Feb. 26, 1935. H. J. LOVE 1,992,305

HOT WATER HEATER

Filed Sept. 18, 1933 3 Sheets-Sheet 1

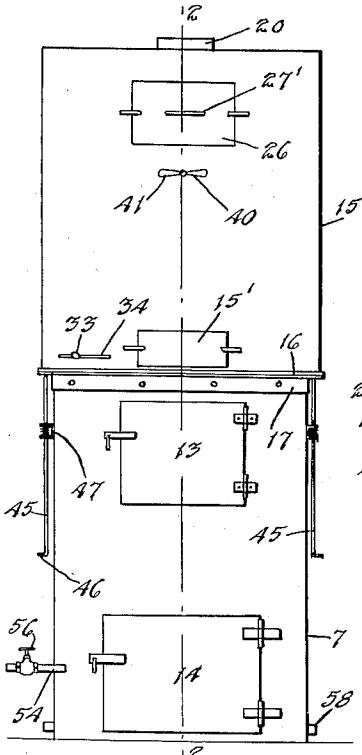


Fig 1

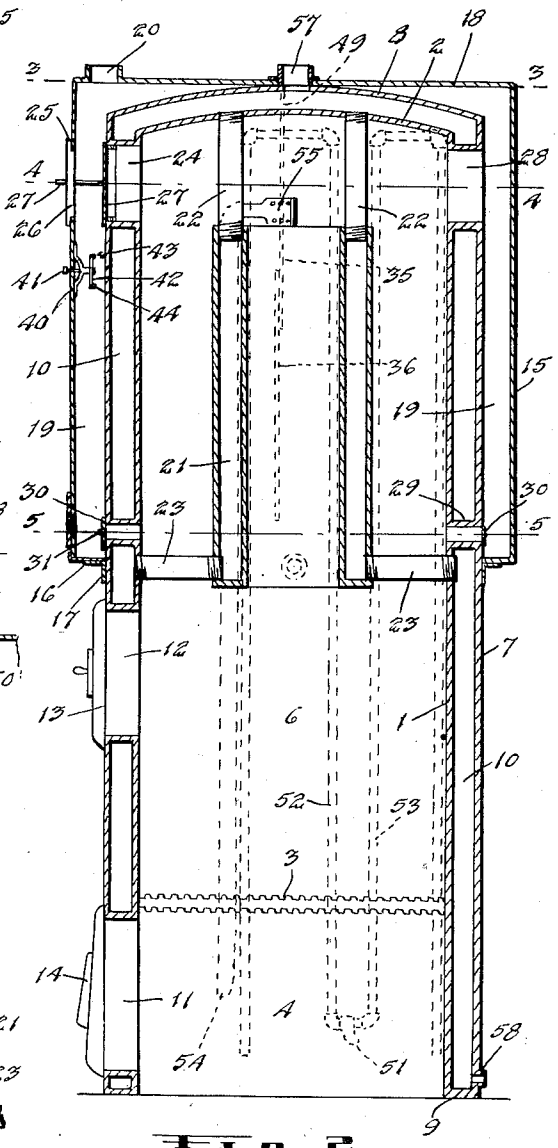


Fig 2

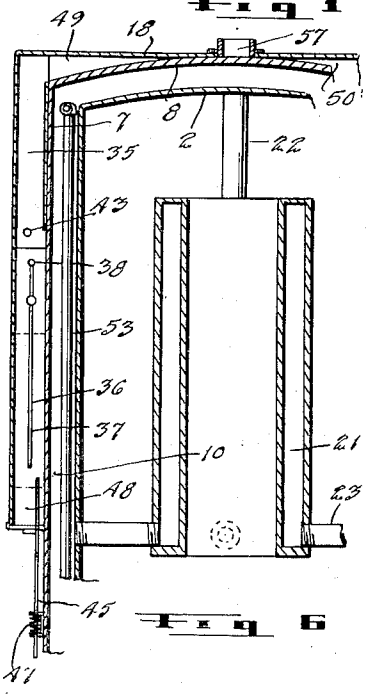


Fig 6

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Feb. 26, 1935. H. J. LOVE 1,992,305

HOT WATER HEATER

Filed Sept. 18, 1933 3 Sheets-Sheet 2

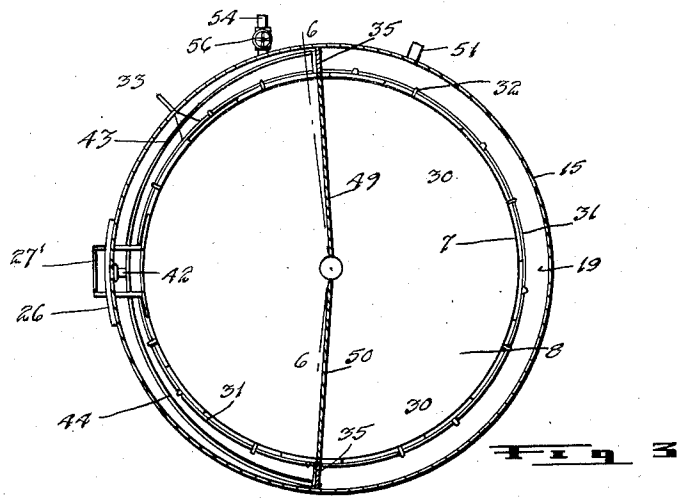


Fig 3

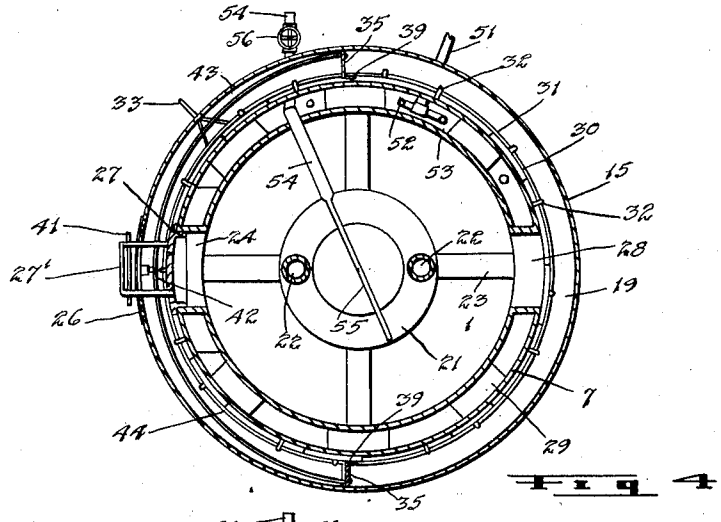


Fig 4

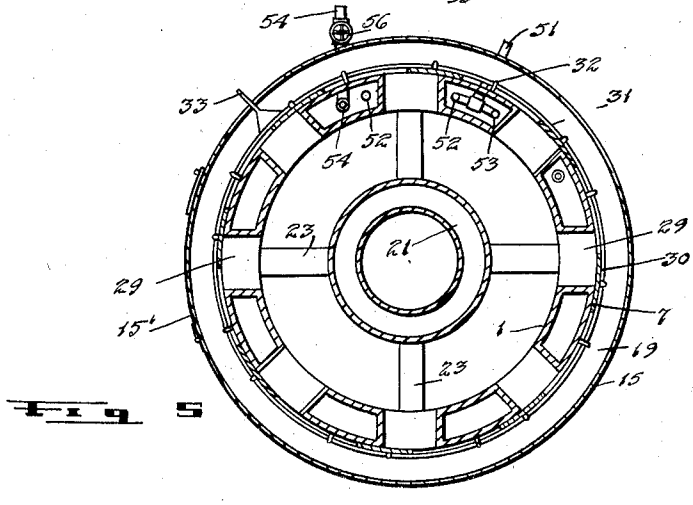


Fig 5

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Feb. 26, 1935. H. J. LOVE 1,992,305

HOT WATER HEATER

Filed Sept. 18, 1933 3 Sheets-Sheet 3

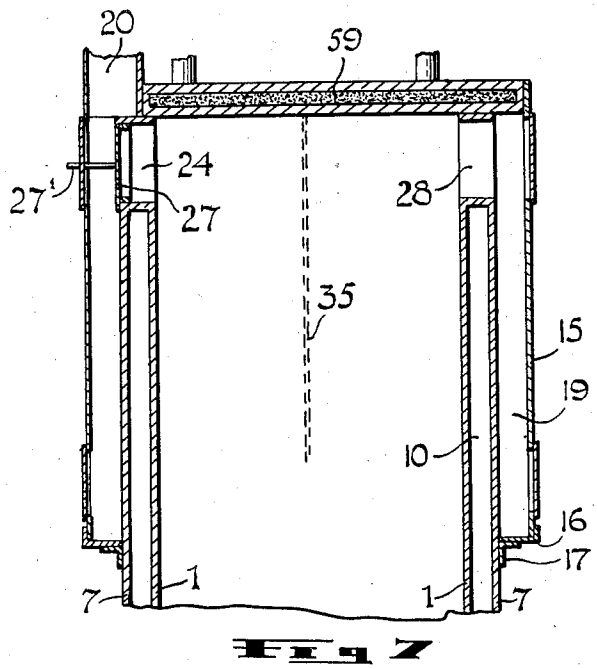


Fig 7

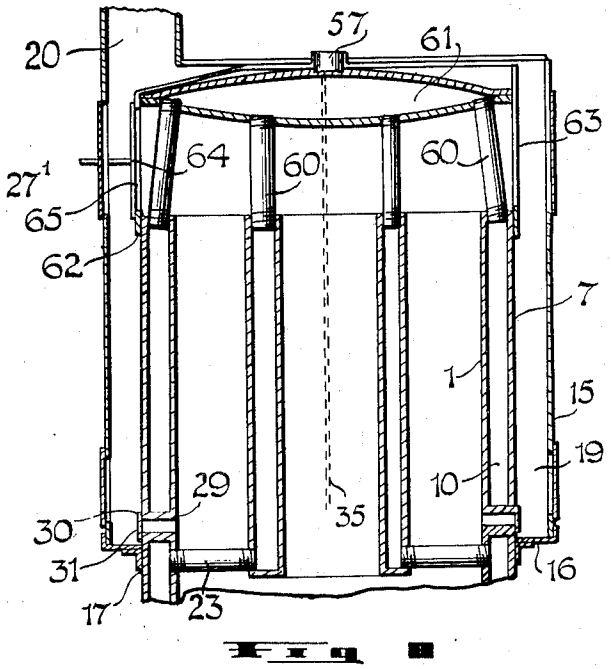


Fig 8

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UNITED STATES PATENT OFFICE

1,992,305

HOT WATER HEATER

Harold J. Love, Winnipeg, Manitoba, Canada

Application September 18, 1933, Serial No. 691,733
In Canada September 17, 1932

4 Claims. (Cl. 122—494)

(Granted under the provisions of sec. 14, act of March 2, 1927; 357 O. G. 5)

The invention relates to improvements in hot water heaters and an object of the invention is to provide a heater having a maximum heating surface and in which all the heat units possible are utilized for the heating of the water and thereby economizing in the consumption of fuel.

A more detailed object is to provide a heater wherein the products of combustion can be caused to circulate up through the interior of the water container and then around the exterior of the water container prior to being liberated to the flue and also to provide means whereby a direct draft may be provided if so desired.

A still further object is to construct the vertical baffles used in the smoke chamber surrounding the water chamber so that they can be adjusted in length to vary the size of the smoke escape passage thereunder and such that they can be swung laterally to permit of a greater or less amount of smoke to escape past as occasion demands.

A still further object is to provide gate controlled smoke passages connecting the combustion chamber with the lower part of the outer smoke chamber, whereby one can permit a greater or less amount of the products of combustion to escape directly into the lower part of the outer smoke chamber if so desired.

A still further object of the invention is to provide a water boiler suspended centrally within the upper part of the combustion chamber and suitably connected with the water jacket for water circulating purposes.

A still further object is to provide means for preheating the water admitted to the water jacket, such being accomplished by passing the inflowing water through a highly heated area before admitting it to the jacket.

A still further object is to provide means for admitting preheated air in regulated quantities to the upper part of the combustion chamber to support combustion.

With the above more important and other minor objects in view which will become more apparent as the description proceeds, the invention consists essentially in the arrangement and construction of parts hereinafter more particularly described, reference being had to the accompanying drawings, in which:

Fig. 1 is a front view of my heater.

Fig. 2 is an enlarged detailed vertical sectional view at 2—2 Figure 1.

Fig. 3 is a horizontal sectional view at 3—3 Figure 2.

Fig. 4 is a horizontal sectional view at 4—4 Figure 2.

Fig. 5 is a horizontal sectional view at 5—5 Figure 2.

Fig. 6 is a vertical cross sectional view at 6—6 Figure 3.

Fig. 7 is a vertical cross sectional view showing a modified construction of the upper part of the heater.

Fig. 8 is a vertical cross sectional view showing a further modified construction of the heater.

In the drawings like characters of reference indicate corresponding parts in the several figures.

An inner cylindrical shell or casing 1 is provided having the upper end closed by a head 2 and the lower end supplied with an elevated grate 3 providing an ash pit 4 therebelow and a fire box and combustion chamber 6 thereabove. The casing 1 is enclosed within an outer casing 7 spaced therefrom and having the top end thereof closed by a head 8 and the bottom end connected by a base plate 9 to the bottom of the inner casing. The area between the inner and outer casings forms a water container 10 in the form of a water jacket surrounding and covering the inner casing.

A suitable inlet passage 11 opens through the casings to the ash pit and a suitable firing passage 12 opens through the casings to the fire box and both of these passages are closed by the well known hinged doors 13 and 14.

The upper portion of the outer casing is enclosed within a cylindrical shell 15 which is spaced from the outer casing and has the lower end resting on a flanged annular plate 16 which receives the outer casing and is supported from the outer casing by a band 17 of angle iron cross section, the band being suitably riveted to the casing. The upper end of the shell is closed by a top plate 18. This shell forms with the outer casing a smoke chamber 19 surrounding and overlying the water jacket. A smoke pipe 20 leads from the front part of the shell top.

An interior annular water boiler 21 is located centrally in the upper part of the combustion chamber and it has the upper end thereof connected by two water pipes 22 to the overlying upper portion of the water container 10 and the lower end connected by four radially extending similar water pipes 23 to the central portion of the chamber 10.

A main smoke duct 24 connects the upper part of the combustion chamber with the upper part of the smoke chamber 19 and directly opposite this duct, I locate a clean out opening 25 which is normally closed by a removable cover plate

26. A main damper 27 is provided for closing the outlet duct 24 and suitable means is provided for supporting and adjusting this damper, such being herein shown as a U-shaped damper rod 27' passing slidably through the cover plate 26 and having the ends thereof permanently fastened to the damper. Obviously one can open the damper from the front part of the heater by pulling outwardly on the damper rod.

Directly opposite the smoke duct 24 and at the rear of the heater, I locate a further duct 28 which connects the rear part of the combustion chamber with the rear upper part of the smoke chamber 19. This duct 28 is at all times fully open. The lower part of the annular smoke chamber 19 is connected by a plurality of suitably spaced lower ducts 29 with the combustion chamber and with the outer ends of these ducts, I associate a plurality of similar sliding gates 30, all of which are permanently fastened to a circular rod 31 surrounding the outer casing 7 and slidably carried by suitable carrying lugs 32 secured to the latter casing. An operating handle 33 extends outwardly through a horizontal slot 34 provided in the shell and the arrangement is such that one by side shifting the handle rotates the ring 31 around the outer casing and in so doing simultaneously shifts all the gates to open or close the ducts 29.

In the smoke chamber 19, I locate similar vertical baffles, the baffles being placed at the sides of the heater. The baffles are both identically constructed, each comprising an upper plate 35 and a lower plate 36, the lower plate being adjustably connected to the upper plate for vertical sliding movement. I have herein shown the lower plate as supplied with a longitudinally extending slot 37 and slidably connected to the upper plate by bolts 38 passing through the slot. The upper plate in each instance has the inner edge thereof hinged at 39 to the casing 7 and the width of the plates is such that when extended they cross the smoke chamber 19 and divide it into front and rear compartments.

Means is provided for simultaneously rotating the baffles on their hinges and such is herein shown as a short shaft 40 rotatably carried by the shell and provided at the outer end with a hand grip 41 and at the inner end with a cross bar 42, the cross bar having its opposite ends connected by curved operating rods 43 and 44 to the free edges of the upper portions of the baffles. Obviously one can open the baffles a greater or less amount by turning the hand grip 41 as desired.

To each of the plates 36 of the baffles, I connect permanently the upper end of a downwardly extending adjusting rod 45 which extends freely through the plate 16 and has its lower end terminating in a hand grip 46. The upper end of the rod is secured to the plate close to the inner edge thereof so that there is not much lateral swinging movement given the rod when the baffle is swung on its hinge. The rod passes through an adjustable fastener 47 of any approved type secured to the outer casing and adapted to hold the rod in any adjusted position. Obviously one can adjust the lower plate of the baffle in regard to the upper plate and in so doing increase or diminish the escape passage 48 for smoke appearing between the lower end of the baffle and the plate 16.

A pair of similar permanent horizontally extending baffle plates 49 and 50 cross the upper part of the heater in a location between the plate 18 and the head 8 and these have their outer ends normally engaging the upper ends of the extended vertical baffles so that the smoke chamber is effectively divided by the baffles into front and rear compartments and in this connection, it will be observed that the duct 28 is continuously in communication with the upper part of the rear smoke compartment and that the duct 24 is, upon the damper 27 being opened, in direct communication with the flue pipe 20 through the upper front portion of the smoke chamber 19.

A water inlet pipe 51 leads into the bottom of the water container 10 and there communicates with pipes 52 and 53 rising within the jacket and having their lower ends opening into the jacket, such arrangement serving to preheat the water admitted to the heater by passing it through the already heated water in the heater. An air pipe 54 is passed into the heater and rises within the water jacket and has the upper end entering the upper part of the combustion chamber where it is supplied with a perforated head 55 for effectively distributing the admitted air into the combustion chamber to support combustion. A valve 56 is supplied for controlling the amount of air admitted. A water outlet pipe 57 communicates with the top of the water jacket.

With a heater of this kind, I can utilize auxiliary hot water tanks and they will be suitably connected to the pipe 57 and will have return pipes leading from them and connected to the lower part of the jacket by the nipples 58.

When one initially starts this heater, he can open both the gates and the damper 27 and then later closes the damper and the gates at which time, the products of combustion pass upwardly within the combustion chamber, outwardly through the passage 28, downwardly through the rear part of the divided smoke chamber 19, forwardly into the fore part of the smoke chamber 19 through the passages 48 under the vertical baffles and then upwardly to the flue 20. In this way the products of combustion are circulated first upwardly within the water heating chamber and then around the outside of that chamber prior to escaping to the flue so that the water is very effectively heated and there is considerable saving of fuel. The operator can regulate the size of the openings 48 at any time and can open the gates a greater or less amount to give the most effective heating under existing circumstances.

Obviously if the gates are opened a greater or less amount, there will be a direct flow of a portion of the products of combustion into the lower part of the smoke chamber 19 and the various adjustments provided, give a wide range of possibilities as will be readily appreciated. The casing 15 is provided at the front with a clean out door 15'.

In Figure 7 of the drawings, I have shown a simpler form of heater and here it will be seen that the water boiler 21 has been removed, the vertical baffles have been made non-adjustable and stationary, the gates have been removed and the water chamber above the combustion chamber has been dispensed with and a comparatively thick heat insulating material 59 has been substituted therefor. With such a construction, the travel of the products of combustion from the combustion chamber to the flue is either direct through the duct 24 or indirect through the chamber 19, the smoke travelling first downwardly in the rear part of such chamber, then underneath the baffles and then forwardly

through the front part of the chamber to the flue.

In Figure 8 of the drawings, the water boiler 21 has been retained, the water jacket is somewhat lower and the upper end of it is connected by tubes 60 to a top boiler 61 and the lower part of the water jacket is supplied with gate controlled ducts similar to those appearing in the first described structure although in this connection these can be omitted if desired. It will be noted, however, that in Figure 8, the space between the boiler 61 and the upper end of the water jacket is closed by a band 62 and the band is supplied with a rear outlet 63 corresponding to the passage 28 and with a front outlet 64 corresponding to the passage 24. A damper 65 similar to that 27 is provided for controlling the outlet 64.

What I claim as my invention is:—

1. In a water jacketed heater having an outer chamber for combustion gases surrounding the jacket, vertical baffles crossing the interior of the chamber to divide the same, said baffles being adjustable in length and laterally swingable.

2. In a water jacketed heater having an outer chamber for combustion gases surrounding the jacket, vertical baffles crossing the chamber to divide the same, said baffles being formed from upper and lower sections and having the upper sections hinged for lateral swinging movement and the lower sections slidably connected to the upper sections for endwise sliding movement.

3. In a water jacketed heater having an outer chamber for combustion gases surrounding the jacket, vertical baffles crossing the chamber to divide the same, said baffles being formed from upper and lower sections and having the upper sections hinged for lateral swinging movement and the lower sections slidably connected to the upper sections for endwise sliding movement and means operable from the exterior of the heater for swinging the baffles and for endwise shifting the lower sections of the baffles.

4. In a water jacketed heater having an outer chamber for combustion gases surrounding the jacket, baffling means within the chamber to divide the same, said baffling means being formed from upper and lower sections and having the upper sections hinged for swinging movement and the lower sections movably connected to the upper sections and means operable from the exterior of the heater for imparting motion to said baffling means.

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