, which necessitates that exactly the right amount of air for most efficient combustion be introduced into the burner and into the zone immediately thereabove. The air inlet openings in the burner side wall are very accurately sized. Thus, the air entering through such openings is accurately metered. It is essential for best operation that no air be admitted to the space immediately above the burner except that provided through the air inlet openings which are provided therefor. This requires that a tight connection between the burner and the boiler be provided.

Heretofore it has been the practice to attach to the lower end of the boiler an annular ring of relatively heavy gauge metal against which, or into which, the upper end of the burner fits. This ring has usually been welded to the lower end of the boiler prior to galvanizing the latter because it is, as above mentioned, impracticable to weld the ring to the boiler after galvanizing the boiler. Since the galvanizing coating is not necessarily uniform in thickness, when the burner is forced against the ring small gaps between the burner and the ring remain which admit air into the zone of combustion immediately above the burner. This is an undesirable condition.

The principal object of the present invention is to overcome the aforementioned difficulties by providing a metal ring formed so that it can be pressed on to the boiler and the upper end of the burner after the boiler has been completed and galvanized.

Another object is to provide a connection be-

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tween the burner and boiler in the form of a ring which is sufficiently flexible to permit the ring to conform closely to the cross-sectional shape of the part of the boiler and burner against which the ring fits.

These objects and others ancillary thereto will appear in the following specification when read in connection with the accompanying drawings, wherein:

Figure 1 is a fragmentary vertical cross-sectional view of a water heater embodying the present invention, taken on substantially the line 1—1 of Figure 2;

Figure 2 is a horizontal cross-sectional view taken on substantially the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary cross-sectional view showing a portion of the boiler and burner and the ring for connecting the two together;

Figure 4 is a fragmentary cross-sectional view showing a modified form of the invention;

Figure 5 is a fragmentary cross-sectional view of a water heater showing still another form of the invention; and

Figure 6 is a fragmentary cross-sectional view of a water heater showing a still further modified form of the invention.

Figures 1 to 3, which show one form of the invention, disclose the principal parts of a water heater in which the present invention is embodied. In general, the water heater comprises a base 10, a boiler 11, an outer casing 12, a vaporizing pot type burner 13, and an annular ring 14 forming a tight connection between the burner and the boiler. Only the lower portion of the water heater is shown, the construction of the upper end being obvious from the following description.

The base 10 comprises a bottom member 18 and a top member 19. These two members are preferably pressed from sheets of steel and are provided with peripheral flanges 20 and 21, respectively, which engage each other in telescopic relationship. The two parts may be welded or crimped together in any suitable manner. A plurality of upstanding bosses 22 are formed on the upper member 19 at points spaced from the periphery thereof. Each boss is provided with a tapped opening to receive screws 23 by which an outer tube 16 of the boiler is attached to the base. This is clearly shown in Figure 1.

The boiler comprises inner and outer concentric iron or steel tubes 15 and 16. The outer tube 16 extends substantially the full height of the heater, while the inner tube 15 which forms

the flue terminates a substantial distance from the bottom of the heater to provide space for the burner 13. An annular bottom wall 17 is telescoped into the outer tube 16 and surrounds the lower end of the inner tube 15 somewhat above the lower end of the latter. Preferably the wall 17 is welded to the two tubes 15 and 16.

An upper wall, not shown, similar to wall 17 is connected between the upper ends of the tubes 15 and 16.

The boiler is enclosed within the outer casing 12 which is spaced from the boiler, as indicated in Figure 1. The lower end of the casing 12 is mounted in a rabbet in the base and is secured thereto by screws 24. Suitable insulating material may be packed between the outer casing and boiler, if desired.

The burner 13 is a conventional vaporizing type burner. The burner is mounted in the space defined by the outer tube 16, the base 10 and the bottom wall 17. Preferably the burner is supported from the base by means of a support 25 of relatively heavy gauge steel strip material. A screw 26 is threaded into the support and engages the bottom of the burner to accurately locate the same, as will be more fully pointed out hereinafter. Fuel is fed to the burner from a suitable source, not shown, from a conduit of which the T 27 forms a part. Fuel is admitted to the bottom of the burner where it is vaporized and burned in the presence of air admitted through inlet apertures 28 in the side wall of the burner. Adjacent the upper end of the burner side wall and spaced therefrom is an outwardly extending annular head 29. Preferably the head 29 is accurately sized in the manner disclosed in the Patent No. 2,341,355 granted on February 3, 1944 to Eliad A. Bovee. Secondary air inlet openings 30 are formed in the head to admit secondary air to the burner.

The connecting ring 14 which constitutes the essence of the present invention is an annular ring formed from relatively light gauge sheet metal. The ring comprises a cylindrical portion 31 of the same internal circumference as the external circumference of the head 29 so that it will fit snugly over the head in press fit engagement therewith. Preferably the cylindrical portion 31 is provided with a plurality of small inwardly indented bosses 32 which act as stops to limit the upward movement of the head on the burner relative to the cylindrical portion 31. In the present instance there are four of these stops (see Figure 2). The screw 26 is employed to force the head 29 against the stops 32 and thereby accurately locate the burner within the ring 14.

The ring 14 is also provided with a second cylindrical portion 33 spaced axially inwardly of the portion 31. This portion 33 is also accurately sized. It is adapted to fit tightly over the lower end of the inner tube 15 which extends below the bottom wall 17 of the boiler in the manner indicated best in Figure 3. Preferably the fit between the portion 33 and the boiler is a heavy press or drive fit, so that when the ring is installed it is permanently connected to the boiler. The connection between the portion 31 of the ring 14 and the burner is a light press fit, to permit removal of the burner for repair.

The two cylindrical portions are connected by a curved intermediate portion of arcuate cross-section 34.

The ring 14 may be formed to the desired cross-section in any suitable manner. Preferably after forming, the cylindrical portions 31 and 33 are

stressed by expanding or shrinking the same slightly, somewhat in the manner disclosed in the above named Patent No. 2,341,355, so as to accurately dimension the same and provide the required press fit between the head 29 and the lower end of the tube 15.

As is obvious from the above, the ring 14 is pressed over the lower end of the tube 15 and the burner is pressed into the lower end of the cylindrical portion 31. The burner is held in that position by the support 25 and the screw 26. Due to the curvature of the intermediate portion 34 of the ring, the latter engages the bottom wall 17 of the boiler in two radially annular narrow zones. This construction compensates for roughness in the bottom wall 17, and increases the flexibility of the ring.

After the cylindrical portion 33 is pressed over the lower end of the tube 15, the latter is expanded very slightly, as is evident in Figure 3, so as to securely lock the ring on the tube 15 and aid in closing any slight openings between the two parts.

Figure 4 shows a slightly modified form of connecting ring for connecting the burner to the boiler. The various parts of the boiler and the burner are identical to those previously described and the same reference numerals will be used in connection therewith.

In Figure 4 the annular ring which connects the burner to the boiler is substantially the same as the ring shown in Figures 1 to 3. It comprises a cylindrical portion 40 which telescopes over the head 29 on the burner. Another cylindrical portion 41 telescopes over the lower end of the tube 15 on the boiler. Instead of expanding the entire periphery of the lower end of the tube 15, as in Figure 3, the lower end of the tube 15 and the cylindrical portion 41 are slit vertically at intervals, as indicated at 42, and the metal thereof is bent outwardly in the form of lugs 43 to lock the ring on the lower end of the boiler.

In Figure 5 the connecting ring comprises the usual cylindrical portion 45 which telescopes over the head 29 on the burner. Another cylindrical portion 46 spaced radially and axially from portion 45 is formed to telescope into the lower end of the tube 15 with a press fit. No particular provision for locking the portion 46 on the tube 15 is provided. The frictional engagement between the two parts is relied upon to hold the two parts together.

Figure 6 shows still another modification of the invention. In this modification of the invention the ring comprises a cylindrical portion 35 of the same general shape and configuration as the portion 31. It is adapted to telescope over the head 29 on the burner and is provided with stops 36. The ring has another cylindrical portion 37 spaced radially outwardly from the portion 35 and the two cylindrical portions are connected by an intermediate annular portion 38. In this modification of the invention the cylindrical portion 37 is telescoped into the depending annular flange on the bottom wall 17 of the boiler instead of on to the lower end of the tube 15, as previously described.

As pointed out above, in all of the modifications, the two cylindrical portions of the ring can be very accurately sized as to circumferential dimensions so that they will fit snugly into or over the respective parts of the burner and the boiler. Then, due to the flexibility of the ring, the latter will distort slightly, if need be, to accommodate slight irregularities in shape of the

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burner and boiler so that a practically airtight fit will be provided between the bead of the burner and the lower end of the boiler. The ring can be assembled onto the burner and boiler after the latter has been galvanized, so that there will be no irregularities on the ring due to galvanizing, which has been customary heretofore. In this way all of the air employed for combustion of the fuel in the burner must be admitted through the usual inlet openings provided therein. Such air inlet openings, as has been pointed out, are very carefully sized so that the air admitted therethrough is accurately metered. The invention is quite simple and is very easily and economically manufactured and installed.

The scope of the invention is indicated in the appended claims.

We claim:

1. In combination, a flue, a vaporizing pot type fuel burner therebelow, said burner having a tubular side wall provided with apertures for admitting a controlled amount of air into said burner, and means for connecting the outlet of said burner to the flue with a substantially airtight joint comprising an annular metal ring having axially spaced tubular portions, the one tubular portion of said ring receiving the lower end portion of said flue with a press fit and the other portion of said ring receiving the upper end portion of said burner side wall with a press fit, the walls of said ring being imperforate to provide an imperforate passage connecting said flue with said burner.

2. The combination defined in claim 1 wherein the flue is tubular and the said tubular portions

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of said annular metal ring have different diameters.

3. The combination claimed in claim 2 wherein the tubular side wall of the burner is provided with an outwardly extending circumferential bead adjacent its upper edge, the tubular portion of said ring connected with said burner being cylindrical, the said bead having a press fit in the cylindrical portion of said metal ring having the greater diameter.

4. The combination claimed in claim 1 wherein said press fit between said metal ring and the upper end portion of said burner comprises the sole connecting means between said burner and metal ring.

BASIL D. FIGG.

JOHN W. MILLER.

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