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A. D. WRIGHT & E. E. SAGER.

ELECTRIC WATER HEATER.

APPLICATION FILED SEPT. 6, 1904.

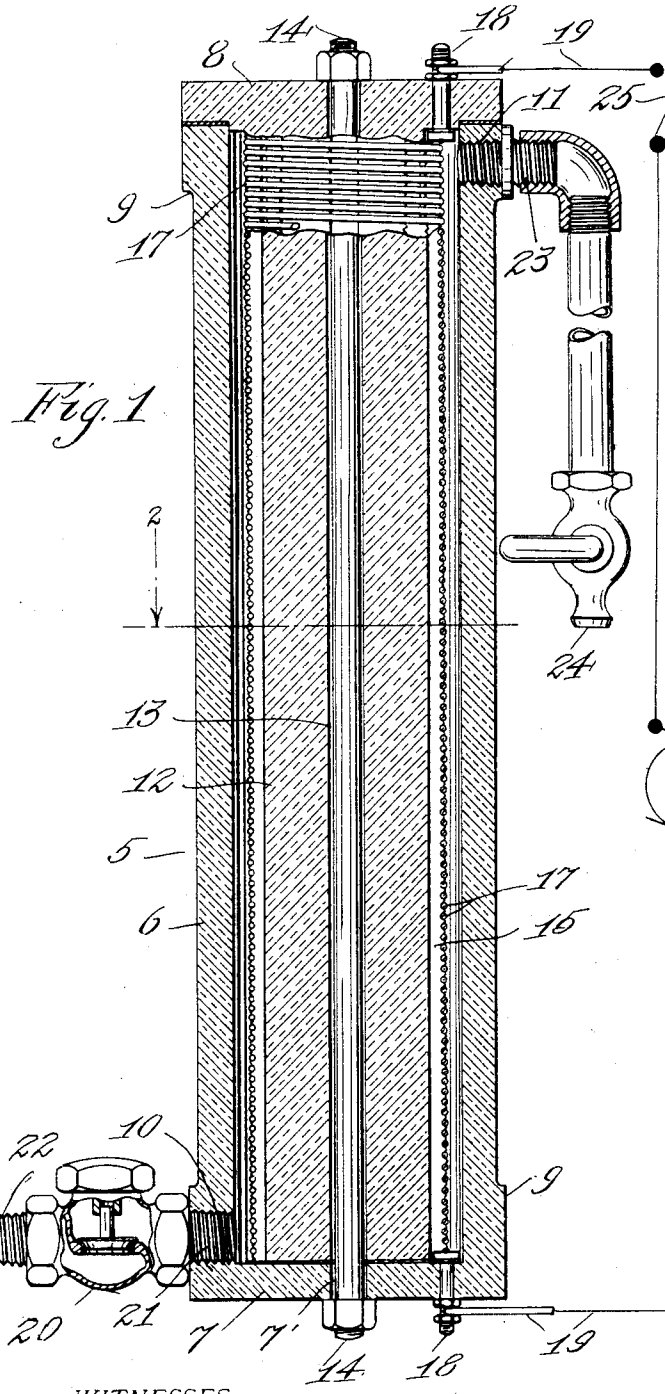


Fig. 1

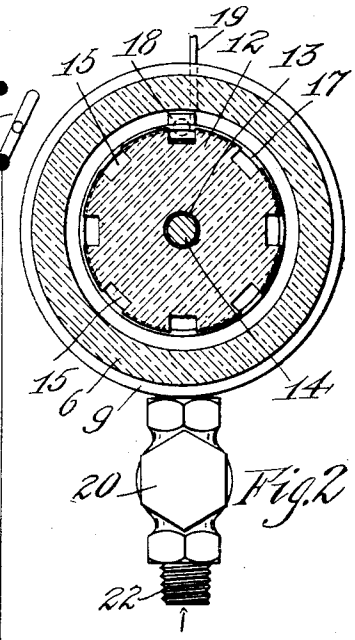


Fig. 2

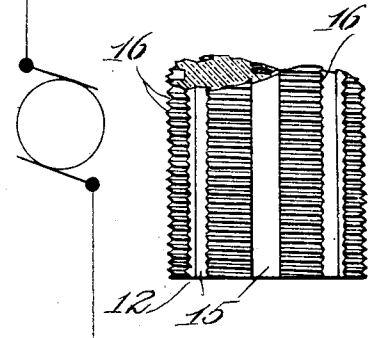


Fig. 3

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UNITED STATES PATENT OFFICE.

ARTHUR D. WRIGHT AND ELI E. SAGER, OF SEATTLE, WASHINGTON, ASSIGNORS OF ONE-HALF TO WILLIAM C. DICE, OF SEATTLE, WASHINGTON; SAID WRIGHT ASSIGNOR OF HIS REMAINING RIGHT TO ANDREW HEMRICH, OF SEATTLE, WASHINGTON.

ELECTRIC WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 793,118, dated June 27, 1905.

Application filed September 6, 1904. Serial No. 223,554.

To all whom it may concern:

Be it known that we, ARTHUR D. WRIGHT and ELI E. SAGER, citizens of the United States of America, and residents of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Electric Water-Heaters, of which the following is a specification.

Our invention relates to improvements in electric water-heaters, and has for its objects to provide an inexpensive device of this class embodying essential features of simplicity, adaptability, and general efficiency which render the device simple of construction, easy to install and repair, economical of electricity, and capable of heating the water more rapidly.

The above-mentioned and other desirable objects are attained by the constructions, combinations, and arrangement of parts as disclosed on the accompanying drawings, set forth in this specification, and pointed out in the appended claims.

With reference to the drawings filed herewith and bearing like reference characters for corresponding parts throughout, Figure 1 is a view of the device in longitudinal section and shows the same connected in an electric circuit. Fig. 2 is a transverse section of the device on line 2 of Fig. 1, and Fig. 3 is a fragmentary view of the bar employed in the device.

Referring to the drawings, reference character 5 indicates the shell of the device, which is preferably of cylindrical form and composed of non-conducting substance, such as porcelain, which when in plastic condition can be readily molded to the form desired. This shell comprises a tubular portion 6, of suitable diameter and length, and heads, as 7 and 8, the former of which is preferably formed integral with the tubular portion and provided with a centrally-located aperture 7′, while the latter is removable. The tubular portion 6 is formed with a wide peripheral flange 9 at each end, and a screw-threaded intake-aperture 10 is provided in the wall of said portion adjacent one end thereof, while a screw-threaded discharge-aperture 11 is provided in said wall adjacent the other end and located at the opposite side of the casing from the intake, so as to insure more thorough circulation of the water in the shell as it passes between said aperture. Fitting within the shell is a bar 12, which is slightly less in diameter than the bore of the tubular portion and composed of non-conducting material, being preferably formed integral with the removable head 8. This bar is substantially equal in length to the bore of said tubular portion and formed with a centrally-located aperture 13 of comparatively small diameter, which extends through said head and is adapted to receive freely a binding-bolt 14, the shank of which is inserted therein through the aperture in head 7 and projects from head 8, being supplied with a nut on the projecting end adapted to draw the removable head tightly to place on the tubular portion of the shell, suitable packings, as sections of rubber or the like, having previously been placed between the inner end of said bar and the fixed head of the shell and between said tubular portion and the removable head to insure the shell from leakage. The bar is formed with spaced-apart channels 15 extending longitudinally thereof in the periphery and of suitable depth to permit the water to circulate therein, as will be later understood, and across the outer faces of the ridges which occur between these channels shallow grooves 16 are formed, which follow a helical course about the bar at a comparatively small pitch. Extending spirally about the bar and fitting in said grooves 16 is an electrical conductor 17, comprising a coil of wire composed of refractory substance of high resistance, such as German silver. This coil extends from one end of the bar to the other and is suitably electrically connected at the extremities with binding-posts, as 18,

which are seated in suitable apertures provided in the heads of the shell and project outwardly therefrom as convenient means for connecting the said coil in an electric circuit embracing a suitable energizing medium, as a dynamo, battery, or the like. The binding-posts are of identical construction and consist of bolts of suitable material formed with square heads of suitable diameter to fit snugly in the channels 15, so that the bolts will thereby be held from turning in drawing them to place. These bolts are each provided with a pair of nuts between which the electrical conductors, as 19, which lead to and from the energizer of the electric circuit, are clamped, and the under one of said nuts serves to draw the bolt to place in its seat, a suitable packing having previously been placed under the head of the bolt to prevent leakage.

Connected with the intake-aperture of the shell is an ordinary check-valve, as 20, which opens inwardly and is adapted to separate the hot water in the shell from the supply during intermissions in drawing water from the shell when the device is in use, the back pressure of the water in the shell, due to expansion in heating, serving to keep the valve closed during said intermissions. This valve is conveniently connected with the shell by means of a nipple 21, screwed into the intake-aperture 10, and is provided with a second nipple 22, by which it is connected with a conduit leading from a source of water-supply under pressure through the medium of an ordinary coupling. Fitted in the discharge-aperture 11 of the shell is a nipple, as 23, which is adapted as convenient means for connecting the shell with a conduit having a suitable valve or cock, as 24, for controlling the discharge of warm water.

By forming the shell and bar of non-conducting material a much simpler and more inexpensive construction of the device is attained, as leakage of the electric current from the coil is thereby prevented without requiring expensive insulated joints, coverings, or the like. Furthermore, by providing the channels in the bar a greater area of heating-surface is presented to the water, as the surfaces of the walls of the channels and the periphery of the coil where it crosses the channels will be entirely exposed.

In the present instance our invention is directed for use in the home or other places where hot water is intermittently required; but we do not desire to so limit its use, as it is capable of embodiment as a heating medium in circulating systems where hot water is employed for heating purposes.

To install the device, suitable straps or the like are passed about the tubular portion thereof adjacent the inner edges of the flanges 9 and secured to a wall or other suitable means of support. The supply and discharge conduits are then connected with the shell, as heretofore intimated, and the wires 19, which are usually the positive and negative wires of an ordinary electric system previously installed for lighting, are connected with the binding-posts, and a suitable switch 25 is included in the circuit at a convenient point for opening and closing the same, as desired. When hot water is desired, the switch is closed to complete the electric circuit, and thereby energize the coil, which owing to its resistance is instantaneously brought to a high temperature by the electric current, and thereby serves to heat the water in the shell and also the bar. As water is drawn from the casing the check-valve is opened by pressure of the supply, which flows into the shell and passes about the coil and bar in a comparatively thin sheet, owing to the narrow spacing of the bar from the shell, whereby it is more quickly heated. The bar owing to its bulk will remain heated for a considerable length of time after the electric circuit is opened and serves to keep the water in the shell heated during intermissions of short duration in drawing water, while the check-valve will act to keep the water in the shell and the supply separated during said intermissions. It is therefore obvious that the circuit can be opened during said intermissions and a resultant saving in the use of the electric current thus attained without danger of the temperature of the water in the shell being to any marked degree lowered.

When desired to replace or inspect the coil, it is simply necessary to remove the nuts from the lower binding-post and binding-bolt, when the bar with the coil in place can be withdrawn by lifting the removable head.

This device is simple and inexpensive of construction, and the parts thereof are readily accessible. Furthermore, it is economical of electricity and not likely to get out of order.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States of America, is—

1. An electric water-heater comprising a shell, a bar disposed therein, and a resistance-coil wound about said bar, said coil being in contact with said bar at various points about its periphery and spaced therefrom at other points.

2. An electric water-heater comprising a shell, a bar of non-conducting material slightly less in diameter than the bore of the casing and disposed therein, and a resistance-coil encircling said bar and only contacting therewith at spaced-apart points about its periphery.

3. An electric water-heater comprising a shell a bar disposed therein and provided with longitudinally-extending channels and a resistance-coil wound about said bar.

4. An electric water-heater comprising a shell, a bar disposed therein and provided with longitudinally-extending channels in the periphery and comparatively shallow grooves in the outer faces of the ridges between said channels, and a resistance-coil seated in said grooves.

5. An electric water-heater comprising a shell, a bar disposed therein and provided with longitudinally-extending channels in the periphery and comparatively shallow grooves in the outer faces of the ridges between said channels, said grooves following a helical course about the bar, and a resistance-coil wound about said bar in said grooves.

6. An electric water-heater comprising a shell composed of non-conducting material, a bar slightly less in diameter than the bore of said shell and disposed therein, said bar being composed of non-conducting material and provided with longitudinally-extending channels in the periphery, and a resistance-coil wound about said bar.

7. An electric water-heater comprising a shell composed of non-conducting material and provided with an intake-aperture at one side adjacent one end and a discharge-aperture at the opposite side adjacent the other end, a bar slightly less in diameter than the bore of said shell and disposed therein, said bar being composed of non-conducting material and provided with longitudinally-extending channels in the periphery, and a resistance-coil wound about said bar.

8. An electric water-heater comprising a shell composed of non-conducting material and having a removable head, a bar of non-conducting material formed integral with said head and projecting into said shell, means to secure said head in place, and a resistance-coil wound about said bar.

9. An electric water-heater comprising a shell composed of non-conducting material and having a removable head, a bar of non-conducting material slightly less in diameter than the bore of said shell and formed integral with said head, said bar being provided with longitudinally-extending channels in the periphery, means to secure said head in place, and a resistance-coil in said casing wound about said bar.

10. An electric water-heater comprising a shell composed of non-conducting material and having a removable head, a bar of non-conducting material slightly less in diameter than the bore of said shell and formed integral with said head, said bar being provided with a longitudinally-disposed aperture extending through said head, a binding-bolt in said aperture projecting from the opposite head of said casing, and a resistance-coil wound about said bar.

11. An electric water-heater comprising a shell composed of non-conducting material and comprising a tubular portion having an integrally-formed head at one end and provided with an intake-aperture adjacent said head at one side and a discharge-aperture at the opposite side adjacent the other end, and a removable head, a bar of non-conducting material slightly less in diameter than the bore of said shell and formed integral with said last head, said bar being provided with a longitudinally-disposed aperture extending through the removable head, and channels in the periphery, a binding-bolt in said aperture engaged with said fixed head, and a resistance-coil wound about said bar.

12. An electric water-heater comprising a shell having a fixed head and a removable head each provided with an aperture adjacent the side wall, a bar slightly less in diameter than the bore of said shell and connected with second head, said bar being provided with longitudinally-disposed channels in the periphery, binding-posts seated in said apertures and provided with heads fitting snugly in one of said channels, means to secure removable head in place, and a resistance-coil wound about said bar and connected with said posts.

Signed at Seattle, Washington.

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ELI E. SAGER.

Witnesses:
ERNEST B. HERALD,
RICHARD SETH JONES.