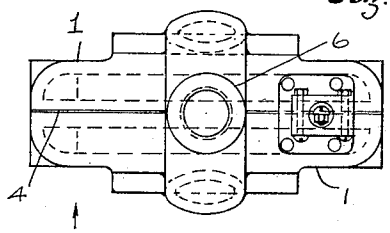
C. M. BOSWORTH AND A. G. BOESEL.

ELECTRIC WATER HEATER.

APPLICATION FILED FEB. 7, 1920.

1,375,357. **Patented Apr. 19, 1921.**

Fig. 1



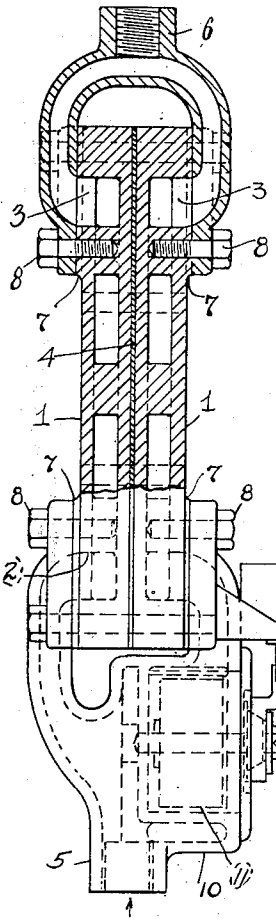


Fig. 3

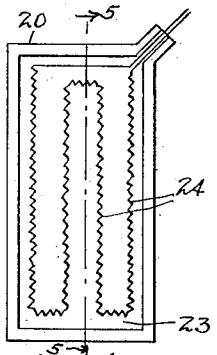


Fig. 4

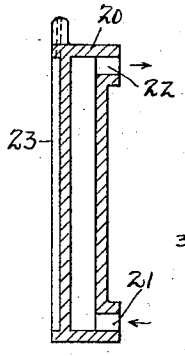


Fig. 5

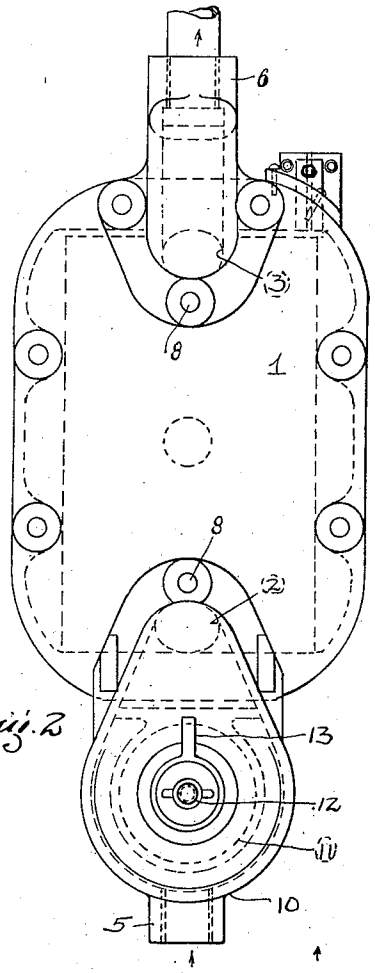


Fig. 2

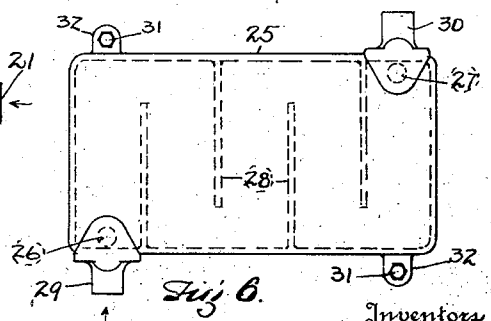


Fig. 6.

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ELECTRIC WATER-HEATER.

1,375,357. Specification of Letters Patent. Patented Apr. 19, 1921.

Application filed February 7, 1920. Serial No. 356,896.

To all whom it may concern:

Be it known that we, CYRUS M. BOSWORTH and ALOYSIUS G. BOESEL, both citizens of the United States, and residents of Lakewood, county of Cuyahoga, and State of Ohio, and Cleveland Heights, county of Cuyahoga, and State of Ohio, respectively, have jointly invented a new and useful Improvement in Electric Water-Heaters, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated that principle, so as to distinguish it from other inventions.

The present invention relates, as indicated, to water heaters, and more particularly to one in which the water is heated by means of a heating electric resistance element installed in the water circuit between the supply and the point of use, or between such supply and a suitable storage tank. In the former case the heater will be installed in the same fashion as are so-called instantaneous water heaters in which gas is used, while in the latter case the heater will be attached to the usual water tank in the same fashion as the usual gas heater is attached.

The object of the invention is to provide a compact heater in which there is a minimum opportunity for loss of energy by reason of unnecessary radiation, and in which the heating electric resistance element is mounted so as to be absolutely free from danger of short-circuiting through water leakage reaching same. To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a plan view of our improved heater; Fig. 2 is a side elevation of the same; Fig. 3 is an end elevation thereof, with parts shown in vertical section; Fig. 4 is a side elevation of a detached unit showing a modified form of construction; Fig. 5 is a central vertical section of such modified unit; and Fig. 6 is a side elevation of still another modified form of construction.

It is not considered necessary to show our heater in conjunction with a water tank or other accessories of supply or use. It will further be understood that such heater may be suitably incased, if desired, so as to further conserve the heat by preventing unnecessary radiation.

Referring, then, first of all, to the construction shown in Figs. 1, 2 and 3, the heater will be seen to comprise two similar water containing and heating members in the form of elongated, flat, hollow bodies 1. The shape of these bodies in side elevation need not be vertically oblong with rounded corners, as shown in Fig. 2, but may be longitudinally elongated or otherwise modified as desired. Adjacent their respective ends, these bodies are formed with water inlet and outlet openings 2 and 3, such openings being preferably located in the oppositely disposed flat faces of the bodies when they are brought with their other flat faces in juxtaposition as shown in Fig. 3. A suitable heating electric resistance element 4 is interposed and tightly clamped between such juxtaposed flat faces, so as to be in practically air-tight contact with such faces. The detail construction of this heating element forms no part of the present invention, but any well known form of such element may be utilized, for example an element of the type used in various electrically heated utensils or implements, such as sad-irons, for example. Branched connections 5 and 6 are fitted over the respective ends of the assembled bodies so that free communication may be had through such branches with the hollow interiors of said bodies, with the result that the water entering through connection 5 divides in its flow, part passing through the one body and part through the other, and is then again collected and discharged through connection 6. The arms or branches of said connections 5 and 6 have their inner faces machined to tightly fit over the corresponding ends of the bodies, suitable gaskets 7 being interposed to insure a water-tight joint. It will be understood that the arms possess a certain amount of resiliency whereby they may be sprung a trifle in thus fitting them in place. When thus in place, set screws 8 serve to secure said branches or arms, and thus the corresponding connections 5 and 6, firmly to the assembled heater units or hollow bodies 1.

The inlet connection 5 is desirably enlarged to provide a housing 10 in which is mounted a thermostatic coil 11, said coil freely contacting with the inflowing water or other liquid. Such coil is connected to rotate a spindle 12 that projects through the wall of the housing and carries a lever arm 13 disposed with its outer end in position to engage a finger 14 that depends from a switch box 15. Said arm 13, it will accordingly be seen, is adapted to throw the switch in one direction, *e. g.* on, when it rotates far enough in a clockwise direction, and conversely to throw such switch off when it rotates in a counter-clockwise direction. It is not considered necessary to show the electric circuit in connection with the foregoing switch box, whereby the current is alternately caused to pass through the heating resistance element or resistor 4, or cut out.

In the modified construction shown in Figs. 4 and 5, we utilize a substantially similar flat hollow body 20 as the water heating unit, said body having water inlet and outlet openings 21 and 22 in its one flat face, as before. Instead, however, of an entirely separate heating electric resistance unit, the other flat face 23 of said hollow body is recessed to provide a shallow depression in which a resistance wire 24 is disposed, said wire being embedded in an insulating enamel so as to be kept out of contact with the body. A unit of this sort may be employed singly if desired, or two such units can be clamped together with the recessed faces 23 juxtaposed in a fashion similar to that in which the previously described bodies 1 are clamped together by means of branched connections.

In the construction shown in Fig. 6, we show the adaptation of our heater to units of larger size. Thus the unit 25 here illustrated, while still a flat hollow body, is longitudinally elongated, and the water inlet and outlet openings 26 and 27 are located at diagonally opposite corners of said body. Furthermore, in order to provide a devious course for the water or other liquid being heated, as it passes through said hollow body, a series of interrupted or staggered partitions 28 are provided in said body, the effect of which will be obvious. In order to supplement the effect of the branched connections 29 and 30 in holding a pair of such bodies together, additional clamping means, in the form of bolts 31 passing through ears 32, adjacent the remaining corners of the body, may be utilized.

In each of the several constructions of our improved water heater hereinbefore described, it will be observed that the water inlet and outlet openings nowhere intersect the face of the hollow body constituting the water heating unit, against which the heating electric resistance is applied. Accordingly, even should the joint between the connections, whereby the water is supplied to and conducted away from the heater, show a disposition to leak, there is no danger of such water coming into contact with the resistor, and thus short-circuiting the same. We have found that this is a very important consideration in electric water heaters of the type in hand, the most stable form of insulating material known tending to disintegrate or at least become porous when subjected to the action of hot water. The heater as a whole presents a neat and compact appearance, and occupies, as a matter of fact, less room than a gas heater of corresponding capacity, and where a thermostatic control device is utilized, as described, the operation becomes entirely automatic, whether the heater be installed directly in the supply line or in conjunction with a tank or reservoir.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:—

1. A unit for an electric water heater comprising a flat hollow body provided with water inlet and outlet openings, and a heating electric resistance element applied to one face of said body, such openings nowhere intersecting such face.

2. A unit for an electric water heater comprising a flat hollow body provided with water inlet and outlet openings, and a heating electric resistance element applied to one face of said body, such openings being located in the opposite face of said body.

3. In a device of the character described, the combination of two flat hollow bodies respectively provided with water inlet and outlet openings and arranged with two flat faces juxtaposed, means adapted to clamp said bodies together under pressure and a heating electric resistance interposed between such faces, such openings nowhere intersecting such faces.

4. In a device of the character described, the combination of two flat hollow bodies respectively provided with water inlet and outlet openings and arranged with two flat faces juxtaposed, means adapted to clamp said bodies together under pressure and a heating electric resistance interposed between such faces, such openings being located in the outwardly disposed faces of said bodies, respectively.

5. In a device of the character described, the combination of two elongated flat hollow bodies respectively provided with water inlet and outlet openings and arranged with

two flat faces juxtaposed, means adapted to clamp said bodies together under pressure and a heating electric resistance element interposed between such faces, such openings being located in the outwardly disposed faces of said bodies adjacent the respective ends thereof.

6. In a device of the character described, the combination of two elongated flat hollow bodies respectively provided with water inlet and outlet openings and held together with two flat faces juxtaposed, a heating electric resistance element interposed between such faces, such openings being located in the outwardly disposed faces of said bodies adjacent the respective ends thereof, and a branched connection communicating with each such pair of openings.

7. In a device of the character described, the combination of two elongated flat hollow bodies respectively provided with water inlet and outlet openings and held together with two flat faces juxtaposed, a heating electric resistance element interposed between such faces, such openings being located in the outwardly disposed faces of said bodies adjacent the respective ends thereof, and a branched connection communicating with each such pair of openings, the branches of such connections serving to clamp said bodies together.

8. In a device of the character described, the combination of two elongated flat hollow bodies respectively provided with water inlet and outlet openings and held together with two flat faces juxtaposed, a heating electric resistance element interposed between such faces, such openings being located in the outwardly disposed faces of said bodies adjacent the respective ends thereof, and interrupted partitions in said bodies forming a devious course for water passing therethrough.

Signed by me, this 4th day of February, 1920.

CYRUS M. BOSWORTH.

Signed by me, this 5th day of February, 1920.

ALOYSIUS G. BOESEL.