R. C. BOYER.

ELECTRIC WATER HEATER.

APPLICATION FILED FEB. 15, 1913.

1,077,035. Patented Oct. 28, 1913.

Fig. 1.

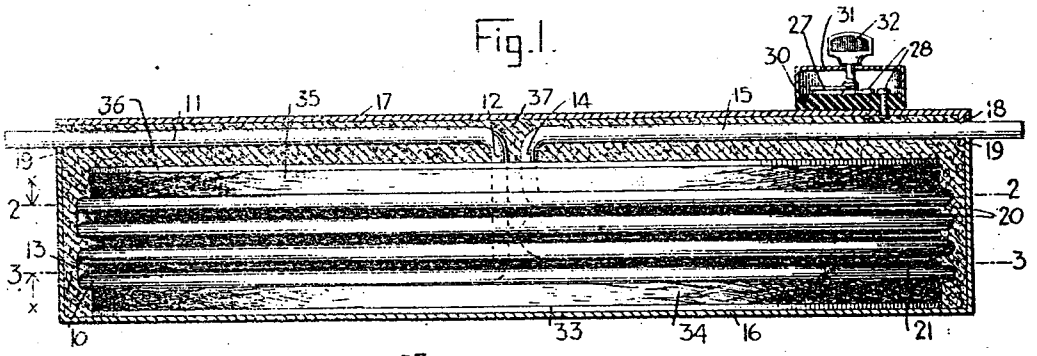


Fig. 2.

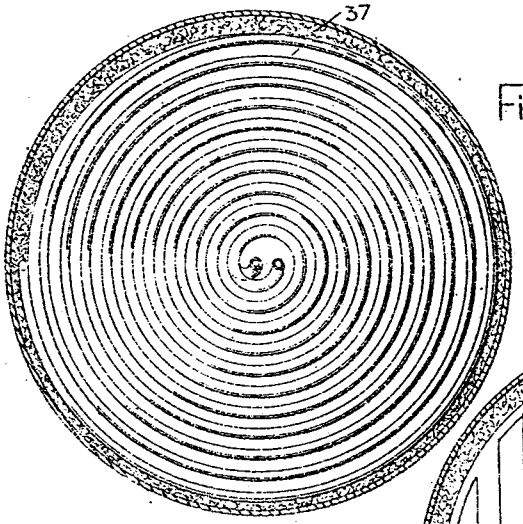


Fig. 3.

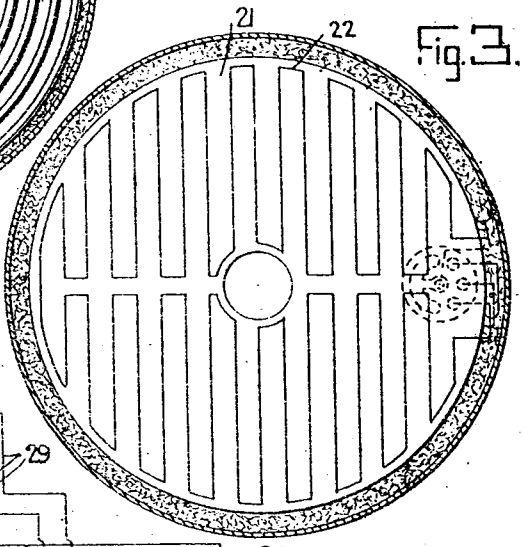
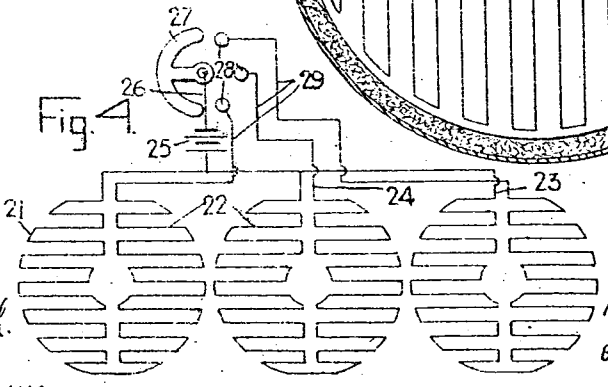


Fig. 4.



WITNESSES

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ELECTRIC WATER-HEATER.

1,077,035. Specification of Letters Patent. Patented Oct. 28, 1913.

Application filed February 15, 1913. Serial No. 748,569.

To all whom it may concern:

Be it known that I, RAY COLE BOYER, a citizen of the United States, and a resident of Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Electric Water-Heaters, of which the following is a full, clear, and exact description.

My invention has special reference to novel and useful improvements in electrical heating appliances and more particularly to an improved electric water heater.

The essential object of the invention is evolved in the provision of a simple and novel heater of the above character which includes in part a novel arrangement of circulating coils of pipe and a novel arrangement of heating elements disposed within a container, whereby as the water circulates through the coils, it will be instantaneously heated.

Another essential object of the invention is to so mount the parts within the container above specified, that a person may freely handle the same without the liability of being burned and to connect the heating elements to a multiple contact switch which may be arranged on the container, so that one or a plurality of the heating elements may be joined in circuit with a suitable source of electrical energy, thus varying the amount of heat generated and permitting the temperature of the water or fluid heated to be regulated to a nicety.

With the above and other objects in view, the invention resides more particularly in the peculiar combinations and arrangements of parts, which will be illustrated as a preferred embodiment in the accompanying drawings and described in the specification.

In the drawings: Figure 1 is a central vertical sectional view through the improved heater, with the circulating coils, heating elements and interposed packings in elevation; Fig. 2 is a horizontal sectional view of the device taken on the line 2—2 of Fig. 1 to show the coil arrangement of the circulating pipe, the parts being reduced in size; Fig. 3 is a similar view taken on the line 3—3 of Fig. 1 and particularly disclosing the arrangement of the wiring or resistance wire constituting a heating element and also showing the connection with the switch, the latter of which is diagrammatically indicated in phantom; and Fig. 4 is a diagrammatic view showing the wiring of the heating elements with the multiple contact switch.

In illustrating the preferred embodiment of the invention, the improved instantaneous heater is shown as comprising a series or plurality of superimposed coils 10 of metal pipe or tubing, the same being formed from a single section bent in the manner specified. The inlet portion of the coils through which the water or other fluid to be heated circulates, is indicated by the numeral 11, the same being extended to the center of the coils and depending centrally as shown at 12 to form the lowermost coil, the latter beginning at the inside and being wound continuously to the outside.

It will be observed from the drawings and more particularly from Figs. 1 and 2, that the tube is arranged in coils or layers located in horizontal alinement with respect to the convolutions thereof, thus forming relatively flat surfaces of any desired size and number. After the lower coil is formed, the coil thereabove is formed from a connecting portion 13 beginning at the outer convolution, and the remaining coils are formed alternately in this manner, so that the upper coil preferably terminates at the innermost convolution, where the tube or pipe is directed upwardly as shown at 14 and then extended radially to form an outlet 15. It is to be understood that the inlet and outlet may be connected to a suitable source of water or fluid supply and a receiving member respectively, within the scope of the invention.

With the circulating coils arranged in the manner above described, they are arranged within a container 16, preferably of metal, and provided with a removable top or cover 17, the inlet and outlet portions being extended through diametrically opposed portions of the container and a depending flange 18 of the cover. The flange 18 is slotted as shown at 19 so that the cover may be removed, while the inlet and outlet portions of the circulating pipe will prevent lateral movement or turning of the cover.

Arranged between the sets of coils are heating elements for heating the water as it circulates through or is retained in the coils and each heating element is arranged between spaced layers of mica or the like 20 to prevent the flow of current to the coils without materially effecting the heating thereof. The heating elements are in-

dicated by the numeral 21, the same consisting each of a layer of mica interwoven with resistance wire 22, preferably arranged in zigzag form in plan and in opposed series, as is best shown in Figs. 3 and 4 of the drawings. By this arrangement of the wiring of the resistance or heating elements, the feed and return wires 23 and 24 thereof respectively may be conveniently joined in circuit with a suitable or common source of electrical energy 25 by a common feed wire 26 to a multiple contact switch, the latter of which is indicated by the numeral 27 and is shown as consisting of an arcuate plate.

The contacts are indicated by the numeral 28 and are shown as being arranged in an arc concentric to the pivot of the switch plate, whereby one or more of the heating elements may be joined in circuit by contacting the plate with one or more of the respective contacts, while the circuits are closed through return wires 29 connecting the respective heating elements with the contact. In Fig. 1 of the drawings the switch is shown as mounted on an insulated base 30 having a casing 31 while the switch is operable by means of a thumb piece 32 and the stems of the contacts are extended through the cover, which latter carries the base, but are electrically insulated therefrom. The wiring has been omitted in Fig. 1 to avoid confusion, as the same is clearly illustrated in Figs. 3 and 4 of the drawings.

With the coils and heating elements arranged as described, a sheet of iron or other heat-retaining metal 33 is mounted on the bottom of the container, while seated thereon is a layer 34 of asbestos, these parts being of a thickness found most desirable but the asbestos being considerably thicker as shown. These parts support the coils and heating elements and a layer 35 of asbestos and a metal sheet 36, similar to the sheet 33, are arranged in superimposed relation on top of the coils, the sheets of mica and the last-named layer of asbestos and metal sheet being centrally apertured to receive the portions 12 and 14 of the pipe or tube forming the circulating coils. The space surrounding the coils and adjacent parts and within the container, as well as at the top thereof, is filled with an asbestos packing indicated by the numeral 37 and by this means full benefit of the heat generated for the heating of the water or fluid in the coils is derived, while at the same time heating of the container is obviated whereby the latter may be handled without the liability of one being burned.

It will thus be seen that a heater has been provided which will efficiently serve to heat water or other fluid by electricity, it being apparent that the compact arrangement of the parts provides a maximum heating quality with a minimum supply of current. It is also apparent that the arrangement permits of the most economical production of a heater for the purpose specified, consistent with safety and decreased liability to get out of working order.

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

1. An electrical water heater comprising in part, a series of superposed coils arranged with their convolutions in horizontal alinement with respect to each coil and having an inlet and an outlet disposed in horizontal alinement, a container for the coils, said inlet and outlet extending through diametrically opposite sides of the container, electrical heat generating elements, and means for supplying current to said elements.

2. An electrical water heater comprising in part, a series of superposed coils having a common inlet and a common outlet, a container for the coils having diametrically opposed recesses through which the inlet and outlet extend, a cover for the container, said cover being held against radial movement by the inlet and outlet, heat generating elements arranged between the innermost coils, heat radiating elements above and below the coils, a source of electrical energy having connection with the heat generating elements, and a switch mounted on the cover of the container for controlling the supply of current to the heat generating elements.

3. An electrical water heater comprising a series of superposed coils mounted in close proximity to each other and having an inlet and an outlet communicating with the bottom and top coils respectively and extending radially therefrom, a container for the coils, a cover for the container having a depending flange with opposed recesses through which the inlet and outlet extend, electrical heat generating elements arranged between and operating to instantaneously heat a fluid body passed through the coils, a source of electrical energy, and a multiple contact switch connected in circuit with said source and the heat generating elements for throwing one or a plurality of said elements into operation to vary the heat generation.

4. In a water heater of the class described, a container having a cover, a series of relatively flat water circulating elements mounted in the container and having a common inlet and a common outlet entering through the container, layers of metal and asbestos above and below the circulating elements, a non-conducting and heat-retaining packing surrounding said elements, and layers within the container, layers of mica between each pair of elements, and heating elements between the layers of mica.

5. In a water heater of the class described, a container having a cover, a series of rela-

tively flat water circulating elements mounted in the container and having a common inlet and a common outlet entering through the container, layers of metal and asbestos above and below the circulating elements, a non-conducting and heat-retaining packing surrounding said elements and layers within the container, layers of mica between each pair of elements and heating elements between the layers of mica, each heating element consisting of a layer of mica interwoven with current resistance wire and adapted for connection with a source of electrical energy.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RAY COLE BOYER

Witnesses:
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