M. H. SHOENBERG.

ELECTRIC FLUID HEATER.

APPLICATION FILED MAR. 18, 1916.

1,197,552. Patented Sept. 5, 1916.

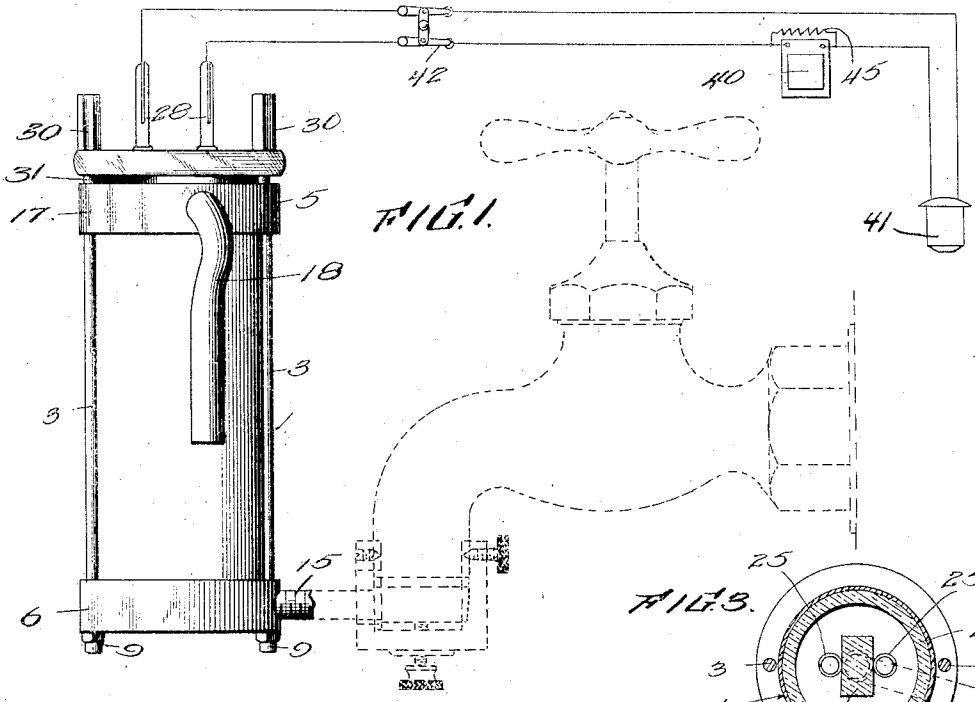


FIG. 1.

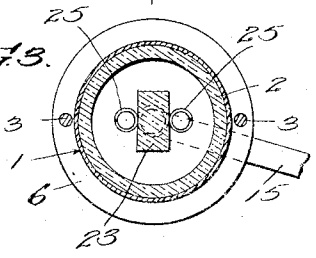


FIG. 3.

FIG. 2.

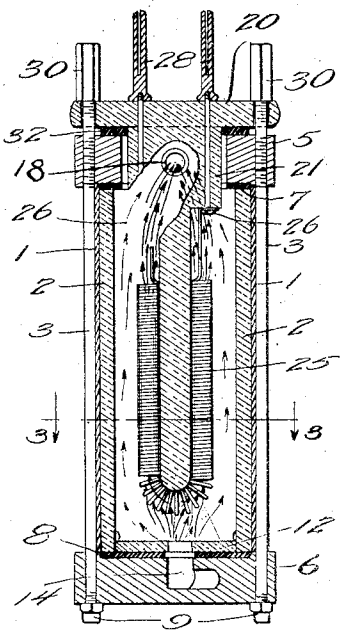


FIG. 4.

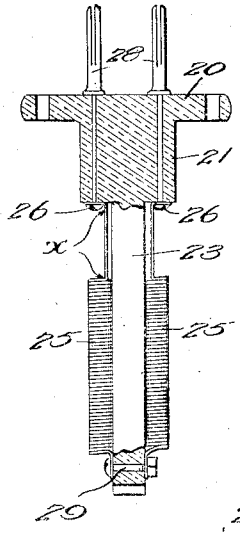
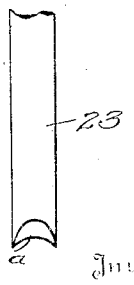


FIG. 5.



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ELECTRIC FLUID-HEATER.

1,197,552. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed March 18, 1916. Serial No. 85,094.

To all whom it may concern:

Be it known that I MILTON H. SHOENBERG, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Electric Fluid-Heaters, of which the following is a specification.

This invention relates to electric heaters especially adapted for heating water but which may be used for other purposes.

My invention is characterized by the fact that a single pair or set of bolts is enabled to clamp the parts of the liquid container or vessel, to position the heating element and to secure it in operative position, no additional fastening means being required. The heating element is a unitary structure and is characterized by the fact that the parallel portions of the resistance or heating coils are separated by an insulating medium to prevent electrolytic action between the parts of the separate portions and by the fact that the upper part of each coil portion is straightened out so that it will not heat as rapidly and consequently will not burn out as readily, if the water supply is turned off while the electric current is still flowing. Furthermore the intake and outlet are arranged symmetrically with respect to the heating coils and this in conjunction with the separating wall between the coils, causes the heat to be abstracted from the coils uniformly.

In the accompanying drawings which illustrate an embodiment of my invention, Figure 1 is a side elevation of one form thereof and showing also the manner in which it may be attached to a spigot and connected to an electric circuit; Fig. 2 is a vertical section of the heater; Fig. 3 is a cross section on the line 3—3 of Fig. 2; Fig. 4 is a side elevation of one form of heating unit; and Fig 5 is a fragmentary view of the support for the heating coils shown in Fig. 2.

I have greatly simplified the construction of the fluid container or vessel, rendering it easy to manufacture and facilitating the assembling of parts. It comprises an outer metal cylinder or tube 1, and an inner porcelain or other insulating cylinder 2, clamped by means of bolts 3, between heads or end disks 5, 6, preferably of metal, with interposed gaskets 7, 8, to form tight joints. The bolts may be conveniently threaded into the upper disk and provided at the lower ends with nuts 9. A centrally apertured disk 12 of porcelain or other insulating material may be placed in the bottom of the vessel to prevent contact between the heater coil and the metal disk in case the coil should become broken or loose and drop down.

The lower head or disk 6 is provided with an inlet channel 14, extending downwardly and laterally and is preferably threaded to receive a supply pipe 15. The upper head or disk 17 is provided with an outlet channel extending laterally and threaded to receive a discharge pipe 18.

The heating unit comprises an integral support preferably of porcelain, having a cap portion 20, and a depending stem provided with an upper plug member 21 adapted to extend through the aperture in the disk 5 and a coil support 23, which is preferably flattened to form a separating wall between the opposite portions of the resistance or heating coils 25. As appears from Fig. 3, this separating member 23 extends beyond the periphery of the coils upon each side so as to effectually prevent any electrolytic action between opposite points in the parallel coil portions and is also longitudinally of greater length than the coils thereby coöperating with the coils to cause the currents of heated fluid to flow upwardly threading the entire length of the coils. The upper ends of the coils are fastened under the heads of screws 26, which pass through passages in the porcelain plug part 21 and thread into the binding posts 28. If a single continuous or V-shaped heating coil is employed as shown in Fig. 2, the stem 23 is provided with a grooved channel 23ª at the bottom; but if two separate coil portions are employed, as illustrated in Fig. 4, I prefer to connect their lower ends by means of a bolt 29, passing through a hole in the stem. The head portion 20 is provided with holes through which the projecting threaded ends of the bolts 3, may pass when the heating unit is placed in the containing vessel. The heating unit is then securely clamped by means of nuts 30, threading upon the bolts 3, the joint being made fluid tight by means of the interposed gasket 32. This construction makes an exceedingly simple and efficient

device and the heating unit can be readily removed for inspection, or to be cleaned or replaced. The same bolts 3 which clamp the parts of the container or vessel together, serve also to guide and position the heating unit and to maintain it in proper relation to the inlet and outlet, the nuts 30, screwed upon the threaded ends of the bolts 3 serving to fasten the heating element securely and to clamp the gasket 32 between the cap 20 and the disk 5, thereby forming a fluid-tight joint.

To insure the greatest efficiency of the heating coils, I arrange the inlet 14, centrally so that the issuing stream of water will divide substantially equally and pass upwardly through the heater coils uniformly and in equal volumes so that each coil will be subjected to the same conditions and will supply an equal amount of energy. To fulfil these conditions I also arrange the outlet opening leading to the discharge pipe 18, centrally with respect to the two coils, thereby causing the heated water to be withdrawn symmetrically with respect to the two coil parts. The importance of this symmetrical arrangement and its effect upon the operation of the heater will be appreciated by engineers.

In case the supply of water should be shut off while the electric current is still flowing through the coils of the heating unit, the water will be evaporated from the top downward, and when the coils are entirely exposed they will rapidly burn out. For the purpose of preventing injury to the coils if the current should be left on for a short time sufficient to evaporate the water in the upper part of the vessel, I construct the heating wire with straight parts x, which generate less heat per unit length and are more exposed to radiation and therefore do not heat as much as the compact coil portions. These straight portions may be subjected to the current temporarily, even when not surrounded with water, without burning out.

For the purpose of calling attention to the fact that the current is on the heater, I may include a "buzzer" 40 in the connecting cord or circuit wires connecting the plug terminal 41 with the heater, the cord conductors also preferably including a double pole switch, indicated diagrammatically at 42. If, therefore, one inadvertently leaves the heater connected to the electric circuit after turning off the water supply, the audible signal 40, will call attention to this fact and the straight portions x will prevent the heater coils from being burnt out if the current is turned off within a short time. The shunt resistance 45 around the buzzer lowers the operating voltage across its terminals.

I have shown the upper terminals of the heater coils secured by screws 26 but it is evident that they could be carried up through the screw channels and connected directly to the binding posts or plug terminals 28.

While I have described in detail the particular construction illustrated in the accompanying drawings for the purpose of disclosing an embodiment of my invention, it will be evident that various changes and modifications may be made within the scope of the appended claims and without in any manner departing from the spirit of my invention.

By making the cylinder 2 of porcelain, the outer casing or shell 1 may be omitted if desired.

I claim:—

1. An electric fluid heater, comprising a fluid container or vessel having separable ends and a tubular body, a heating unit having parallel resistance portions and an insulating medium within said tubular body and separating said resistance portions, said vessel having inlet and outlet openings symmetrically disposed with respect to said resistance portions and coöperating with said separating medium to cause the inflowing fluid to separate into equal streams and thereby subjecting the separated resistance portions to like conditions.

2. An electric fluid heater, comprising a fluid container or vessel having separable ends and a tubular body, a heating unit having a coiled resistance wire arranged in a plurality of parallel sections, and an insulating partition extending between said sections, an inlet below said resistance and centrally disposed with respect to the sections, an outlet above said resistance symmetrically disposed with respect to said sections, said partition preventing electrolytic action between the resistance sections and separating the fluid currents flowing therethrough.

3. An electric fluid heater, comprising a fluid container or vessel having separable ends and a tubular body, a heating unit having parallel resistance portions and an insulating medium separating said resistance portions, said vessel having inlet and outlet openings symmetrically disposed with respect to said resistance portions, and a set of bolts serving to position and secure the heating unit in the vessel and to clamp the parts of the vessel together.

4. An electric fluid heater, comprising a heating unit having an insulating support provided with a cap provided with a depending stem, a plurality of coiled resistance sections arranged upon opposite sides of said stem, and terminal posts carried by said cap and having connecting members passing through channels in said cap and secured to the free ends of said resistance sections.

5. An electric fluid heater, comprising a heating unit having an insulating support provided with a cap provided with a depending stem, a plurality of coiled resistance sections arranged upon opposite sides of said stem, and terminal posts carried by said cap and having connecting members passing through channels in said cap and secured to the free ends of said resistance sections, said ends having a straight portion to decrease the amount of heat generated in a given length of the heating unit.

6. An electric fluid heater, comprising a heating resistance element provided with parallel coiled parts separated by an insulating partition within the fluid heater, an inlet and an outlet at opposite ends of said parallel parts respectively and symmetrically arranged with respect to the combined resistance parts, so that the fluid is caused to flow through the coils in equal streams and thereby subject the coils to like conditions.

7. An electric fluid heater, comprising a coiled resistance, the upper end of said coiled resistance being straightened out to provide a certain length of resistance in which a decreased amount of heat is generated in a given space, so that the coils will not be burned out if the fluid supply is cut off only for a short time in which the surface of the fluid is within the space of said certain length.

In testimony whereof I affix my signature in presence of two witnesses.

MILTON H. SHOENBERG.

Witnesses:

GEORGE W. HUGUS,

AUDLEY TAYLOR.