April 22, 1947. O. M. VOILES 2,419,429

ELECTRIC WATER HEATER

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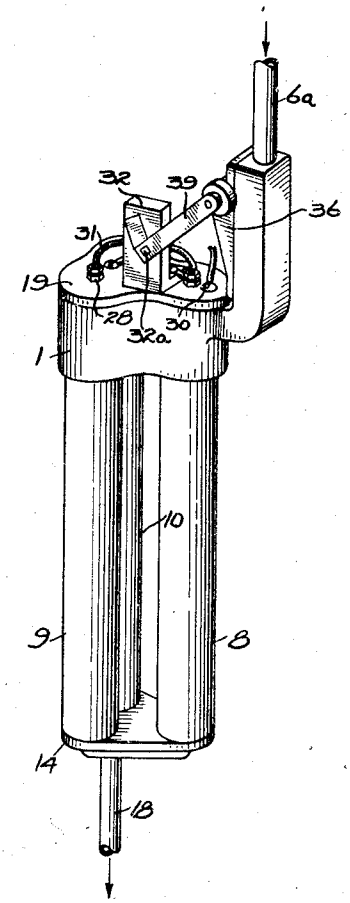


Fig. 1

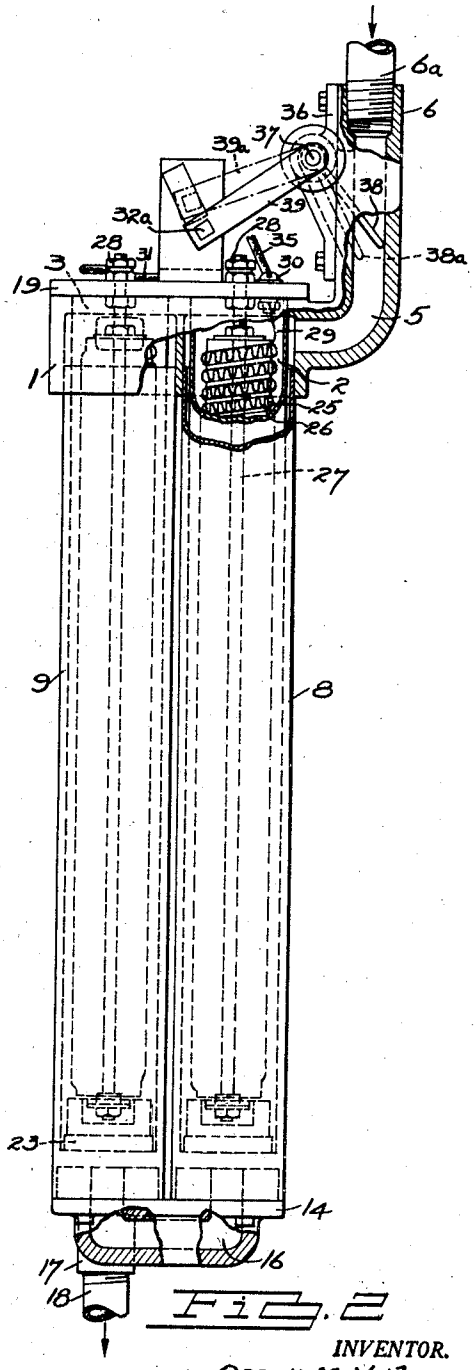


Fig. 2

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ELECTRIC WATER HEATER

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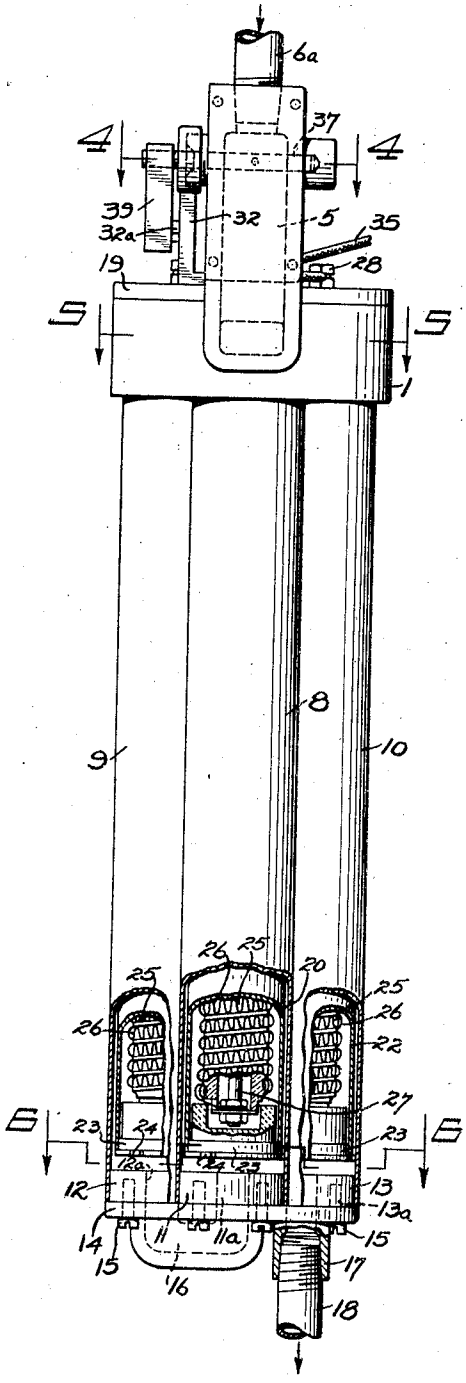


Fig. 3

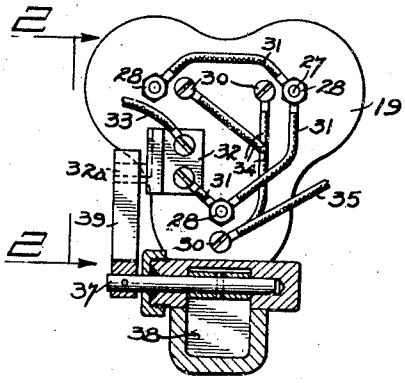


Fig. 4

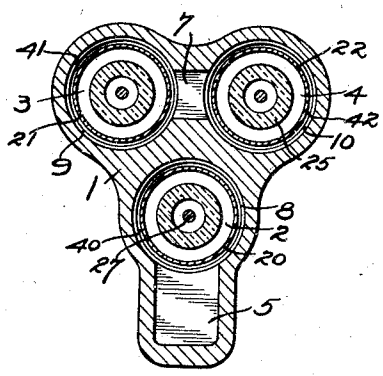


Fig. 5

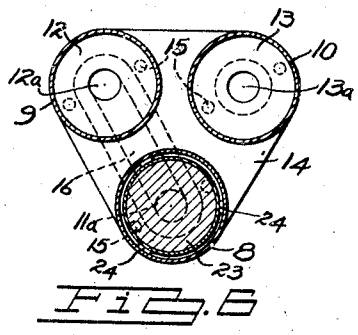


Fig. 6

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2,419,429

ELECTRIC WATER HEATER

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Application April 30, 1945, Serial No. 591,193

1 Claim. (Cl. 219—39)

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This invention relates to improvements in electric water heaters. It is an object of the invention to provide an electric water heater wherein a thin annular stream of water is exposed to heat during substantially its entire flow therethrough and is heated to a high temperature during its passage, so that hot water is almost instantaneously available.

Another object of the invention is to provide an electric water heater which is relatively small and compact, and includes outer tubes extending between a top and a bottom header, inner tubes having heating elements therein concentrically mounted in the outer tubes to provide annular water passages between the inner and outer tubes, and ports in the headers each connecting the ends of two outer tubes so that water flowing consecutively through the annular passages is quickly heated.

A further object of the invention is to provide an electric water heater including a control mechanism which closes a switch in the heating element circuit as soon as water commences to flow therethrough, and by which the circuit is opened when the flow of water through the heater ceases.

Having thus briefly stated some of the objects and advantages of the invention I will now describe a preferred embodiment thereof with the aid of the accompanying drawings, in which:

Figure 1 illustrates a perspective view of the invention.

Figure 2 is a side elevation taken on the line 2—2 of Figure 4.

Figure 3 is a front view, partly in section.

Figures 4, 5 and 6 are sections on the lines 4—4, 5—5 and 6—6 respectively of Figure 3.

Referring to the drawings, 1 designates a top header having a plurality of spaced, parallel openings 2, 3 and 4 therethrough which are of smaller diameter adjacent their upper extremities; and 5 denotes an inlet chamber in the header which terminates at its lower extremity in the opening 2 and at its upper extremity in an inlet connection 6 to receive an inlet pipe 6a. Formed also in the top header 1 is a port 7 which connects the openings 3 and 4 intermediately of their height. Extending a short distance into the openings 2, 3 and 4 from their lower extremities and brazed or otherwise secured to the header 1 are outer tubes 8, 9 and 10 respectively.

Brazed or otherwise secured in the lower extremity of each of the outer tubes 8, 9 and 10 is a disc 11, 12 and 13 respectively which is mounted upon the upper face of a bottom header 14 as by

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screws 15. Formed in the bottom header is a port 16 which connects the lower extremities of the tubes 8 and 9 through openings 11a and 12a in the discs 11 and 12 respectively. Formed also in this header 14 is an outlet connection 17 connected to the outlet tube 10 by an opening 13a through the disc 13, and extending from the connection 17 is an outlet pipe 18.

Brazed or otherwise supported in and depending from the smaller upper portions of the openings 2, 3 and 4 are inner tubes 20, 21 and 22 which extend downwardly in and spaced from the outer tubes 8, 9 and 10 to form narrow annular water passages 40, 41 and 42 respectively in the latter. The lower extremity of each inner tube is closed by a similar disc 23 brazed or otherwise secured therein; it will be noted that each disc 23 is spaced above the disc 11, 12 or 13 beneath it. Each disc 23 is annularly stepped; its upper portion which is of smaller diameter projects into the lower extremity of its inner tube, its lower, larger portion which is the same diameter as that of the inner tube bears against the lower extremity of the latter, and extending radially from the lower, larger portion of each disc are a plurality of spacers 24 which bear against the bore of the outer tube 8, 9 or 10 in which it is located. Seated on the discs 23 in the inner tubes are insulating members 24 the upper faces of which are preferably centrally recessed.

Extending centrally throughout the length of each inner tube 20, 21 and 22 and spaced from the wall thereof is a heating element consisting of an insulating core 25 around which a resistance wire 26 is spirally wound. Mounted on the upper face of the top header 1 is an insulating plate 19, and extending longitudinally through each core 25 is a rod 27 the upper extremity of which projects through the insulating plate on which it is dependingly mounted while its lower extremity rests in one of the recessed insulating members 24. The rods 27 have terminals 28 on their upper extremities and their lower extremities are connected to the resistance wires 26. Extending also through the insulating plate 19 are leads 29 the upper ends of which are connected to terminals 30 upon the said plate and their lower ends are connected to the upper extremities of the resistance wires 26. Leads 31 connect the terminals 26 to one side of a switch 32 mounted on the plate 19, and from the other side of the switch a wire 33 extends to a source of power—not shown. Leads 34 connect the terminals 30 to a wire 35 which is also connected to the source of power

so that when the switch is closed all the resistance wires **26** are energized.

One side of the chamber **5** is closed by a cover plate **36** having a rod **37** extending therethrough on which a control member **38** is secured within the chamber. Fixed also on the rod **37** outside the chamber is a weighted arm **39** which is downwardly inclined from the said rod. This arm normally retains the control member **38** so positioned that it projects across the passage **5**, however when the outlet pipe **18** is opened water flows from the inlet pipe **6***a* into the heater and the pressure of the water moves the control member and its arm to their respective positions **38***a* and **39***a*; and as soon as the outlet pipe is again closed the weight of the arm **39** returns the latter and the member **38** to their initial positions. Connected to the arm **39** is a lever **32***a* extending from the switch **32** so that upon movement of the arm to its position **39***a* the switch is closed, and when it is moved back to its original position the switch is again opened. Consequently immediately water commences to flow through the heater the resistance wires **26** are energized and when the flow ceases the circuit through the said wires is broken.

From the foregoing it will be readily seen that water entering from the inlet pipe **6***a* flows through the chamber **5** past the control member **38** and through the opening **2** into the annular passage **40**. It then flows through the port **16** into and up the annular passage **41** to the opening **3** whence it passes through the port **7** into the opening **4** and down through the annular passage **42** to the outlet pipe **18**. Thus throughout substantially its entire travel through the heater a narrow annular stream of water is virtually in contact with one of the inner tubes which are quickly heated to a high heat by the resistance wires confined therein.

While in the foregoing the invention has been described and shown with three sets of inner and outer tubes it is of course understood that a greater or lesser number may be employed without in any way departing from the spirit of the invention; and it is further understood that other alterations and modifications may be made to the construction herein shown and described provided the said alterations and modifications fall within the scope of the appended claim.

What I claim is:

An electric water heater including a top and a bottom header, an inlet connection in the top header extending to a chamber therein, the top header having parallel openings therein smaller adjacent their upper extremities, a port therein connecting two of the openings and a passage therein connecting the chamber with another opening therein, outer tubes mounted in the lower extremities of the openings, inner tubes closed at their lower extremities mounted in the smaller upper extremities of said openings and projecting downwardly in the outer tubes to form annular passages therein, apertured discs in the lower extremities of the outer tubes spaced below the undersides of the inner tubes, a bottom header on which said discs are secured, the bottom header having ports therein connecting the apertures in two of the discs, an outlet connection in the bottom header in communication with another apertured disc, a rod mounted for rotary movement in and extending through opposite sides of the chamber, a control member fixed on the rod normally extending across the chamber and adapted to be moved by water flowing through the latter, a weighted arm fixed on the rod and extending at a downward inclination therefrom, an insulating plate on the top header, terminals thereon connected to the heating elements, an electric circuit including a switch to which the terminals are connected, said weighted arm being connected to the switch whereby the latter and the circuit are closed by movement of the control member when water flows through the chamber, and said switch being opened by movement of the weighted arm and member when the water flow through the chamber ceases.

OSCAR M. VOILES.

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