

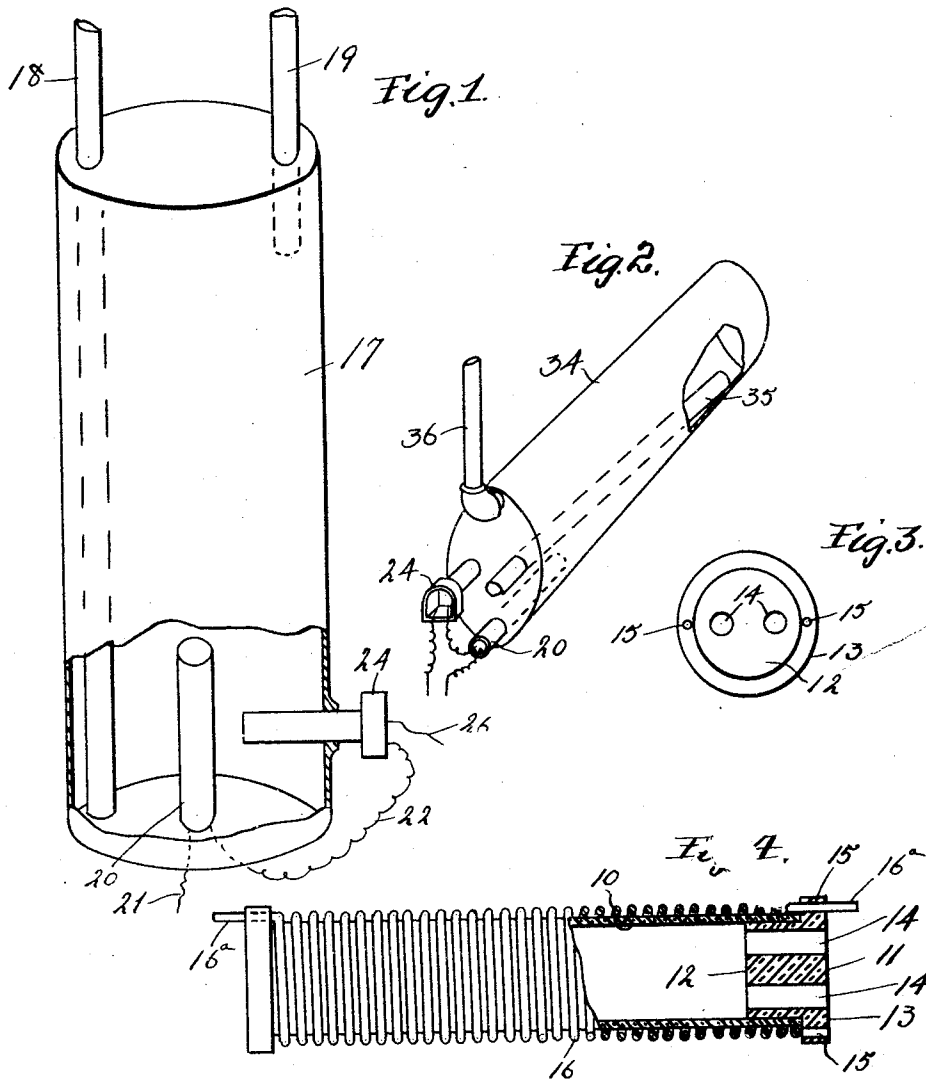
May 20, 1930.

V. ROSENBERGER
ELECTRIC WATER HEATER

1,759,281

Filed June 13, 1928

2 Sheets-Sheet 1



Inventor
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By *W. W. Williamson*

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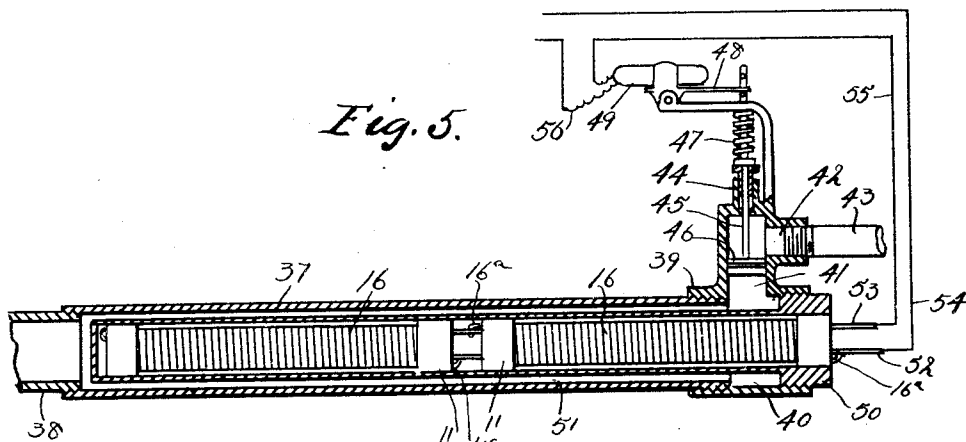
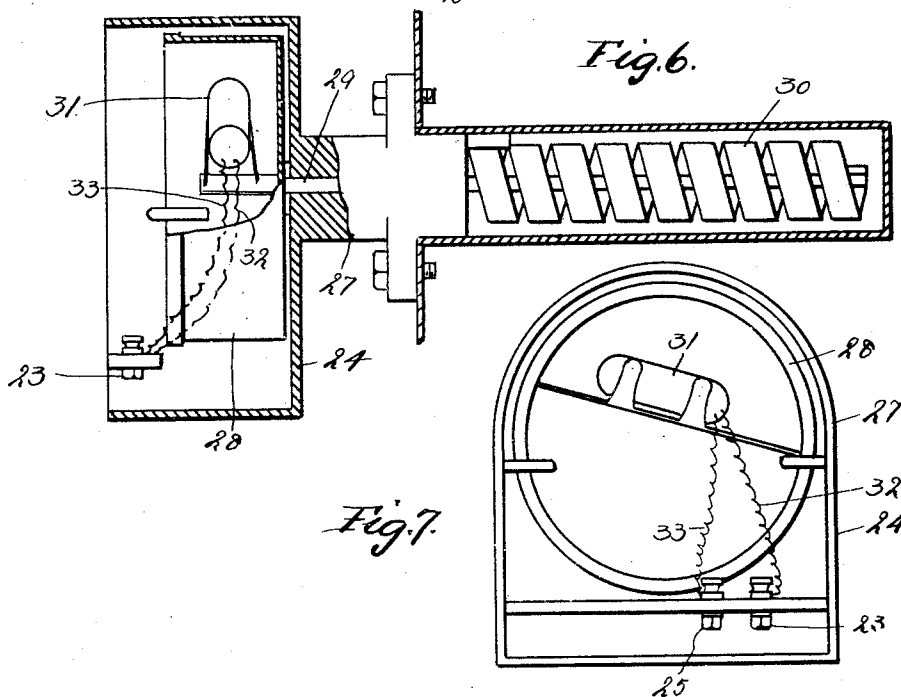
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UNITED STATES PATENT OFFICE

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ELECTRIC WATER HEATER

Application filed June 13, 1928. Serial No. 284,977.

My invention relates to new and useful improvements in an electric water heater, and has for its primary object to provide a heating element of unique construction so as to increase the life of such devices and increase the efficiency thereof.

Another object of the invention is to provide an electric water heating unit comprising a core in the form of a tube or sleeve of mica or other similar high heat resisting material which can be used very thin without the likelihood of collapsing and on which is mounted the heating element such as wire coiled about the tube while the ends of the latter are closed and supported by caps of suitable electrical insulating material and also preferably of high heat resisting material although the heat resisting attributes of said caps may not be of the same high degree as that of the tube.

A further object of the invention is to provide an electric water heating unit so constructed as to permit the use of one or more according to the purpose for which it is to be used or the construction of the enclosure in which it is placed.

A still further object of the invention is to provide an electric water heater which may be used in conjunction with ordinary vertically or horizontally positioned household hot water boilers for heating water in bulk or located in a suitable conduit through which water flows for heating said water.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claim.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by numerals to the accompanying drawings forming a part of this application, in which:—

Fig. 1, is a perspective view of an ordinary vertical household boiler with a portion broken away, showing the manner in which my invention is applied thereto.

Fig. 2, is a perspective view on a smaller scale of a horizontal household boiler with my

invention connected thereto and a portion broken away to illustrate details of construction.

Fig. 3, is an enlarged inner end view of one of the heating units.

Fig. 4, is a side elevation thereof with portions broken away to show one end in longitudinal section.

Fig. 5, is a longitudinal sectional view on a smaller scale of a conduit leading from a water supply to a spigot showing a number of heating units in the conduit for instantaneously heating water passing therethrough, the electrical current being turned on or off as the spigot is open or closed.

Fig. 6, is a sectional view of an aquastat such as used in the upright or horizontal boilers for turning on the electric current when the water drops below a predetermined temperature and turning it off after reaching a predetermined temperature.

Fig. 7, is an end view thereof.

In carrying out my invention as herein embodied, particular reference being had to Figs. 3 and 4, 10 represents a tube or sleeve of mica or other suitable similar heat resisting material having relatively thin walls and in the ends of this tube or sleeve are mounted caps 11 of another heat resisting material, such as porcelain or other similar hard material, said caps each including a body 12 of a size to snugly fit within the tube and a flange 13 at the outer end so as to extend some distance beyond the outer circumference of the tube or sleeve 10, thus forming a shoulder against which an end of the tube rests to position the cap.

The body of the cap has a pair of longitudinal openings 14 spaced from each other and for a purpose to be presently described while the flange has holes 15 therethrough, the purpose of which will also be presently described.

A heating element 16 of any suitable character and construction, but for convenience of illustration herein shown as a wire, is placed about, mounted or coiled upon the tube or sleeve and the terminals 16^a projected through one of the holes in each cap, or if found desirable, the heating element may be so coiled that both terminals may

be projected through the holes in one cap, as will be readily understood by those skilled in this art.

In Fig. 1, I have shown an ordinary household vertical or upright boiler 17 provided with the usual cold water supply pipe 18 passing into the boiler and having its ends terminating a short distance above the bottom end and also provided with a hot water supply pipe 19 leading from the upper portion of the boiler.

In the lower end of this boiler is set a tubular casing 20 having a closed inner end so that none of the water within the boiler can enter said casing and in this casing is mounted one or more of the heating units shown in Figs. 3 and 4 with one terminal connected to a source of electrical energy as by a conductor 21 while the other terminal is connected by a conductor 22 with one binding post 23 of an aquastat 24 and the other binding post 25 is connected by the conductor 26 with the source of electrical supply so that when the water in the boiler reaches a predetermined temperature, the electric current being supplied to the heating unit or units will be shut off and when the temperature of said water drops below another predetermined degree, the current will be turned on to the heating element.

The aquastat may be of any desirable construction but one form is illustrated herein merely to show the manner of operating my device and therefore will be only briefly described.

In one portion of the casing 27 is mounted a hollow rotor 28 connected to a shaft 29, the movements of which are controlled by a thermostat 30 in another part of the casing and in the rotor is a mercury tube or switch 31 having two terminals at one end which are connected by conductors 32 and 33 with the binding posts 23 and 25 respectively. As shown in Figs. 6 and 7, the thermostat 30 is contracted due to the low temperature of the water and therefore the mercury in the tube 31 has bridged the terminals and the current is flowing through the circuit.

In Fig. 2, I have shown an arrangement that permits the installation of my heater in a horizontal household boiler, the latter being indicated by the numeral 34 and is shown with a cold water supply pipe 35 leading from one end to a point adjacent the opposite end near the bottom of the boiler when considered as in the position assumed when mounted for use. From the upper portion of the boiler leads a supply pipe 36 to the point or points of use.

In the same end of the boiler through which the pipes 35 and 36 pass is mounted a casing 20, the same as in the other form of boiler and has a closed inner end for the same purpose as described and likewise has a heating unit or units therein which is connected with the aquastat 24 also mounted in the end of the

boiler through which said pipes 35 and 36 pass. The operation of the device in connection with the vertical and horizontal boilers is identical.

In Fig. 5, I have shown an arrangement of my invention to produce an instantaneous water heater wherein a conduit 37 is shown connected at one end with a water supply pipe 38 while on the other end is mounted a fitting 39 providing a passageway 40 through the fitting in alignment with the bore of the conduit and another passageway 41 at right angles thereto which communicates with a socket 42 to receive the pipe 43 leading to a spigot or outlet. With the fitting is formed a stuffing box 44 through which the rod 45 passes for connection with the piston 46 slidably mounted in the chamber 41 and said piston is normally forced inward by a spring 47.

The outer end of the piston rod 45 is connected with a frame or holder 48 for the mercury switch or tube 49 having a pair of terminals at one end as is well known.

In the outer end of the fitting 39 is detachably mounted a casing 50 so that its inner portion projects into the conduit 37 and the outer circumference of said casing is smaller than the inner circumference of the conduit 37 so that a space 51 is provided about the casing, and in practice, the area of this space is approximately equal to the area of the water supply pipe 38 so that any amount of water passing through the pipe 38 may also pass in a thin sheet through the conduit 37 about the casing 50.

In the casing 50 is mounted one long heating unit or a number of shorter ones as shown, in which case conductors 52 and 53 may pass through the heating units and project from each end because of the holes 14 in the caps and the ends of the heating elements or terminals 16 are connected with these conductors.

To complete the installation, one of the conductors, as 52, is connected with a conductor 54 leading from a source of supply while the other conductor 53 is connected by a conductor 55 with one of the terminals of the mercury switch or tube and the other terminal of said switch or tube then connected by a conductor 56 with the source of supply.

From the foregoing description it will be obvious that when a spigot is turned on so that water flows through the conduit 37 and into the fitting 39, the pressure thereof will move the piston 46 outward to permit the water to pass through the socket 42 into the pipe 43. The movement of the piston will cause the mercury switch to tilt in that direction to complete the circuit so that current will be supplied to the heating elements and in a short time will become sufficiently hot to transfer heat through the medium of the cas-

ing 50 to the water flowing about it and when the spigot is turned off, the flow of water will cease and therefore the spring 47 will gradually move the piston 46 inward and turn the mercury switch in the direction to open the circuit.

Of course I do not wish to be limited to the exact details of construction as herein shown, as these may be varied within the limits of the appended claim without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is:—

An electric water heater comprising a conduit for connection at one end with a water supply, a fitting at the opposite end of said conduit and having a passageway in alignment with the bore of the conduit, another passageway at right angles thereto and a socket, said socket adapted to be connected with a pipe leading to an outlet, a casing mounted in the fitting and closing the first mentioned passageway and also projecting into the conduit and having an outside diameter smaller than the inside diameter of said conduit, the inner end of said casing being closed, heating units comprising heating elements supported on mica, a tiltable mercury switch, a piston in the second named passageway and movable in one direction by flow of water through the fitting, a spring to move the piston in the opposite direction when the flow of water is stopped, means to connect said piston with the mercury switch after actuating the latter in unison therewith, and an electric circuit including a source of supply, the mercury switch, and the heating unit.

In testimony whereof, I have hereunto affixed my signature.

VALENTINE ROSENBERGER.