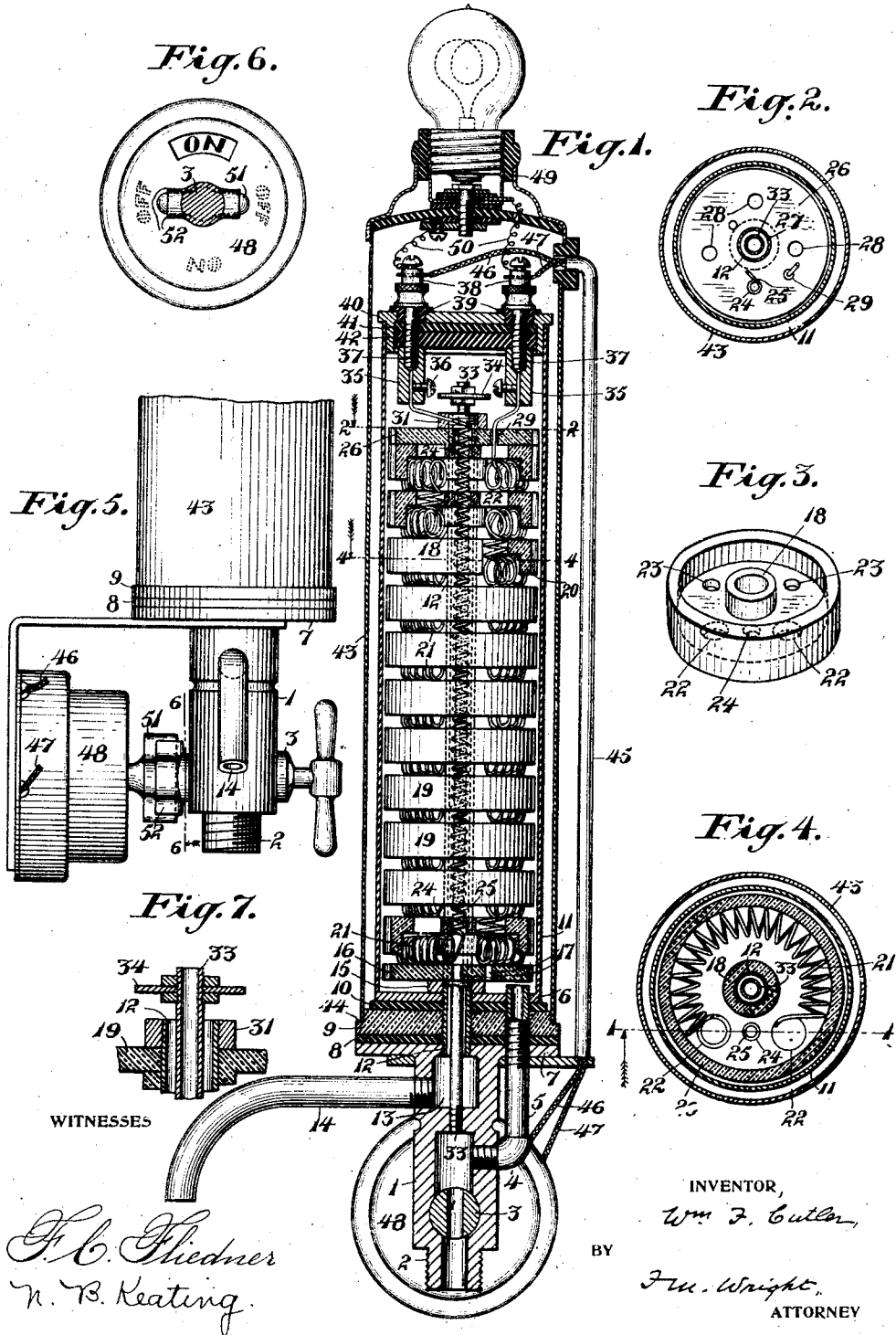


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ELECTRIC WATER HEATER.  
APPLICATION FILED JULY 8, 1909.

961,937.

Patented June 21, 1910.



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# UNITED STATES PATENT OFFICE.

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ELECTRIC WATER-HEATER.

961,937.

Specification of Letters Patent. Patented June 21, 1910.

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To all whom it may concern:

Be it known that I WILLIAM F. CUTLER, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Electric Water-Heaters, of which the following is a specification.

The present invention relates to an electric liquid heater, adapted for use as a rapid heater, or for the purpose of aging and improving the qualities of wines and other liquors, or for similar uses, which will be of great efficiency in proportion to its size, will be cleanly and sanitary in construction, and safe in operation.

In the accompanying drawings, Figure 1 is a vertical section of the heater on the line 1—1 of Fig. 4; Fig. 2 is a horizontal section on the line 2—2 of Fig. 1; Fig. 3 is a perspective view of one of the cups; Fig. 4 is a horizontal section on the line 4—4 of Fig. 1; Fig. 5 is a front view of the lower part of the heater; Fig. 6 is a section on the line 6—6 of Fig. 5; Fig. 7 is a detail vertical section through the top of the auxiliary supply pipe.

For convenience, the apparatus will be described in reference to its use for heating water, but it is to be understood that the invention is by no means limited thereto.

Referring to the drawing, 1 indicates a valve casing having a threaded portion 2, adapted to be secured to a liquid supply pipe, the passage of the water through said casing being controlled by a faucet valve 3. The main inflowing current of the water passes from the valve 3 by means of an elbow 4 and a vertical pipe 5 screwed through a base 7 formed integral with the valve casing, upon which base rests a disk 8 of soft rubber, upon which is a disk 9 of insulating material, preferably hard porcelain, upon which disk 9 is a second disk 10 of soft rubber. Upon said upper disk 10 rests the bottom 6 of the cylindrical casing 11 of a heating chamber, which casing is partly secured in position by means of the pipe 5, which pipe is not only screwed through the base plate 7, and passes through the disks 8, 9, 10, but is also screwed at its upper end into said bottom 6 of the casing 11. Said casing is additionally secured by the lower end of a central discharge water

pipe 12, which is screwed into the bottom 6 of said casing, and passes through the disks 8, 9, 10, and also centrally into the base plate 7, the lower end of said pipe discharging into a cavity 13 in the valve casing from which it flows by means of a faucet 14. Around the lower end of said pipe 12, but spaced from the bottom 6 of the casing by a collar 15, is a disk 16 of insulating material, preferably hard porcelain, suitably apertured, as shown at 17.

Within the heater casing there are contained a vertical series of inverted shallow cup-shaped insulators 19, preferably of hard porcelain, each centrally apertured and having, around said aperture, a depending hub 18, surrounding the central discharge pipe 12, said hub forming, with the wall 20 of the insulator, a circular groove to receive heating coils. Within each cup-shaped insulator 19 is contained a portion of a coil 21 of high resistance wire, such as German silver, each insulator being formed with two comparatively large holes 22, these holes permitting the coil of wire 21, after extending around within the greater part of the circular groove of one insulator, to pass through one of said holes, and then to extend in the opposite direction within the groove of the next insulator above or below. Although only one hole 22 is actually used with each insulator each cup is formed with two such holes for convenience of assembling. The hubs 18 insulate the heating coil 21 from the central water pipe 12.

Each insulator is formed with two small apertures 23 to permit the water to freely circulate through the heater, and in addition with a third small aperture 24, all of the apertures 24 of the respective insulators being arranged in vertical alinement with each other, to permit a comparatively small terminal coil 25 of high resistance wire to pass upward through all of the said apertures. This latter coil may be either detachably connected at its lower end to the lower end of the larger coil 21 or may be formed integral therewith, as shown in Fig. 1. The upper ends of the small and large coils form the terminals of the complete heating wire.

Upon the uppermost cup-shaped insulator is laid a thin circular disk 26, which is centrally apertured, as shown at 27, to permit the central pipe 12 to pass therethrough, is

also apertured, as shown at 28, to permit the water to flow freely therethrough, and is also provided with apertures 29, to permit one of the two terminals of the large and small heating coils to pass selectively there-through. Upon the upper end of the pipe 12 is screwed a nut 31. Into the chamber of the valve 3 is also screwed the lower end of a narrow pipe 33 which passes centrally upward through the discharge pipe 12 and discharges through its open top, thus serving as an auxiliary supply pipe. Upon said pipe near its upper end is secured a disk 34 which serves to retard the commingling of the cold water passing up through said pipe 33 and the hot water entering the top of the discharge pipe 12. The purpose of this auxiliary pipe 33 is to increase the flow the heat furnished by the resistance coils being sufficient to heat a larger volume of water than would naturally flow through the pipe 5. It also prevents the formation of steam.

The two terminals of the heating coils are inserted in socket pieces 35 and are secured therein by screws 36, and said pieces 35 are screwed upon bolts 37 which carry at their upper ends binding screws 38, and are passed, first, through sleeves 39 of fiber or other insulating material, said sleeves 39 being set into the head 40 of the casing of the electric heater, which head fits within said casing with a tapering fit, so as to make a very tight joint therein. Said bolts are then passed through rubber disks 41, 42, within said heater and upon the lower ends of said bolts are screwed the socket pieces 35, as heretofore described.

43 indicates an outside casing, which rests upon a shoulder 44 formed upon the porcelain disk, and is therefore spaced from the heater casing, so that no electric shock could be given by contact with said outside casing. At the side of said casing is supported a tube 45 down which pass wires 46, 47, leading to a switch 48, on a bracket connected to the heater, the ends of said wires 46, 47, being connected to said binding screws 38. Upon the top of the outer casing is mounted an electric lamp fitting 49, the poles of which are connected by wires 50, with said binding screws.

The stem of the key 51 of the switch 48 is arranged in line with that of the valve 3, and the latter is extended beyond the valve casing and has formed on its end fingers 52 which engage the key 51, so that said key always turns with the valve. By this arrangement it is provided that the electric current cannot be turned on without at the same time also turning on the water supply, so that the device cannot become overheated.

The mode of operation of the device will be readily understood from the foregoing description. The valve is opened and the

electric current turned on simultaneously. The water in passing up through the apertures in the cup-shaped insulators is thoroughly heated. It flows to the top through the apertures in the uppermost disk, and commingles with the auxiliary supply passing through the pipe 33. It then flows down through the central pipe 12 into the cavity in the valve casing and out through the faucet. The lamp is lighted only when the current has been turned on through both heaters.

A particular advantage of this invention resides in the form of the cup-shaped insulators, which, being inverted, prevent the collection of sediment, and have formed integral therewith means for spacing the heating coils not only from the casing but also from the central discharge tube.

I claim:—

1. In an apparatus of the character described, the combination of a heating chamber, a vertical series of inverted cup-shaped insulators therein, coils in said insulators, electric conductors leading to said coils, and means for admitting liquid into and out of said heating chamber, substantially as described.

2. In an apparatus of the character described, the combination of a heating chamber, a vertical series of inverted cup-shaped insulators therein, each insulator being apertured to permit the liquid to freely circulate therethrough, coils in said insulators, electric conductors leading to said coils, and means for admitting liquid into and out of said heating chamber, substantially as described.

3. In an apparatus of the character described, the combination of a heating chamber, a vertical series of inverted cup-shaped insulators therein, said insulators having apertures alining vertically with each other, a vertical coil extending through said apertures, coils in said insulators, electric conductors leading to said coils, and means for admitting liquid into and out of said heating chamber, substantially as described.

4. In an apparatus of the character described, the combination of a heating chamber, a vertical series of inverted cup-shaped insulators therein, each formed with a central aperture and a depending hub around said aperture, heating coils in said insulators, electric conductors leading to said coils, and means for admitting liquid into and out of said heating chamber, substantially as described.

5. In an apparatus of the character described, the combination of a heating chamber, a vertical series of inverted cup-shaped insulators therein, each apertured to permit the liquid to freely circulate therethrough, coils in said insulators, electric conductors leading to said coils, a discharge pipe for conducting the liquid from said heating

chamber, means for admitting the liquid at the opposite end of the heating chamber to that from which said discharge pipe conducts, and an auxiliary supply pipe discharging into said heating chamber at the same end as that from which the discharge pipe conducts, substantially as described.

6. In an apparatus of the character described, the combination of a heating chamber, heating coils therein, electric conductors leading to said coils, a discharge pipe for conducting the liquid from said heating chamber, means for admitting the liquid at the opposite end of the heating chamber to that from which said discharge pipe conducts, and an auxiliary supply pipe discharging into said heating chamber at the same end as that from which the discharge pipe conducts, substantially as described.

7. In an apparatus of the character described, the combination of a heating chamber, heating coils therein, a central discharge pipe, connected with said heating chamber at the top and discharging at the bottom, means for admitting liquid at the bottom of said heating chamber, and an auxiliary supply pipe and a discharge pipe both opening into the top of said heating chamber, substantially as described.

8. In an apparatus of the character described, the combination of a heating chamber, heating coils therein, a central discharge pipe, connected with said heating chamber at the top and discharging at the bottom, means for admitting liquid at the bottom of said heating chamber, an auxiliary supply pipe and a discharge pipe both opening into the top of said heating chamber, and a spreader on the top of said auxiliary supply pipe, substantially as described.

9. In an apparatus of the character described, the combination of a heating cham-

ber, a vertical series of inverted cup-shaped insulators therein, coils in said insulators, electric conductors leading to said coils, a central discharge pipe, means for admitting liquid to the interior of the chamber at the same end as the discharge end of said discharge pipe, and an auxiliary supply pipe located within the discharge pipe, and admitting liquid to the other end of said chamber, substantially as described.

10. In an apparatus of the character described, the combination of a heating chamber, coils therein, electric conductors leading to said coils, a central discharge pipe, means for admitting liquid to the interior of the chamber at the same end as the discharge end of said discharge pipe, and an auxiliary supply pipe located within the discharge pipe, and admitting liquid to the other end of said chamber substantially as described.

11. In an apparatus of the character described, the combination of a heating chamber, heating coils therewithin, means for admitting liquid into and out of said heating chamber, electric conductors connected to said coils, a rotary switch for controlling the current through said conductors, said switch having a key, and a rotary valve for controlling the passage of liquid into and out of said chamber, the axes of said switch and valve being in alinement, and said valve having an axial extension engaging said key, whereby said valve and switch can rotate only in unison, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM F. CUTLER.

Witnesses:

FRANCIS M. WRIGHT,  
D. B. RICHARDS.