T. J. NASH.

ELECTRIC FLUID HEATER.

APPLICATION FILED DEC. 26, 1914.

1,132,604. Patented Mar. 23, 1915.

Fig. 1.

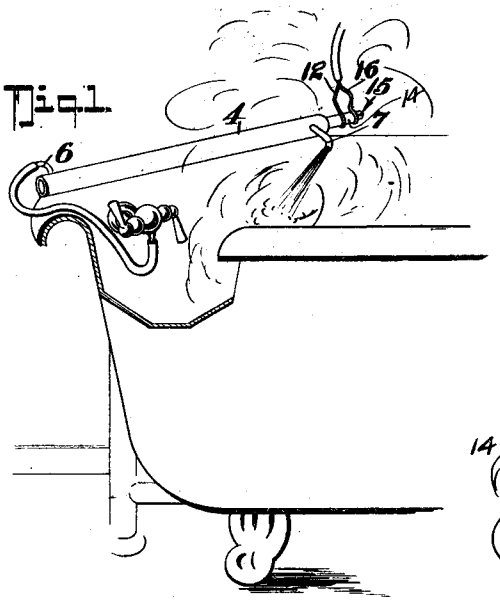


Fig. 2.

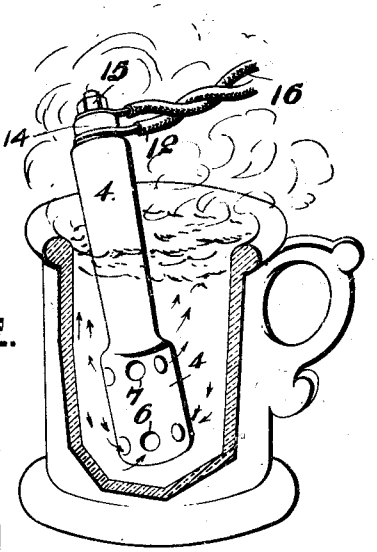


Fig. 3.

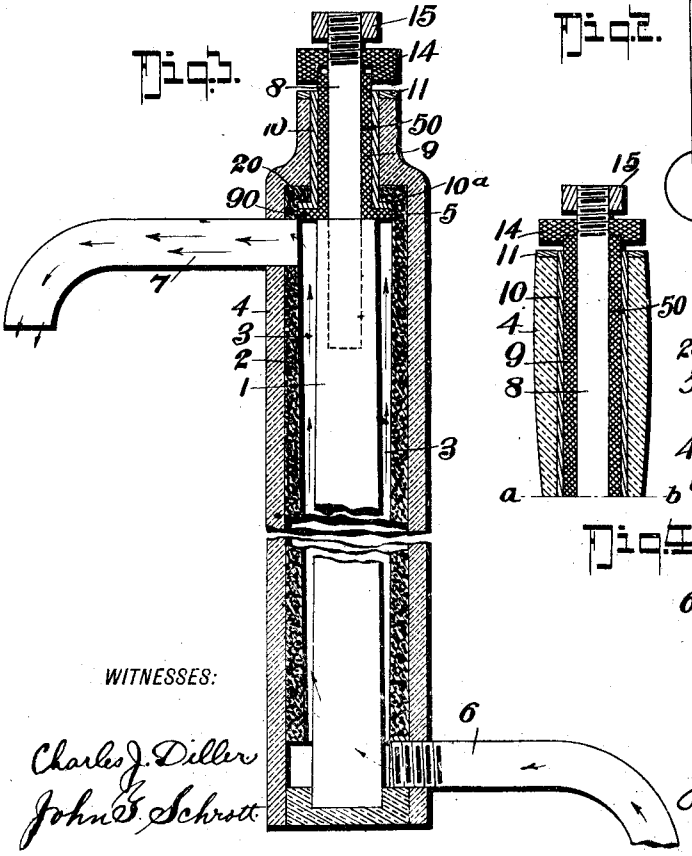
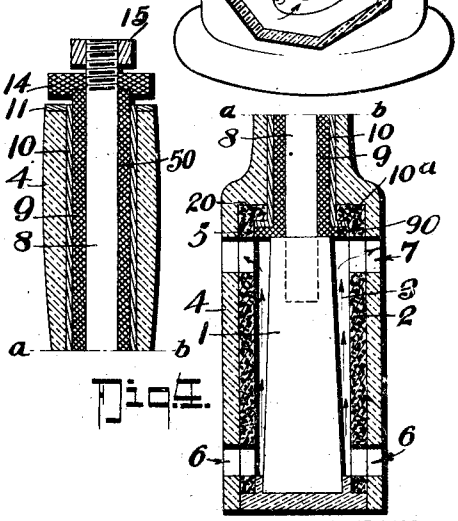


Fig. 4.



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ELECTRIC FLUID-HEATER.

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To all whom it may concern:

Be it known that I, THOMAS J. NASH, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented a new and Improved Electric Fluid-Heater, of which the following is a specification.

This invention, which has reference to electric fluid heating means, primarily has for its object to provide a heating means of the general character stated of a simple and economical construction, that is readily adapted for being portably or permanently attached to sources of both the fluid and lectrical supplies which may be conveniently handled, and which effectively serves its intended purposes.

Another and essential object of my invention is the provision of an electric fluid heater in which there is no complete metallic circuit and in which the circuit is completed by the fluid and in which, as soon as the fluid contained within the heater is exhausted, the flow of the electric current ceases.

Again, my invention has for its purpose to provide an electric fluid heater in which the electrodes are so designed and relatively connected to the body of the heater, that after the fluid supply is cut off, the fluid that remains in the heater immediately boils dry without injury to the electrodes, and thereby automatically breaks the circuit through the heater without turning off the switch in the electric circuit feeder to the heater.

Furthermore, my invention comprehends an improved construction of electric heater of the general character stated having provision for balancing the varying resistance of the hot or cold water contained within the heater to thereby provide for a uniform heating of the water as it passes through the heater.

With other objects in view that will hereinafter appear, my invention consists of the peculiar combination and novel arrangement of parts, all of which will be hereinafter fully explained, specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:—

Figure 1 is a perspective view of a large type of my improved fluid heater, the same being shown as applied for use. Fig. 2 is a similar view of a smaller type of my heater, the same being shown in the nature of a portable heater adapted for being partially immersed in the fluid to be heated. Fig. 3 is a vertical section of the type of heater shown in Fig. 1. Fig. 4 is a vertical section of the type of heater shown in Fig. 2, lines *a*—*b*, *a*—*b*, being read together to complete the figure.

In carrying out my invention, when constructed to form a large type heater, as shown in Figs. 1 and 3, the same includes a rod-like electrode or core 1 (preferably carbon) that is slightly tapering from the upper end, and the said electrode 1 is located within a tubular electrode or shell 2 (also preferably carbon) and which is tapering on the inside so that the bottom or lower end thereof is of smaller diameter than the upper end.

By reason of tapering the inner and the outer electrodes 1 and 2, in the manner stated and shown, an annular tubular space or fluid passage 3 is provided between the said two electrodes that is of less area at the bottom than at the top, and up which the water may pass and be gradually heated when the heater is in the operative condition, and since the area of the said space or passage gradually increases from the inlet to the outlet end of the heater, the cold fluid as it enters the space end of lesser area gradually grows hotter, and the conductivity of the fluid increases, and as the area between the walls of the electrodes increases, the resistance is thereby balanced, or in other words, is the more clearly equalized from one end of the heater to the other.

4 designates a tubular jacket of insulating material entirely inclosing the heating elements or electrodes and 5 indicates a cap designed to hold the electrodes in spaced relation it having a central seat 50 that forms the bearing for the central electrode 1, see Fig. 3.

6 designates the fluid inlet to the heater, of which, when the form of heater is used, as shown in Figs. 2 and 4, there may be a plurality and the said inlet when, as shown in Figs. 1 and 3, may take the form of an enlarged area by terminating the outlet or tubular electrode short of the bottom. A rod 8 is embedded in the upper end of the solid electrode 1 and the upper end thereof is threaded to receive a lock nut 15 that cooperates with a disk or washer 14 of insulating material for clamping one terminal 16 of the electrical supply. An insulating bushing 9, that has an outwardly projecting

base flange 90 is mounted on the rod 8 and insulates it from a metallic bushing 10 also provided with a flange 10^a that is forced into electrical contact with the inwardly projecting flange 20 on the upper end of the electrode 2 when the parts are assembled for use. A metallic washer 11 is mounted on the upper end of the bushing 9, and it is held in electrical contact with the bushing 10 that forms the connection for joining with the terminal 12 of the electrical supply which is clamped down by the washer 14 when the binding nut 15, is screwed home.

From the foregoing taken with the accompanying drawings, the complete construction, the manner of operation and the advantages of my invention will be readily apparent.

By reason of the structural arrangement of its parts, my electric heater can be made up in different sizes to suit the requirements and readily connected with the fluid and electric sources of supply.

For heating water contained in vessels, see for example Fig. 2, the heater is made as shown in detail in Fig. 4.

What I claim is:

1. In an electric heater, a casing of insulating material, heating elements within the casing comprising an outer tubular electrode and an inner electrode, the said electrodes being spaced and insulated from each other, the space between the said electrodes forming the fluid receiving chamber, the said casing having a fluid feed inlet in communication with one end of the said chamber, a fluid outlet in communication with the other end of the said chamber, the opposing faces of the inner and outer electrodes being relatively shaped to form an annular fluid receiving chamber of gradually increasing area from the inlet to the outlet end thereof.

2. In an electric heater, a casing heating elements within the casing, said elements comprising a tubular electrode whose internal diameter gradually increases from one end to the other, an inner electrode within the tubular electrode spaced and insulated from the said tubular electrode, said inner electrode being of gradually decreasing diameter from one end to the other, means for connecting the electric circuit terminals to the said electrodes, a fluid feed inlet in communication with the restricted end of the space between the electrodes, and a fluid outlet in communication with the other end of the space between the said electrodes.

3. In an electric heating appliance of the character stated; a tubular casing of insulating material having a restricted neck, a closure for the lower end of the said casing, said casing having a fluid inlet at the lower end, a tubular electrode within the casing whose upper end terminates in an inturned flange, a fluid outlet that extends through the casing and the upper end of the tubular electrode, an inner electrode located within and spaced from the tubular electrode, the lower end of the said inner electrode having a bearing on the bottom closure of the outer casing, a rod that extends through the restricted neck of the casing and joins with the inner electrode, an insulating sleeve on the said rod that includes a flanged lower end that opposes the flanged end of the tubular electrode, a metallic sleeve on the insulating sleeve, said metallic sleeve including a flanged lower end that fits between the flanged end of the insulating sleeve and the flanged end of the tubular electrode, a metallic washer that contacts with the metallic sleeve, an insulating clamping disk on the upper end of the rod that connects with the inner electrode, a clamp nut on the upper end of the said rod.

4. In an electric water heater, an outer electrode shell, an inner electrode core, said shell and core being spaced apart a distance increasing in cross sectional area from the inlet progressively toward the outlet, means for admitting water into the space between the said electrodes, and means for conveying water out of the space between said electrodes.

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