April 21, 1931. H. O. BREE 1,802,316

WATER HEATER

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FIG. 1.

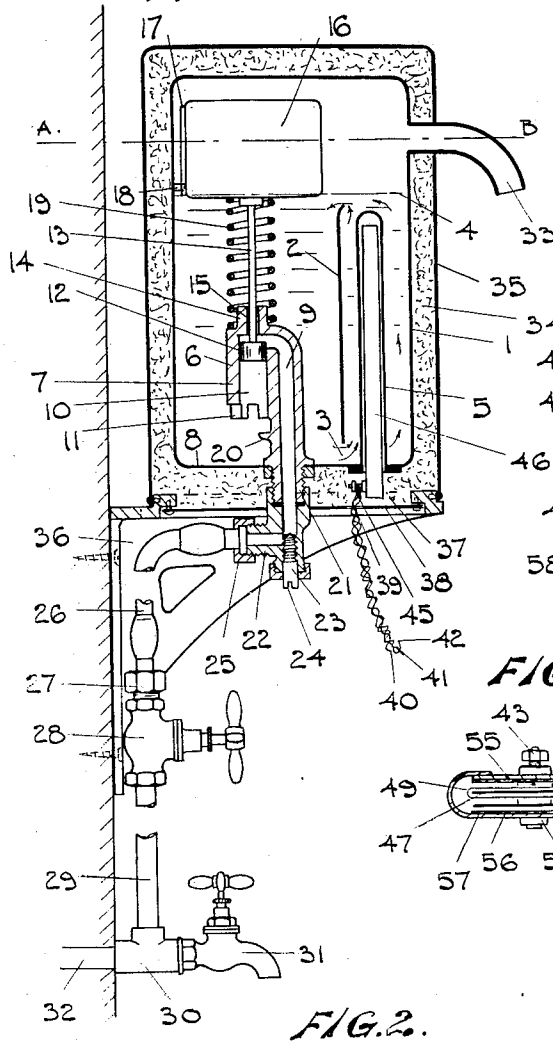


FIG. 3.

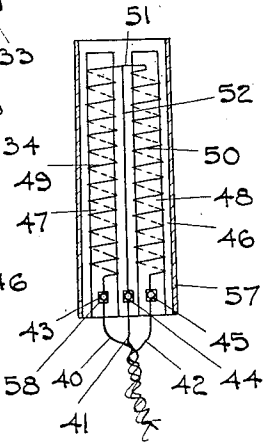


FIG. 4.

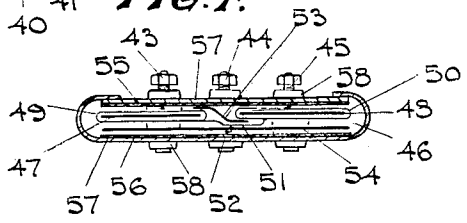
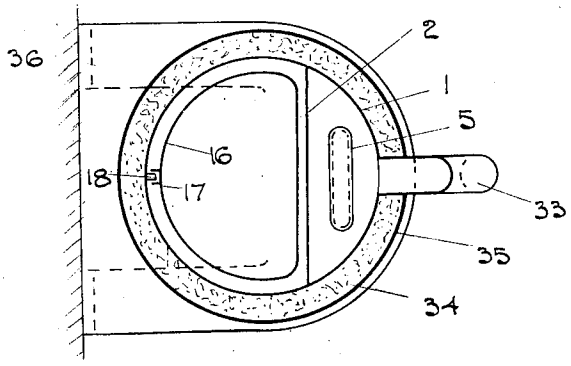


FIG. 2.



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FIG. 5.

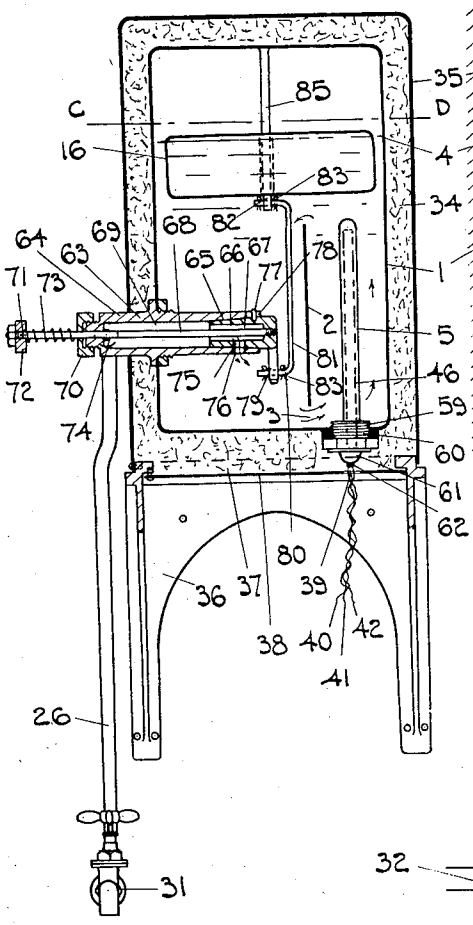


FIG. 6.

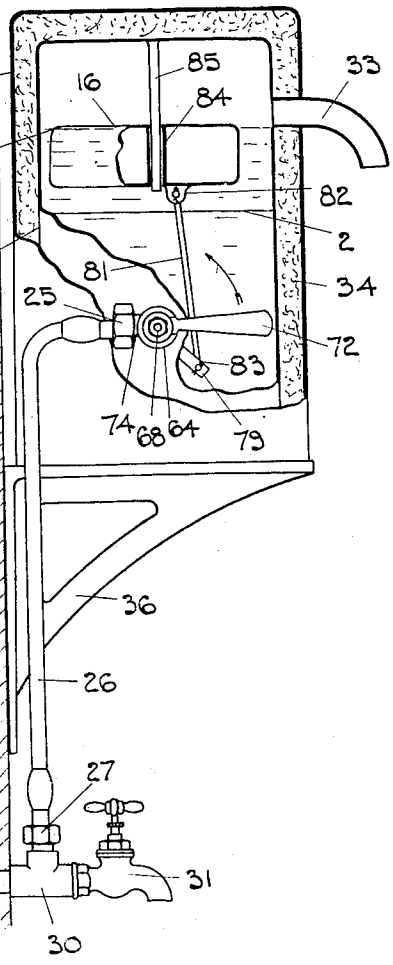
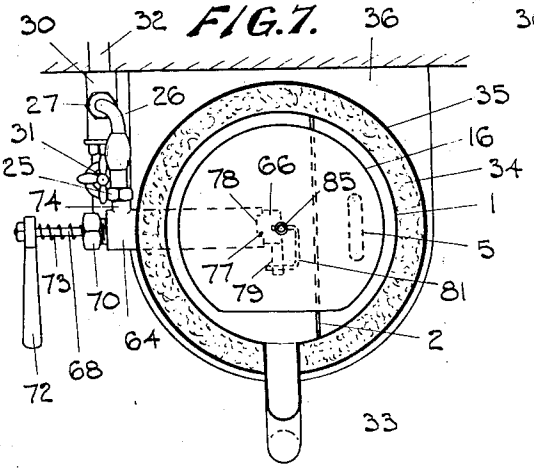


FIG. 7.



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UNITED STATES PATENT OFFICE

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WATER HEATER

Application filed December 22, 1926, Serial No. 156,507, and in New Zealand August 24, 1926.

This invention relates to water heaters and has for its object the provision of a readily attachable quick action water heater which is especially adaptable for general household use and for hair-dressing saloons and the like where limited quantities of very hot or boiling water are required at short notice.

A feature of the invention is the provision of means whereby the discharge of a limited quantity of hot water from the water heater is accomplished by the provision of water displacing means which is adapted to be normally located above the water level when the apparatus is being heated and water is neither entering nor being admitted but which on water being introduced into the container is adapted to be depressed below the water level thereby displacing a volume of water proportionate to the size of the displacer to be conveniently discharged through the outlet pipe. The invention describes one way of attaining this result both when the invention is applied to high pressure and low pressure water systems.

The invention consists in these features and in the features and arrangements and combination of parts hereinafter described and more particularly pointed out in the claims.

While the invention is described with reference to an electric water heater having a specially designed heating unit, it will be obvious that the invention with obvious adaptations may be utilized with gas or other suitable fuel.

Referring to the accompanying drawings which illustrate two constructional embodiments of the invention Figure 1 is a sectional elevation of the water heater to be used with high pressure water system, shown as applied to the average kitchen water tap, Figure 2 is a sectional plan view on line A—B of Figure 1, Figure 3 is a sectional elevation of the heating unit to show the wiring arrangement, Figure 4 is an enlarged sectional plan view of the unit shown in Figure 3, Figure 5 is a sectional front elevation of the water heater to be used with low pressure water system applied to the usual kitchen water tap the valve being shown in the "on" position, Figure 6 is a partial sectional side elevation of Figure 5, Figure 7 is a sectional plan view on line C—D of Figure 5.

Referring to the embodiment of the invention as applied to a high pressure water system and shown in Figures 1, 2, 3 and 4 there is a cylindrical enclosed vessel or container 1 having a vertical baffle plate or partition 2 therein so arranged as to have an opening 3 at the bottom and is carried up only to such height as to be below the water level 4.

Into the container 1 to one side of the partition 2 there passes the heating unit container 5 of more or less rectangular cross section rounded at the edges and open only at the bottom outside of the container 1.

At the opposite side of the partition 2 to that of the unit container 5 there is the water inlet control mechanism 6 which consists of a cylindrical casting 7 attached to the bottom 8 of the container 1, the casting 7 having an inlet pipe 9 passing to the top of a cylinder 10 which is open at the bottom and provided with slots 11.

In the cylinder 10 fits a piston 12 the piston rod 13 of which passes through a guide 14 the bore 15 of which fits the rod 13 just neatly enough to allow a small slow amount of leakage past the rod 13 the latter passing upwardly and being attached to a D shaped in plan float or displacer 16 which has two guide strips 17 acting as guides for preventing lateral movement of the displacer 16, a pin 18 attached to the side of the container 1 passing between the guide strips 17.

A compression spring 19 is fitted over the piston rod 13 and it presses against the displacer 16 and the top of the casting 7 in such a manner as to tend to keep the piston 12 and the displacer 16 always in the up position as shown in Figure 1.

A stop 20 is provided on the casting 7 to prevent the piston 12 from passing right out of the cylinder 10. To the screw-threaded portion 21 of the casting 7 which constitutes the inlet orifice is attached a regulating valve 22 the valve pin 23 of which has a slot 24 for the insertion of a screwdriver or similar tool for altering the adjustment of the valve pin 23.

The regulating valve 22 has connected

thereto by union 25 on the end of a piece of pipe 26 the opposite end of which also has a union 27 which connects it to the control valve 28 which is connected by pipe 29 to a T 30 which replaces the usual socket at the back of the kitchen or similar water tap 31 on the water supply pipe 32.

The container 1 has an outlet pipe 33 and is surrounded by a jacket of suitable insulating material 34 which has fitted thereover a casing 35 which is attached to a simple bracket 36 with a circular hole 37 therein fitted with a removable cover plate 38 with a hole 39 therein for the passing therethrough of flexible wires 40, 41 and 42 the opposite ends of which are connected to a conveniently situated electric outlet provided with a three point switch (not shown).

The wires 40, 41 and 42 are connected to the terminals 43, 44 and 45 of the heating unit 46 which is a press fit in the heating unit container 5. This unit 46 (see Figures 3 and 4) consists of two strips of mica 47 and 48 over which the windings 49 and 50 are wound, the upper ends 51 of which are connected together and have a wire 52 passing therefrom to the centre terminal 44 the lower ends of the windings 49 and 50 being attached to the terminals 43 and 45 respectively, a strip of mica 53 being placed between the windings 49 and 50, a strip 54 between the latter and the wire 52, and strips of mica 55 and 56 on the outside of the windings 49 and 50 to keep them and wire 51 away from the metal casing 57 fitted thereover, the terminals 43, 44 and 45 being insulated therefrom by being mounted on insulating blocks 58.

The water heater to be used with low pressure water, see Figures 5, 6 and 7 comprises a preferably cylindrical enclosed vessel or container 1 having a vertical baffle plate or partition 2 therein so arranged as to have an opening 3 at the bottom and is carried up only to such height as to be below the water level 4.

In the bottom of the container 1 to one side of the partition 2 there is a screw hole 59 into which fits the screw base or nipple 60 of the heating unit container 5 (for holding unit 46) the unit container 5 being of more or less hollow rectangular cross section and open only to the outside of the nipple 60, the said nipple being provided with a cover plate 61 having an insulating bush 62.

At the opposite side of the partition 2 to that of the heated unit container 5 there is provided the water inlet and control means 63 comprising a bored body casting 64 attached to the side of the container 1, the inner end of the casting 64 having a tapered bore 65 into which neatly fits a tapered plug 66 which is bored at 67.

The plug 66 has a spindle 68 attached thereto which passes along the bore 69 of the body 64 and to the outside thereof through gland 70, the spindle 68 having an outer screw-threaded end 71 to enable a handle 72 to be secured thereto, a spring 73 over the spindle 68 pressing against the handle 72 and the gland 70 so as to tend to keep the plug 66 within the tapered bore 65.

The portion of the body 64 outside the container 1 is provided with a branch nipple 74 which has connected thereto by union 25, one end of a length of suitable pipe 26, the opposite end of which also has a union 27 connecting it to a T 30 which replaces the usual socket at the back of a kitchen or similar water tap 31 on the water supply pipe 32.

The body 64 is provided with a hole 75, the plug 66 also having a similar hole 76, these holes being so related to each other that they synchronize or coincide (see Figure 5) when the handle 72 is turned down to a horizontal position, the plug 66 being limited in its rotating movement by a pin 77 on its outer periphery engaging in a recess 78 in the body 64 (see Figures 5 and 7).

The plug 66 is provided with a pin or lever 79 at right angles thereto having a hole therein into which passes one bent end 80 of a connecting rod 81 the other upper bent end of which passes into a hole in a lug 82 on the bottom of a D shaped (in plan) hollow float or displacer 16 within the container 1, the connecting rod 81 being kept in place by split pins 83 passing therethrough at either side of the lug 82 and the lever 79.

The displacer 16 has a pipe 84 passing therethrough to form a bore into which a guide rod 85 attached to the top of the container 1 can pass.

The container 1 is provided with an outlet pipe 33 and is surrounded by a jacket of suitable insulating material 34 which has fitted thereover a casing 35 which is attached to a simple bracket 36 with a circular hole 37 therein fitted with a removable cover plate 38 having a hole 39 therein for the passing therethrough of flexible wires 40, 41 and 42, the opposite ends of which are connected to a conveniently situated electric outlet with switch (not shown).

In operation of the water heater shown in Figures 1, 2, 3 and 4, assuming the container 1 to be empty, the control valve 28 is turned on and water flows from the supply pipe 32, T 30 and pipe 29 through the pipe 26 and past the open regulating valve 22 through inlet pipe 9 to the top of the cylinder 10.

The water in the cylinder 10 presses the piston 12 downwardly against the compression of the spring 19 drawing the displacer 16 also downwardly by the piston rod 13.

The piston 12 passes downwardly until it comes in contact with the stop 20 and in this position it has uncovered the ports 11 allowing the water to flow therethrough into the

container 1 which fills with water until it flows out of the outlet 33.

When the water commences to flow from the outlet 33 the valve 28 is turned off and the pressure being thus removed from the piston 12, the spring 19 gradually draws it up to the top of the cylinder 10 as the water in the latter slowly leaks out through the bore 15 of the guide 14.

While the float 16 is in the down position it is covered with water which is at the level of the outlet 33, but when the displacer 16 is in the up position the water level falls until it is at the level 4 (as shown in Figure 1) owing to the displacer 16 passing out of the water.

This lowering of the level of the water allows it to heat up and incidentally expand without any of it dripping out of the outlet pipe 33, thus saving annoyance of continual dripping also saving the hot water as the amount lost by the dripping would be some of the hottest water, being taken from the top level.

The container 1 having been filled with water and the valve 28 shut off, the three point switch of the outlet (not shown) is switched on and the heating unit 46 heats up its container 5 which in turn heats up the surrounding water which rises and flows over the top of the partition 2 and down the level control mechanism side of the partition 2 and through the hole 5 circulating past the unit 46 as indicated by the arrows in Figure 1.

It being desired to run off some of the boiling water in container 1, valve 28 is turned on and the piston 12 is forced to the stop 20, the displacer 16 being also drawn down into the water so that the water level is raised and continued admission of cold water into the container 1 forces the hot water of higher level to flow from the outlet 33.

By having a separate container 5 for the heating unit 46, the latter can be at any time readily removed without having to remove the water in the container 1.

With the use of the common three heat switch connected by flexible wires 40, 41 and 42 three different degrees of heat can be secured with the unit 46.

With the first heat the power passes to the terminals 43 and 45 the current passing in series through the windings 49 and 50; with the second heat the power passes to terminals 43 and 44 and from thence through the winding 49 only and with the third heat and greatest heat the power passes to terminals 43 and 45 and 44 the current passing in parallel through both of the windings 49 and 50.

To counteract the variation of water pressure in different towns and districts and to prevent flooding of the container 1 that is to say, admit water more quickly to the container than it can flow out of the outlet 33, the regulating valve 22 is adjusted so that it will allow only the desired amount of water to pass no matter how much the valve 28 is turned on.

Now in operation of the water heater shown in Figures 5, 6 and 7 and considering the handle 72 to be in the vertical "off" position and the container 1 to be empty, the displacer 16 is then up the guide rod 85; water is turned on by turning the handle 72 to a horizontal position as shown in Figures 5, 6 and 7, the rod 68 of the handle 72 turning the plug 66 so that the hole 75 therein is over the hole 76 on the body 64, enabling water in the supply pipe 32 to flow through pipe 26, branch 74, body bore 69, plug bore 67 and into the container 1 through the said holes 75 and 76, the turning of the plug 66 having drawn the displacer 16 down the guide 85 by the connecting rod 81.

Water flows into the container 1 until it commences to flow out of the outlet pipe 33. the handle 72 is then turned back to the vertical position, the plug 66 turning so that holes 75 and 76 are not over each other, stopping the flow of water therethrough into the container 1 and simultaneously the movement of the lever 79 of the plug 66 has caused the connecting rod 81 to push the displacer 16 up its guide rod 85 out of the water in which it was immersed and it will be thus seen that the water level 4 will then fall a distance below the level of the outlet pipe 33 equal to the displacement of the displacer 16.

This lowering of the water level 4 allows the water to heat up and incidentally expand without any of it dripping out of the outlet pipe 33, thus saving annoyance of continual dripping, also the hot water, as the amount lost by the dripping would be some of the hottest water, it being taken from the top level.

The container 1 having been filled with water and the supply shut off, the switch of the outlet (not shown) is switched on as previously described for the unit 46 is heated, which in turn heats up the surrounding water which rises and flows over the top of the partition 2 and down the mechanism 63 side and through the opening 3 circulating past the heating unit container 5 as indicated by the arrows.

It being desired to run off some of the boiling water in container 1, the handle 72 is turned down enabling water to flow through the holes 75 and 76 as described, the displacer being drawn into the water so that the level 4 is raised and continued admission of cold water into container 1 forces the hot water of higher level to flow from the outlet 33. It will be readily seen that if desired, to counteract variation of low pressure water at different places or districts and to prevent flooding of the container 1, that is to say, admit water more quickly to the container 1 than it can flow out of the outlet pipe 33, small holes 75 and 76 can be provided in the body

64 and plug 66 or large holes if the pressure is very low.

Claims:

1. A water heater comprising a container having a discharge orifice in its upper portion, an intake pipe communicating with the container from a water supply source, a displacer within said container, means associated with the displacer and controlled by the water supply for depressing the displacer below the water level in the container upon water being introduced thereinto, whereby fluid is forced out of said discharge orifice.

2. A water heater comprising a container, a chamber within said container, said chamber being provided at its lower end with ports communicating with said container, an intake pipe connecting the chamber with a source of water supply, a discharge orifice in the upper portion of said container, means for regulating the water level in the container, a piston operable in the chamber, a displacer connected with the piston, means for normally maintaining said piston in the upper end of the chamber, means in the upper part of the chamber for permitting a slow outlet of the water in said chamber above the piston, said piston being adapted to be forced downwardly in said chamber carrying with it the displacer when high pressure water supply is introduced through said intake pipe thereby uncovering said ports in the lower part of the chamber and permitting water to flow through said ports into said chamber.

3. A water heater comprising a container, a chamber within the container, said chamber being provided at its lower ends with ports communicating with the container, an intake pipe connecting the chamber to a source of water supply, means for regulating the flow of water from the water supply to the chamber, a discharge orifice in the upper portion of the container, means for regulating the water level in the container, a piston working in the chamber, a displacer connected with the piston, means for preventing rotation of the displacer, means for normally maintaining said piston in the upper end of said chamber, means in the upper part of said chamber for permitting a slow outlet of water in the chamber above the piston, said piston being adapted to be forced downwardly in the chamber carrying with it the displacer when high pressure water supply is introduced through the intake pipe, thereby uncovering said ports in the lower part of the chamber and permitting water to flow through the ports into the chamber.

In testimony whereof I affix my signature.

HELIER OSWALD BREE.