Oct. 28, 1930. M. S. GAZELLE 1,779,696

ELECTRIC WATER HEATER

Filed July 12, 1929

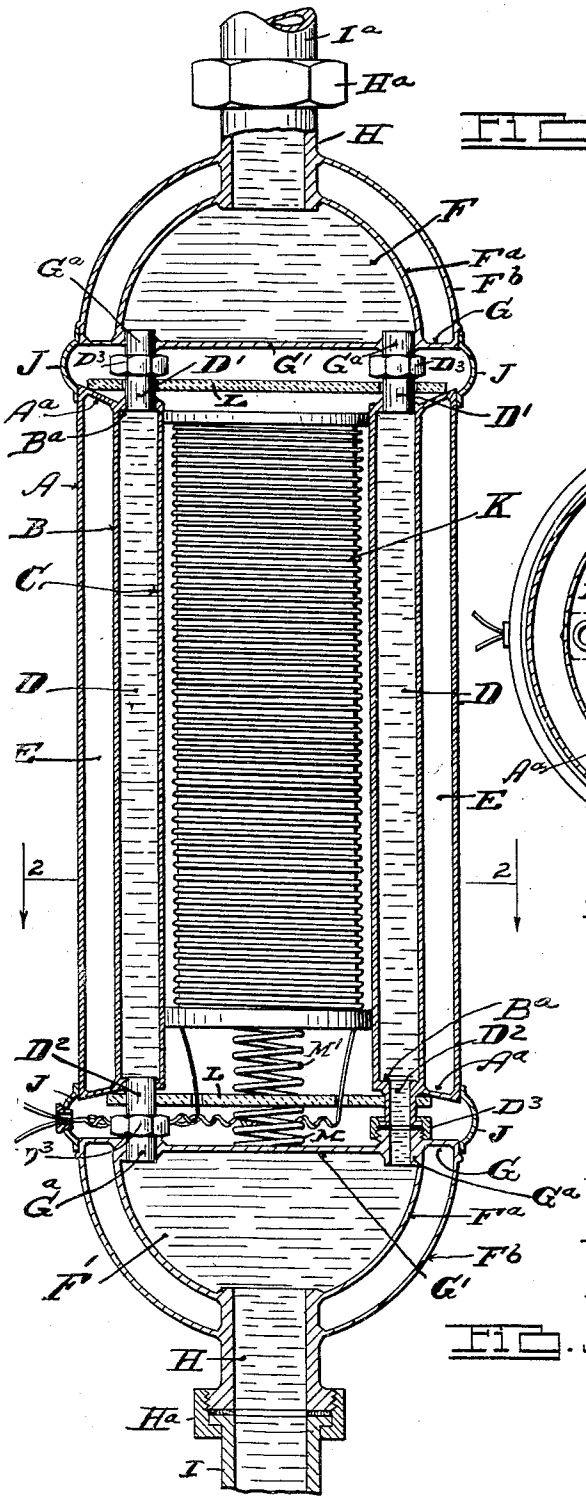


FIG. 1.

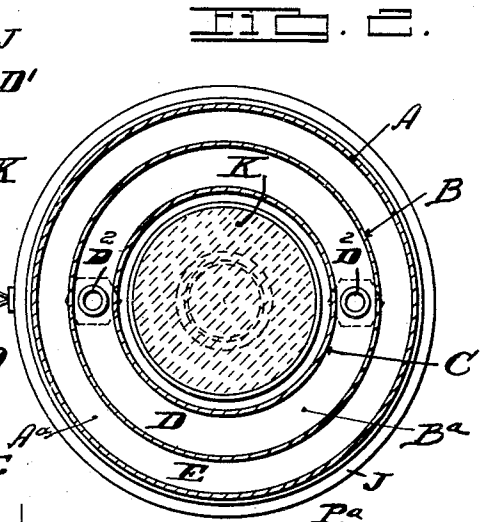


FIG. 2.

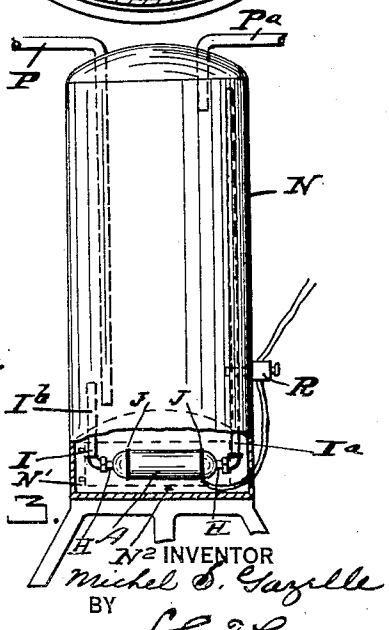


FIG. 3.

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# UNITED STATES PATENT OFFICE

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## ELECTRIC WATER HEATER

Application filed July 12, 1929. Serial No. 377,886.

My invention relates to an electric water heater for use in connection with the usual range boiler or tank employed for domestic water heating,—it being obvious however that it may be used for heating water for other purposes.

The primary object of the present invention is to construct a simple, efficient and inexpensive device which may be quickly and easily installed at a minimum cost.

A further object of the invention is to construct the device almost entirely of sheet metal, thereby increasing its efficiency and the rapidity with which the water may be heated.

One feature of the invention consists in providing a plurality of concentrically arranged sheet metal shells spaced apart by a pair of annular concentric sheet metal rings welded to each end of the shells, thereby providing a closed outer chamber, or "dead air" insulating wall, surrounding an inner annular water chamber, whereby the heat from a heating coil extending axially through the latter may be conserved to insure rapid heating of the water passing through the surrounding water chamber.

A further object of the invention is to provide a device whereby the heating coil and water jacket may be readily enlarged by coupling two or more sections together to meet the requirements necessary for heating water in tanks of various capacities.

A further object of the invention is to provide means whereby the water in the range boiler may be automatically maintained at a predetermined temperature at all times, regardless of the volume of water that may have been drawn from the tank from time to time,—the operation being such that upon the water in the tank reaching a predetermined temperature, the electric current delivered from a service station will be automatically cut off from the heating coils.

With the foregoing and other objects in view which will appear as the description proceeds, the invention further resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes may be made in the precise embodiment of the invention herein disclosed without departing from the spirit of the same.

In the drawings accompanying this specification:

Figure 1 is a vertical, or longitudinal sectional view of the device,—dependent upon its position when installed.

Figure 2 is a cross-sectional view taken on or about line 2—2 of Figure 1.

Figure 3 is an elevation of a range boiler, with its lower end broken away and in section to disclose the heating device installed horizontally within a chamber beneath the boiler, fitted with a door,—shown in dotted lines,—whereby access may be had to the heater.

Referring now to the letters of reference placed upon the drawings:

The main body of the device comprises three annular walls A, B, C concentrically arranged in spaced relation to each other to provide annular chambers, the ends of the annular chambers being closed by concentric rings $A^a$ and $B^a$, welded to each end of the respective annular walls, thereby forming an annular water chamber D, and an encircling "dead air" heat insulating chamber E.

Projecting outwardly from the end walls of the water chamber D are nipples $D^1$ and $D^2$ welded thereto, through which water passes to and from the chamber.

Spaced from the ends of the main body of the device are cup-shaped water chambers F and $F^1$, formed of sheet metal comprising inner and outer walls $F^a$ and $F^b$ spaced apart by an annular ring G, welded to the edges of the cup-shaped walls, thereby providing a closed "dead air" chamber or heat insulating wall surrounding the water chamber at each end of the main body portion of the device.

Bridging the wall of each cup-shaped water chamber F, $F^1$ and welded thereto is a wall $G^1$, from which project nipples $G^a$, $G^a$, welded to the wall and connected with the nipples $D^1$ and $D^2$ of the water chamber D, by coupling nuts $D^3$.

H, H are pipe nipples welded in axial alignment respectively to the walls of the cup-shaped water chambers at each end of the

device, and $H^a$, $H^a$ are union nuts connecting the nipples respectively with a cold water pipe I, and a hot water discharge pipe $I^a$ leading to a range boiler.

J, J denote a pair of slidable rings sleeved upon the main body of the device and which normally overlap the edges of the cup-shaped water chamber at each end thereof, thereby providing a smooth unbroken exterior wall which upon shifting permits access to the internal parts of the device for the purpose of making repairs; or whereby additional sections may be coupled end to end to the body portion to increase the heating capacity of the device;—in which case a similar slidable ring overlaps and conceals the junction between abutting sections of the body-portion.

K denotes a heating coil extending axially within the bore of the annular water chamber.

L indicates a porcelain disc at each end of the water chamber provided with a pair of holes through which the nipples $D^1$ and $D^2$ project.

M denotes a spring located between the wall $G^1$ of the cup-shaped water chamber $F^a$ and the porcelain disc L, and $M^1$ a spring between the disc and the end of the heating coil to maintain the respective elements in spaced relation to each other.

N designates a range-boiler provided at its lower end with a chamber $N^1$ in which is lodged the heating device.

$N^2$ denotes a door, shown in dotted lines, whereby access may be gained to the heating device for inspection or repairs.

P indicates a cold water pipe connected with the water supply system extending downwardly to a point near the bottom of the range boiler.

$I^b$ indicates a cold water pipe projecting into the range boiler connected with the pipe I leading to the heating device. $I^a$ denotes a hot water pipe leading from the heating device and preferably discharging into the range boiler adjacent its upper end. $P^a$ designates a hot water pipe leading from the top of the range boiler to the house service pipes.

R indicates diagrammatically a thermostat controlling the delivery of electric current from the service wires to the heating coil of the device, whereby the current may be automatically cut-off from the heating coil whenever the temperature of the water in the range boiler reaches a predetermined degree as will be readily understood, and when the temperature of the water in the tank is lowered below said predetermined degree, the thermostatic switch will be closed automatically for the delivery of current to the heating coil.

Having indicated the several parts by reference letters, the construction and operation of the device will be readily understood.

The thermostat having been set for a predetermined water temperature, the heating coils will cause the water, if below the desired temperature in the water chamber, to rapidly heat the water therein, causing it to circulate through the water chamber into the tank of the range boiler, until the temperature of the water in the latter reaches the desired predetermined temperature, whereupon the thermostat will automatically cut off the supply of current from the service station in a manner which is well understood.

By drawing water from the tank from time to time, the incoming cold water delivered to the tank from the service main will eventually lower the temperature of the water therein, sufficiently to cause the thermostatic switch to automatically close the electric circuit from the service station to the heating coils, that the latter may heat the water until the temperature in the range boiler is restored to its former degree, whereupon the circuit will be cut off as before.

Having thus described my invention, what I claim is:

1. In an electric water heater; a main body portion comprising a plurality of sheet metal shells concentrically disposed in spaced relation to each other; a plurality of annular sheet metal rings welded to each end of the sheet metal shells, to provide both an inner water chamber and an encircling outer dead air heat-insulating chamber, surrounding the water chamber; an electric heating coil extending axially within the annular water chamber; a pair of cup-shaped water chambers respectively located at each end and in spaced relation to the main body portion; an outer cup-shaped wall inclosing each cup-shaped water chamber; an annular ring welded to the walls of said water chambers and their outer inclosing walls; a wall bridging the annular wall of each cup-shaped water chamber; a plurality of pipe nipples connecting the respective cup-shaped water chambers with the annular water chamber; and a water inlet and outlet pipe connection extending respectively from each of the cup-shaped water chambers.

2. In an electric water heater, a main body portion comprising a plurality of cylindrical sheet metal shells concentrically disposed in spaced relation to each other; a plurality of annular sheet metal rings welded to each end of the cylindrical sheet metal shells, to provide an inner annular water chamber and an outer encircling air chamber an electric heating coil extending axially within the annular water chamber; a pair of cup-shaped water chambers respectively located at each end, and in spaced relation to the main body portion; an outer cup-shaped wall inclosing each cup-shaped water chamber; an annular ring

welded to the walls of said water chambers and their outer inclosing walls to maintain them in spaced relation; a wall bridging the annular rim of each cup-shaped water chamber; a plurality of pipe nipples projecting from the walls of the cup-shaped water chambers and welded thereto; a plurality of pipe nipples projecting from the end rings of the annular water chamber in coupling alignment with the nipples of the cup-shaped water chambers; means for coupling said nipples together; and a water inlet and outlet pipe coupling nipple, respectively welded to the inner and outer inclosing walls of said cup-shaped chambers, adapted for connection with water pipes leading to and from the water heater.

3. A structure as specified in claim 2 in combination with a plurality of collars slidably mounted upon the main body portion, adapted to bridge the space between the ends of the latter and the cup-shaped water chambers.

4. A structure as specified in claim 2 in combination with a plurality of porcelain discs, located in spaced relation to the end of the heating coil; and a pair of springs respectively located on each side of one of said discs.

5. A device as specified in claim 2 in combination with a range boiler; pipes leading from the range boiler to the heater and from the heater back to the boiler; service wires connecting the heating coil with a source of electrical energy; and means controlled by the temperature of the water in the range boiler adapted to automatically establish or cut-off the current to said heating coil.

In testimony whereof, I sign this specification.

MICHEL S. GAZELLE.