Dec. 21, 1948. S. W. HALL 2,456,698

ELECTRIC WATER HEATER

Filed Oct. 10, 1945 2 Sheets-Sheet 1

Fig. 1.

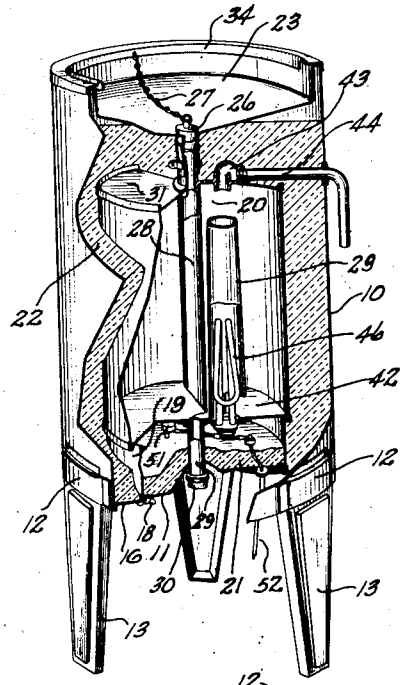
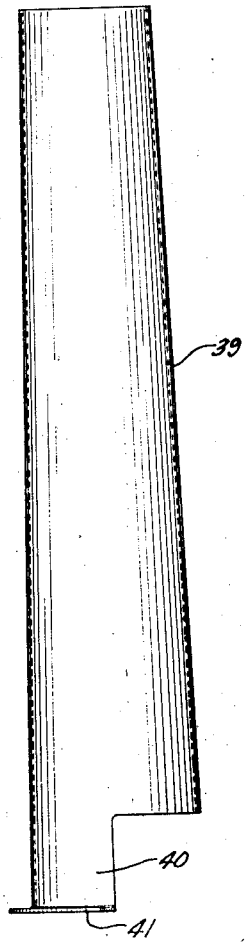


Fig. 3.



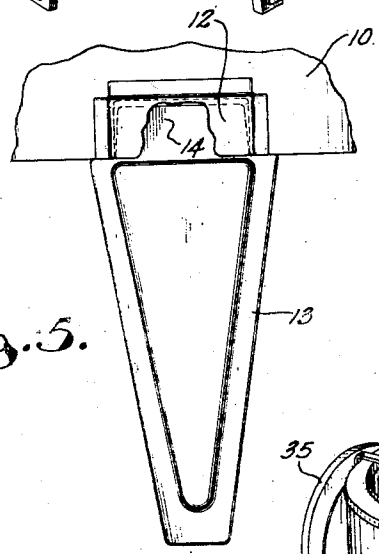


Fig. 5.

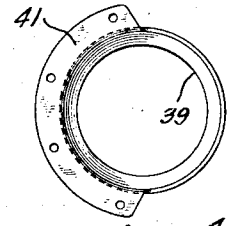


Fig. 4.

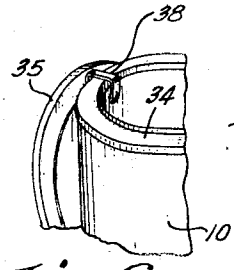


Fig. 6.

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ELECTRIC WATER HEATER

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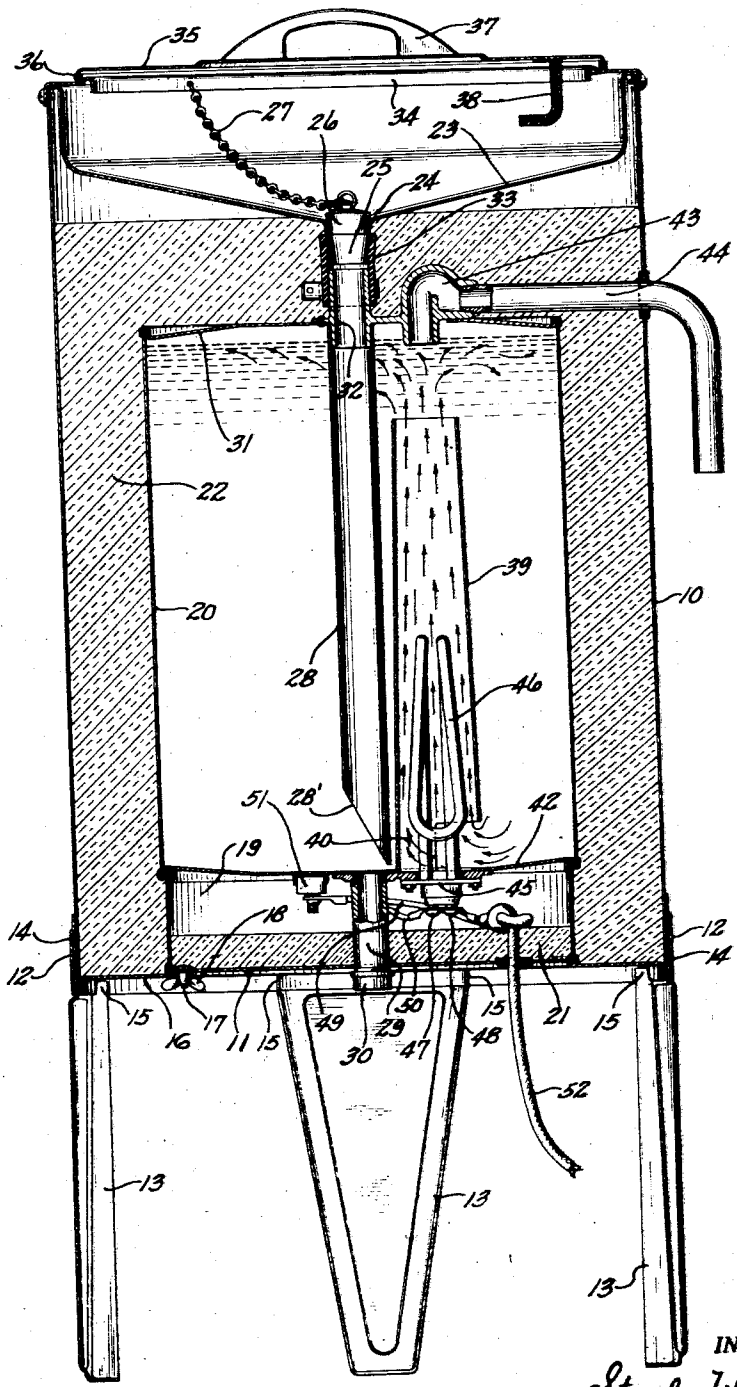


Fig. 2.

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ELECTRIC WATER HEATER

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6 Claims. (Cl. 219—38)

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This invention relates to improvements in electric water heaters.

Generally defined, a primary object of the invention is to provide a highly efficient, rapid operating, and improved electric water heater of the type employing an immersion electric heating element for the purpose of heating water introduced into a tank and thereby causing circulation within the tank and the discharge of heated water from the upper portion of the tank.

In the conventional electric water heaters of the type under consideration, an immersion electric heating element is employed directly in the tank of water in unshielded relation relative to the water in the tank. One of the objects of the present invention is the provision, in an electric water heater of the class described, of a tube mounted within the water chamber of the tank in spaced, enclosure forming relation relative to the heating unit, whereby the tube serves to increase the circulation of the water in the tank, thereby increasing the speed of heat transfer and enhancing the efficiency of the apparatus, and also, because of the speeded-up water circulation, the arrangement tends to keep the heating element free from objectionable deposits which would ordinarily form thereon and detract from its efficiency.

A further object of the invention is to provide an electric water heater adapted especially for use in rural localities and being susceptible of being filled by the introduction of water poured from pails or other containers and requiring no special plumbing, said water heater being unsusceptible of running dry and not being a pressure system.

A further object of the invention is to provide an electric water heater which is entirely automatic in its operation and is thermostatically controlled.

A further object of the invention is to provide an electric water heater which is easy to clean, which may be readily drained and flushed, and in which the electric heating element is removable for cleaning, conditioning and replacement.

A further object of the invention is to provide an electric water heater adapted for batch filling and provided with an upper filler bowl surrounded by an inwardly projecting annular rim which prevents water from splashing out when being poured into the filler bowl from a pail or utensil, which keeps dirt and foreign material out of the filling bowl, and which also serves as a firm support for the pail or utensil used in filling.

A further object of the invention is to provide

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an electric water heater wherein the body or casing is elevated by means of legs which are frictionally engaged in sockets in a manner so as to eliminate the necessity for screws or other separate fastening means.

Another object of the invention is to provide, in an electric water heater of the class described, a syphon head so constructed and positioned that the expansion of the heated water will not cause drippage at the discharge outlet.

Another object of the invention is to provide, in an electric water heater of the class described, an internal base ring or collar member which supports the water tank or vessel within the casing and which also acts as a locater for the associated elements.

A further object of the invention is to provide an electric water heater which is of very simple construction, is strong and durable, is economical to operate, and is well adapted for the purposes described.

With the above and other objects in view, the invention consists of the improved electric water heater, and its parts and combinations as set forth in the claims and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a front perspective view of the improved electric water heater with parts broken away and in section to show details of the construction, the cover for the filler bowl being removed;

Fig. 2 is an enlarged vertical sectional view through the improved electric water heater;

Fig. 3 is a side view of the circulator tube embodied in the heater tank, and on an enlarged scale;

Fig. 4 is an enlarged bottom view of the circulator tube;

Fig. 5 is an enlarged fragmentary view of the lower portion of the water heater casing showing the manner in which a supporting leg is carried thereby, with parts being broken away to show details of construction; and

Fig. 6 is a fragmentary perspective view on a reduced scale showing the manner in which the cover for the filler bowl may be hung in open position on the filler bowl rim.

Referring now more particularly to the drawings, it will appear that the improved electric water heater includes an outer, metallic casing 10 of cylindrical formation and having its lower end closed by a disk-like cover or head 11.

Mounted at spaced intervals on lower outer surface portions of the outer casing 10 are socket forming straps of plates 12, providing openings between their off-set inner face portions and the surface portions of the casing thereadjacent. The outer casing 10, and parts included therein, are adapted to be supported in an elevated position by a plurality of spaced supporting legs 13. The upper end of each supporting leg 13 has, toward its outer face, an upwardly projecting tongue 14, and spaced inwardly thereof are off-set fingers 15 (see Fig. 2). The legs 13 are connected to the bottom portion of the outer casing 10 by means which eliminate the use of bolts, screws or other such expedients. As will be noted from Fig. 2, the bottom cover 11 of the outer casing is attached to a flanged ring disk 16 by means of bolts 17 and winged nuts 18. Relative to a leg 13 the upwardly projecting tongue 14 thereof is inserted into the pocket formed by a casing-borne plate 12 and is held therein by friction. The adjacent downturned flange portion of the bottom disk 16 rests on the top of the leg inwardly of the tongue 14 and the leg fingers 15 engage inner face portions of the disk flange. The legs are thereby mounted in a very secure and stable manner.

Mounted centrally on the inner surface of the bottom of the outer casing is an upstanding metal collar 19 which acts as a locater for the associated parts in the assemblage and which also forms a seat for a cylindrical water tank 20, formed of sheet metal. On the inner surface of the bottom cover 11 and within the collar 19 is a suitable thickness of insulation 21, and likewise, between the inner surface of the outer casing 10 and the outer surface of the water tank 20 and collar 19, is insulation 22 which completely packs the spaces mentioned.

Within the upper end of the outer casing 10 is a filler bowl 23 whose upper peripheral portion is integral with the inwardly flanged upper edge of the outer casing 10. The bottom of the filler bowl inclines evenly downwardly to a central outlet or discharge opening 24 communicating with a downwardly tapered open discharge spout 25. Said opening 24 and water flow through the spout 25 is normally controlled by a removable rubber or fiber stopper 26 carried by an anchored chain 27.

Extending axially downwardly in the water tank 20 is a metal filler tube 28 whose open lower end is cut angular as at 28', and is adapted to discharge slightly above the bottom of the water tank 20 over a drain pipe 29 whose projecting lower end portion is normally closed by a removable cap 30, said drain pipe extending from the bottom of the water tank through the bottom cover 11 of the main casing. The upper end of the filler tube 28 is integral with a top plate 31 which closes the upper end of the water tank 20 and also communicates with the lower end of a metal fitting 32 whose upper end is connected by a hose joint 33 with the spout 25 previously mentioned.

The upper peripheral portion of the outer casing 10 carries an inwardly projecting rim 34 which extends inwardly of and over the upper edge of the filler bowl 23 and has its inner periphery formed as a curved downturned eave-like flange. This eave-like flange prevents water from splashing out of the filler bowl when the latter is having water introduced thereinto and also serves as a convenient support for a pail or utensil used in introducing water into the filler bowl. The top of the filler bowl may be closed by a circular cover member 35 whose downturned outer

peripheral portion carries a rubber bumper or gasket 36 adapted to rest on the top of the horizontal portion of the eave-like rim 34. Centrally mounted on the top of the removable cover 35 is a handle 37. Depending from an undersurface portion of the cover 35 is a cover hanger or hook 38, constructed as is best shown in Fig. 2 and having thereon an outer covering of rubber or similar resilient material. When the cover 25 is removed, as in introducing water into the filler bowl 23, the hanger 38 provides convenient means for hanging or supporting the cover 35 in an exposing position, as is shown in Fig. 6, wherein said cover 35 is disposed against an outer face portion of the main casing 10 and the hanger 38 engages the flanged portion of the rim 34.

A very important feature of the present invention is a circulator tube designated generally by the numeral 39 and shown in detail in Figs. 3 and 4. As will be noted from the drawings, said circulator tube is of circular formation and is slightly upwardly tapered. It is provided with a skirt-like lower extension 40 provided with a flanged arcuate base 41 by which means the circulator tube is mounted on and bolted to the bottom wall 42 of the water tank 20. The circulator tube in its assembled relation is preferably positioned as shown in Figs. 1 and 2 with its open upper end substantially below the top of the water tank 20 and preferably in vertical alinement with the lower open end of a curved syphon head 43. The cutaway lower end portion of the circulator tube 39 adjacent the skirt 40 forms an inlet for water circulating through said tube.

The horizontal extent of an outlet pipe 44 which extends through the outer casing 10, is connected at its inner end with an upper side opening in the syphon head 43. The outer end of the outlet pipe 44 is downturned to discharge heated water into a suitable vessel, or, if desired, an end of a tubular connection or pipe may be attached thereto.

Supported on a suitable base plate 45 carried by the water tank bottom 42 is an upwardly projecting immersion type electric heating element 46 which, as positioned, is within the lower portion of the circulator tube 39. Terminals 47 and 48 on the lower fixture portion of the heating element 46 have connected thereto circuit wires 49 and 50, and also connected to said circuit wires is a thermostat 51. The circuit wires are included in a conventional cable or cord 52 which extends outwardly of the main casing 10 for connection with a convenient source of electrical energy (not shown).

The improved electric water heater may be used in any locality where there is a source of current. The electric heater does not require piping and is, therefore, particularly adapted for rural locations. When the water tank 20 is to be filled, cold water is initially introduced thereinto through any convenient means. If the electric heater is not located near a source of piped water, the water may be introduced into the heater by means of buckets or like utensils. For that purpose the top cover 35 is removed and is conveniently hung on the side of the main casing in the manner shown in Fig. 6. As the stopper-carrying chain 27 is attached to the main cover, the removal of the main cover will insure the disengagement of the stopper from the filler bowl opening 24. As water is introduced into the filler bowl 23 by means of pails, as was previously mentioned, a pail, during the pouring operation,

may be conveniently supported on the filler bowl rim **34** which likewise prevents splashing during the pouring operation. The water introduced into the filler bowl flows down the filler tube **15** and when sufficient water is poured into the device so as to fill the interior of the water tank **20**, the cord **52** is connected with an electrical source and current then flows through the heating element **46**. The circulator tube **39** which encloses the heating element **46** is, of course, filled with water, and the water in said tube in contact with the heating element will become heated thereby and rises in the tube and thus starts the water circulation. The cold water in the tank, of course, continually circulates downwardly and is drawn into the circulator tube **39**, being heated therein and then the warm water rises. The syphon head **43** draws off heated water from the top of the tank **20** and discharges said heated water in a continuous stream through the outlet pipe **44**, the water being discharged into any desired container or it may be conveyed to a desired location by means of tubing connected to the outlet end of the discharge pipe **44**.

The action described continues until the water in the tank **20** has reached a predetermined maximum temperature, at which point the thermostat **51** functions to automatically break the electrical circuit. The electrical circuit will remain open until the tank temperature drops to a predetermined minimum temperature. This may be occasioned by the addition of cold water to the tank **20** or through heat losses. When the tank temperature reaches a predetermined minimum temperature, the thermostat **51** automatically closes the circuit and the heating element is again energized so as to heat the circulating water. This cycle continues as long as the device is in electrical connection with the source of energy. Obviously, additional cold water introduced into the tank **20** will pass to the bottom of the tank through the tube **28** forcing hot water upwardly in the circulator tube **39** and out of the tank through the syphon head **43** and the discharge pipe **44**. The construction of the syphon head is such that expansion of water will not cause drippage at the outlet end of the discharge pipe **44**.

The improved electric heater provides an extremely convenient means for providing an adequate supply of heated water. The water is heated rapidly and efficiently and the thermostatic control insures a supply of heated water at a desired temperature. The improved circulator tube **39** greatly increases the efficiency of the apparatus and facilitates the heating of water in the tank **20**. It also insures an active flow of water through the circulator tube **39** in close proximity to the heating element **46** and thereby additionally serves to keep said heating element free from objectionable deposits. The outlet end of the circulator tube, being in alinement with the open end of the syphon head facilitates the discharge of hot water.

The electric water heater is simple in construction and is easy to assemble and disassemble. In the latter respect, the base collar **19**, not only supports the water tank **20** in an elevated position relative to the bottom of the outer tank **10**, but also serves as a locater for the adjacent constituent elements. The heater does not involve a pressure system and there is no danger of the same running dry. The cap or plug **30**, on the lower end of the drain pipe **29** is readily accessible for removal whereby the tank may be drained and flushed.

It should be understood that it is not desired to limit this invention to the exact details of construction or the precise mode of operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

What is claimed as the invention is:

1. In a displacement type water heater, a jacketed tank adapted to contain a body of water and having a lower cold water inlet and an upper warm water outlet, a water circulator tube mounted upright entirely within said tank spacedly between the tank inlet and outlet, the bore of said tube being slightly upwardly tapered, an immersion-type electric heating element within a portion of said tube in the path of water circulating therethrough, and an internally baffled syphon head in the warm water outlet in substantial alinement with the upper end of said tube.

2. In a water heater, a tank adapted to contain a body of water and having an upper warm water outlet, an open top filler bowl superimposed on said tank and having a controlled drain opening in a lower portion thereof, the upper end of the filler bowl being formed with an inwardly projecting annular rim, a removable cover for the open top of said bowl having a projecting hanger on its inner face to engage said rim and support the cover free of the top of the bowl, a discharge pipe extending from said drain opening into a lower interior portion of said tank to supply cold water thereto, a water circulator tube mounted upright in said tank spacedly between the discharge end of said pipe and said tank outlet, and an electric heating element within a portion of said tube and in the path of water circulating therethrough.

3. A water heater, comprising an outer jacket closed at its bottom and formed at its upper end with an internal filler bowl, the bottom of the jacket being formed with a downturned annular flange and the lower outer surface portions of the jacket being formed with spaced pockets, legs to support said jacket having fingers and tongues at their upper ends bindingly engaging the downturned annular flange and said pockets respectively, a water holding tank spacedly mounted within the jacket and having an upper warm water outlet therein, a discharge pipe extending from said outlet through the jacket, a water supply conduit between the filler bowl and a lower portion of the tank, insulation between the tank and jacket, and a heating device projecting into the tank.

4. In a water heater, a water tank, a normally empty filler bowl secured to the tank and having a cold water conduit arranged to discharged into said tank near the bottom thereof, a normally empty warm water outlet conduit extending outwardly from the upper portion of said tank whereby water poured into said tank from the filler bowl will cause a corresponding quantity to be displaced and discharged through said warm water outlet conduit, a water circulator tube, open at its opposite ends and mounted upright in said tank spacedly between the tank inlet and outlet conduits, and an electric heating element within a portion of said tube and in the path of water circulating therethrough, the opening of the warm water outlet conduit into the tank being adjacent to and alined with the open upper end of the circulator tube.

5. In a water heater, a tank adapted to contain

a body of water and having a warm water outlet, an open top filler bowl superimposed on said tank, the upper end of the filler bowl being formed with an inwardly projecting annular rim, a removable cover for the open top of said bowl having a projecting hanger on its inner face to engage said rim and support the cover free of the top of the bowl, a discharge pipe extending from the filler bowl to said tank to supply cold water thereto, and an electric heating element within said tank.

6. A water heater, comprising an outer jacket, the bottom of the jacket being formed with a downturned annular flange and the lower outer surface portions of the jacket being formed with spaced pockets, legs to support said jacket having fingers and tongues at their upper ends bindingly engaging the downturned annular flange and said pockets respectively, a water holding tank spacedly mounted within the jacket and having a warm water outlet extending therefrom, a water supply conduit entering said tank, insulation between the tank and jacket, and a heating device projecting into the tank.

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