

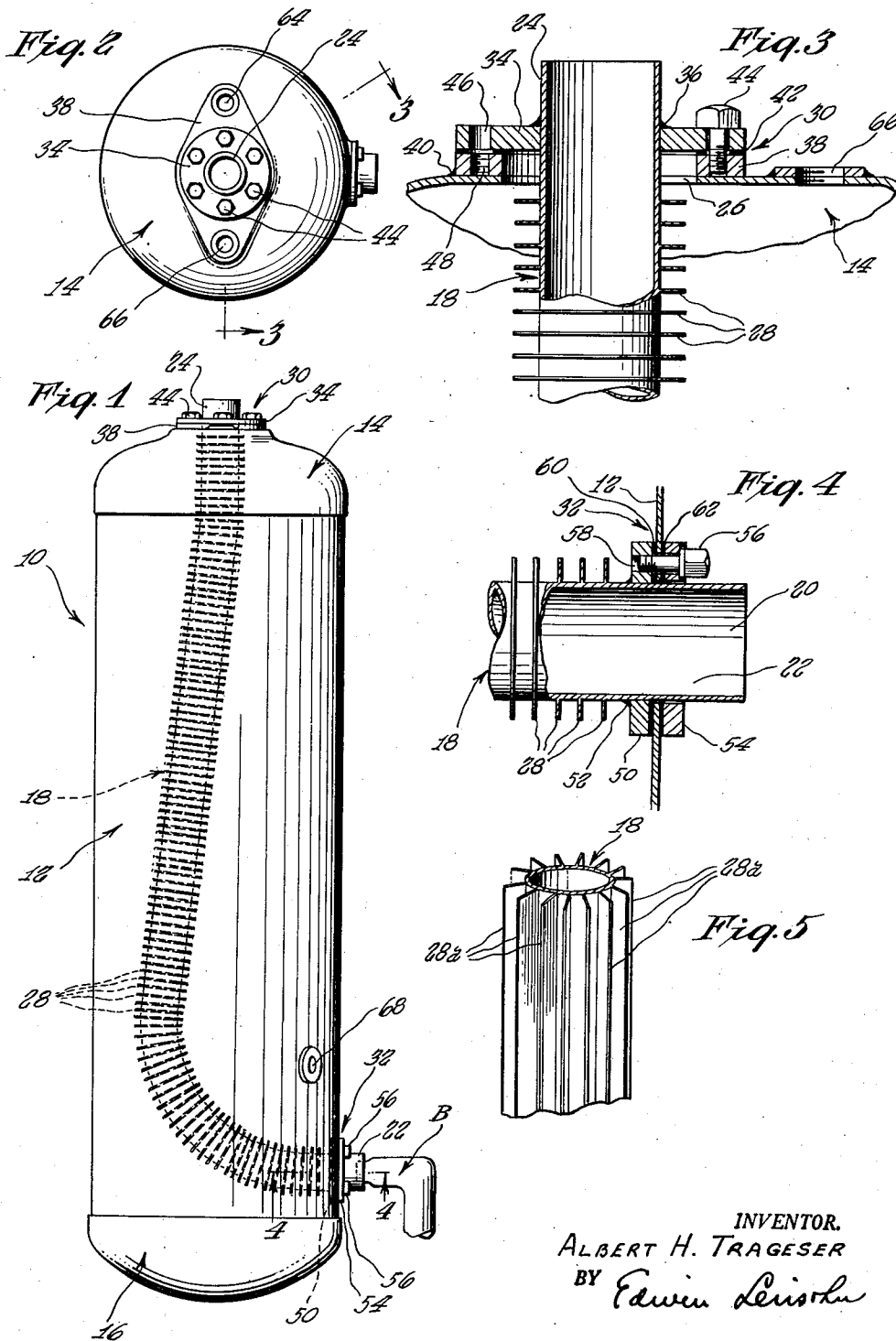
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WATER HEATER

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WATER HEATER

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This invention relates to water heaters and is more particularly directed to water heaters for domestic use without, however, being limited thereto.

Heretofore water heaters were provided with a flue disposed internally of the tank and extending through the bottom thereof at which a gas burner is disposed. This arrangement has been found to be very unsatisfactory and objectionable because, among other things, the accumulation of sludge or other deposits on the inner surface of the bottom of the tank and around the lower end of the flue prevents or greatly reduces the conduction of heat through the bottom of the tank and the lower end of the flue to the water in the tank with the result that the efficiency of the water heater is seriously impaired and with the further result that the bottom of the tank and/or the lower end of the flue burn out. Moreover, in the prior arrangement it is ordinarily either impossible or impractical to replace an impaired or burned out flue, and for this reason it is usually necessary and the practice has been to discard the entire tank, including the flue, and to provide a new water heater in the place of the old one.

The primary object of the present invention is to obviate the above mentioned objections and disadvantages. Further in accordance with the present invention provision is made to enable the flue to be readily removed and replaced by another flue as conditions may require.

The above objects of the present invention and objects ancillary thereto will be fully understood from the following description considered in connection with the accompanying drawings which are to be considered as illustrative of the invention but not in limitation thereof.

In the drawings:

Fig. 1 is a side view of a water heater embodying the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a sectional view, on a larger scale, of the upper part of the heater on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional view, on a larger scale, on the line 4—4 of Fig. 1;

Fig. 5 is a perspective view of part of a flue provided with longitudinal fins instead of the circular fins provided on the flue as illustrated in Figs. 1, 3 and 4.

Referring now to the drawings in detail, the water heater embodying the present invention comprises a water tank 10 which, as here shown, consists of a cylindrical shell 12 and the upper and lower heads 14 and 16 respectively. Tank 10 is preferably made of copper but may be made of steel or any other suitable metal. A flue or pipe 18, which is preferably made of copper but which can be made of any other suitable metal

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is disposed within the water tank 10 in position longitudinally thereof. The lower or inlet end 20 of said flue projects through an opening 22 in the side of the tank near the lower end thereof, preferably at a point above the head 16, and the upper end 24 of the flue projects through a top opening 26 which is here shown as provided in the upper head 14 of said tank. It will be understood that the gaseous products of combustion which pass into the flue through the lower end thereof from the gas (or oil) burner indicated more or less diagrammatically at B flow upwardly through the flue and are exhausted through the upper or outer end 24 of the latter. Preferably, as illustrated in the drawings, a plurality of metal fins 28 are secured to the flue 18 in spaced relation longitudinally of said flue. As indicated there is a large number of said fins 28 so as to provide maximum heat conduction to the water in tank 10 during the passage of the heating medium through the flue. As illustrated in Fig. 5, the fins, instead of being circular, may extend longitudinally of the flue 18, as indicated at 28a.

It will be noted that the flue 18 extends continuously upwardly and in non-reflexed form from its inlet end 22 to its outlet end 24 and that for this reason there are no bent portions or pockets in the flue in which gases may collect and thereby cause back-firing. Further it will be observed since the flue is located above the bottom of the tank, and is therefore clear of sludge or sediment which may collect on the bottom of the tank, the flue is at all times surrounded by water and is thereby protected against burning out. Likewise, since the burner is located at the side of the tank above the bottom thereof, the direct application of the heat of the flame of the burner to the bottom and the consequent impairment of the tank are thereby obviated. Accordingly, it will be understood that the water heater of the present invention not only operates with improved efficiency and a resulting lower fuel consumption but also has a longer life.

Provision is made, in accordance with a feature of the present invention, for arranging and securing the flue to the tank in such manner as to enable the flue to be removed and replaced by another similar flue should such replacement become necessary. More specifically, as here shown, the flue 18 is removably secured in the tank 10 with releasable water-tight joint-forming means 30 and 32, respectively, between the flue and the tank at the upper and lower openings 26 and 22, respectively, of the tank and the adjacent upper and lower ends 24 and 22, respectively, of the flue. The joint 30 comprises a metal flange 34 brazed or otherwise secured to the upper end 24 of the flue externally of the latter in water-tight relation therewith as indicated at 36 (Fig. 3). A companion flange 38 is

disposed externally of the tank around the top opening 26 thereof, externally of the tank, and is brazed or otherwise suitably secured to the tank in water-tight relation therewith as indicated at 40. Flange 34 is releasably secured to flange 38, with an interposed water sealing gasket 42 therebetween, by means of a plurality of bolts 44 which pass through companion openings 46 in flange 34 and are threaded into screw-threaded openings 48 in flange 38.

The joint 32 comprises a metal flange 50 which is brazed or otherwise suitably secured to the lower end 20 of the flue externally thereof in water-tight relation therewith as indicated at 52 (Fig. 4). It will be noted that flange 50 is disposed internally of the water tank 10. A metal collar, which may also be termed a loose flange, is disposed around the end 20 of flue 18 externally of the tank, and a plurality of bolts 56 pass through companion openings in collar 54 and in the shell 12 and are threaded into screw-threaded openings 58 in flange 50. Water sealing gaskets 60 and 62 are interposed between shell 12 and flanges 50 and 54 respectively. These gaskets are preferably formed of asbestos. Gasket 42 between flanges 34 and 38, may also be formed of asbestos.

It will be understood that the flue 18 may be removed from the water tank 10 through the opening 26 when flange 34 is released from flange 38 and when flange 50 is released from bolts 56. In this connection it will be noted that the removal of flue 18 through opening 26 and the insertion of a replacement flue through said opening can be easily accomplished by moving the flue in the direction of its length through said opening, since said flue is substantially of rectilinear form in the direction of its length except for a comparatively small end part thereof which moreover has a large radius of curvature. It will be understood that the overall diameter of the flue, including the fins 28 or 28a, when the flue is provided with such fins, is sufficiently smaller than the opening 26 to allow the movement of the flue through said opening. It will be understood that the bottom or lower head 16 of the water tank 10 does not require the provision of any opening therein since the lower end of the flue does not pass through said bottom of the tank. The top of the tank is provided with a cold water inlet 64 and with a hot water outlet 66. Also, as here shown, the shell 12 is provided with an opening 68 for a thermostat (not shown) for burner control.

As various changes in the form and arrangement of parts of the water heater may be made without departing from the underlying idea or principles of the invention, it is to be understood that various changes in the details of construction and in the arrangement of parts may be made, without departing from the invention, within the scope of the appended claims.

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

1. A water heater, comprising a water tank, and a heating flue positioned within said tank above the bottom thereof, and having a lower inlet opening for the heating medium and an upper exhaust outlet, said flue extending continuously upwardly from said inlet to said exhaust outlet, said tank having a top opening through which the upper end of said flue projects and an opening in the side of the tank

through which the lower end of said flue projects, a flange on the upper end of said flue externally of the latter in liquid-tight relation therewith, said flange being positioned externally of the tank at said top opening and sealing the latter, said flange being releasably secured to said tank, and a flange on the lower end of said flue externally of the latter in liquid-tight relation, said last mentioned flange being positioned internally of the tank and sealing said opening in the side thereof, said last mentioned flange being releasably secured to said side of the tank, said top opening being larger than said last mentioned flange whereby said flue is removable from said tank through said top opening when both of said flanges are released from the tank.

2. A water heater, comprising a water tank having upper and lower openings, a heating flue positioned within said tank and extending between said openings, a flange on the upper end of said flue externally of the latter in liquid-tight relation therewith, said flange being positioned externally of the tank at said top opening and sealing the latter, said flange being releasably secured to said tank, and a flange on the lower end of said flue externally of the latter in liquid-tight relation, said last mentioned flange being positioned internally of the tank and sealing said lower opening, said last mentioned flange being releasably secured to said tank around said opening, said top opening being larger than said last mentioned flange whereby said flue is removable from said tank through said top opening when both of said flanges are released from the tank.

3. A water heater, comprising a water tank having upper and lower openings, a heating flue positioned within said tank and extending between said openings, a flange on the upper end of said flue externally of the latter in liquid-tight relation therewith, said flange being positioned externally of the tank at said top opening and sealing the latter, said flange being releasably secured to said tank, and a flange on the lower end of said flue externally of the latter in liquid-tight relation, said last mentioned flange being positioned internally of the tank and sealing said lower opening, said last mentioned flange being releasably secured to said tank around said opening, said top opening being larger than said last mentioned flange whereby said flue is removable from said tank through said top opening when both of said flanges are released from the tank, the major part of said flue being substantially rectilinear longitudinally of the flue and have a lower curved longitudinal part of a sufficiently large radius to clear said top opening by progressive movement of the flue in the direction of its length through said opening.

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