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HOT WATER HEATER

Filed March 15, 1935

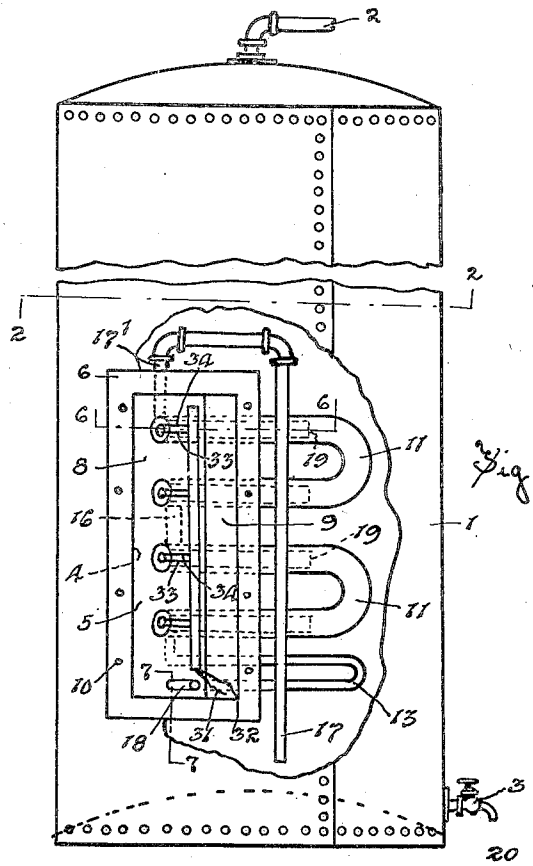


Fig. 1

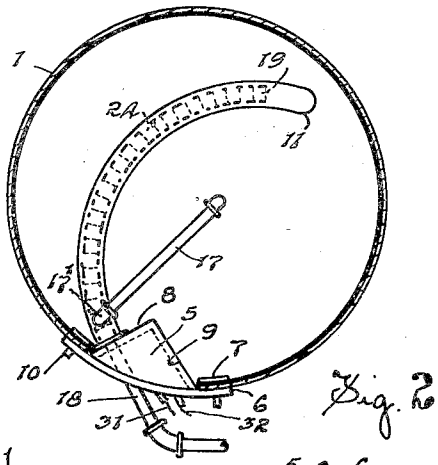


Fig. 2

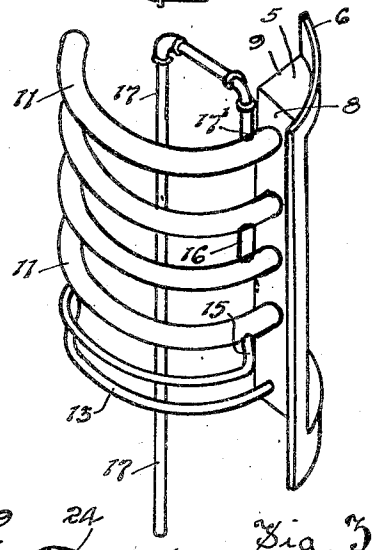


Fig. 3

Fig. 4

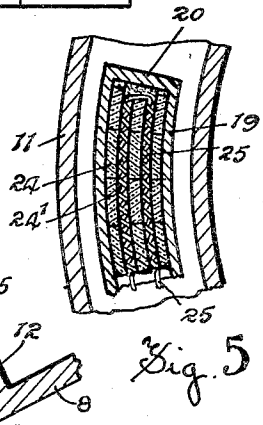


Fig. 5

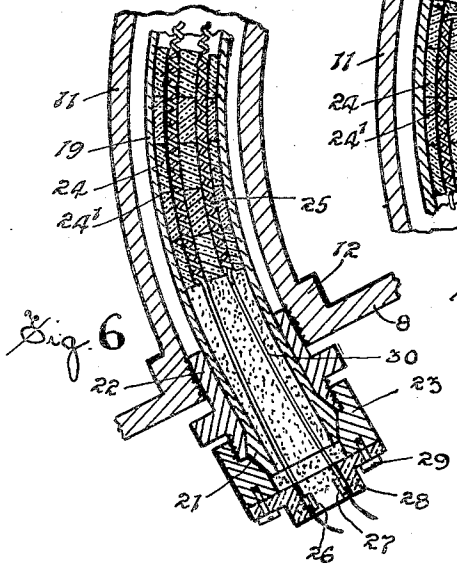


Fig. 6

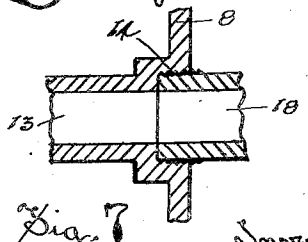


Fig. 7

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HOT WATER HEATER

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9 Claims. (Cl. 219—39)

The invention relates to hot water heaters and particularly to heaters for furnishing hot water for domestic purposes and an object of the invention is to provide an electric heater which operates at relatively low cost and quickly heats the water in the tank in which it is installed and which maintains the water within the tank at a uniform temperature.

A further object is to provide a construction wherein, when water is drawn from the tank through the usual service pipe the water is admitted to the tank through the usual supply pipe is subjected to the heat of the heater submerged within the tank, and prior to being discharged into the tank and wherein also, when the service pipe is closed there is a local circulation established within the tank and through the heater.

A further object is to provide a preheating coil submerged in the tank and through which the entering water passes prior to entering the electrical heating zone.

A further object is to provide a water heating device having coils submerged in the tank and electric heaters contained in the coils and submerged in the supply water passed through the coils to the tank and also to arrange the heaters so that they can be readily inserted within or removed from the coils, from the exterior of the tank, without having to disturb the coils.

A further object is to provide a casing which can be readily secured to the conventional cylindrical tank and which supports the water coils within the tank and further to design the casing and coils so that the electric heaters can be removed from or passed into the coils through the casing and without disturbing the coils.

With the above more important and other minor objects in view the invention consists essentially in the arrangement and construction of parts now described, reference being had to the accompanying drawing in which

Fig. 1 is a side view of the tank with part broken away to expose the heater.

Fig. 2 is a horizontal sectional view at 2—2 Fig. 1.

Fig. 3 is a perspective view of the tubes and associated parts.

Fig. 4 is a perspective view of one of the insulators.

Fig. 5 is an enlarged central sectional view through the inner end of one of the heaters.

Fig. 6 is a horizontal sectional view at 6—6 Fig. 1.

Fig. 7 is a vertical sectional view at 7—7 Fig. 1.

In the drawing, like characters of reference indicate corresponding parts in the several figures.

The tank 1 is of the usual type as used for domestic service and can be of any predetermined water capacity and it is fitted at the top with the customary service pipe 2 and at the bottom with a drain off tap 3.

In equipping the tank with our device we make a substantially rectangular opening 4 in the front of the tank towards the bottom and in the opening we insert a box or casing 5 having a continuous outstanding flange 6 which engages the edges of the opening. The flange is welded or otherwise permanently secured to the tank body to insure of a water tight joint and internally the tank is reinforced by strips 7 also welded to the tank body.

It will be observed that the casing is for the greater part within the tank and that it has the side walls 8 and 9 thereof intersecting at ninety degrees and meeting the tank body at angles of approximately forty five degrees. The flange carries screw threaded studs 10 which permit of the ready application of a closure plate (not shown).

To the rear side of the wall 8 we secure permanently the ends of similar horizontally disposed substantially U-shaped water tubes or coils 11 positioned one above the other and having the ends thereof opening through the said wall, suitable screw threaded openings or holes 12 being provided for the purpose. The tubes make a water tight joint with the wall to insure against leakage.

The U-shaped tubes are curved longitudinally, as shown, and it will be observed that they extend cross-wise of the tank being totally submerged in the water of the tank.

Two water coils are shown but more could be used if desired where greater heating capacity is required.

Directly underneath the lowermost coil 11 we locate a preheating water tube or coil 13, bent in the same manner as the former tubes and one end of the tube 13 is secured to the wall 8 (see Fig. 7) and the said wall has a screw threaded opening 14 therein communicating with the latter tube. The other end of the tube 13 is connected as indicated at 15 (see Fig. 3) with the lower end of the tube 11 immediately thereabove.

A short pipe 16 connects the end of the upper leg of lower coil 11 with the adjacent or lower end of the overlying coil 11. A water inlet pipe 17 is connected at 18 to the upper end of the upper coil 11 and leads down towards the bottom of the tank as best shown in Fig. 1. A water

supply pipe 17' is screw-threaded into the opening 14 and said latter pipe communicates with the source of domestic water supply.

It will be seen from the above that the water admitted to the tank is passed first through the coil 13, then successively through the coils 11 and then finally through the pipe 17, it being understood that the ends of the coils 11 are closed in a manner later disclosed.

In each leg of the coils 11 we insert an electric water heater and as the heaters are all alike the description of one will suffice. A copper tube 19 is provided having a diameter somewhat less than the diameter of the tube 11 and a length somewhat less than the length of the leg of the latter tube, and said copper tube has the one end thereof permanently closed as indicated at 20 and the other end open and provided with an enlarged coned shaped head 21 and it is curved concentric to the tube 11.

This construction is such that the said tube 19 can be slid endwise into the leg of the tube 11 to take a position such as is shown in Figs. 5 and 6. Suitable means is provided for securely fastening the tube 19 within the tube 11, such herein comprising a sleeve or hollow screw plug 22 which receives the tube 11 and screws into the opening 12 and an open centered lock nut 23 screw-threaded onto the forward end of the sleeve. The coned head of the tube 19 is securely held between the sleeve and the lock nut and a water and steam tight joint is insured.

The tube 19 contains a plurality of similar insulators 24 which are shaped to slide freely into the said tube and the insulators are provided with holes 24' through which a heating element 25 can be threaded. The insulators can carry one or two heating elements as desired and each element after being threaded backwardly and forwardly through the insulators has its ends passed forwardly through the tube 19 and connected to suitable binding posts 26 and 27 carried by a hollow insulator 28 secured to the nut 23 by screws 29.

Asbestos or other suitable insulating material 30 is packed in the forward end of each tube 19.

It will be particularly observed that the casing 5, tubes 11 and tubes 19 are all designed so that the tubes 19 with their contained heating elements, can be readily inserted in the tubes 11 through the open front of the casing 5 and further such that the insulators and heating elements can be readily pulled out as a unit from the tubes 19 upon the insulators 28 being released. The latter arrangement permits of the ready repair or inspection of the heating elements when required.

From the above it will be seen that the electric heaters are immersed in the water in the tubes 11 there being in reality a relatively thin stream of water circulating through the tubes when the heaters are in use.

A pair of supply wires 31 and 32 are passed into the box 5 from a suitable source of current supply and the several electric heaters are connected to the supply wires, each by a pair of lead wires 33 and 34.

The device operates in the following manner, assuming that the tank and coils are full of water and that the heaters are turned in. If all taps communicating with the tank through the pipe 2 are closed, the heaters will cause a local circulation of water in the tubes 11, the water entering the tubes from the tank through the pipe 17 and being discharged back into the tank through the same pipe 17. This local circulation continues until the water in the tank is all raised to a high temperature, when the heaters can be turned off if desired. When water is drawn from the tank, through the pipe 2 there is an inflow of cold water to the tank through the pipe 18 and this water is heated by the heaters as it passes through the tubes 11 and discharges through the pipe 17 into the tank. It will be observed that the coil 13 acts to preheat the water as it passes to the coils 11.

We have found that a heater constructed as herein described heats the water in the tank very quickly and efficiently and that the temperature of the water in the tank is practically uniform at all times.

What we claim as our invention is:—

1. The combination with a water tank and a service pipe leading therefrom, of a casing permanently secured to the wall of the tank and entering the tank through a suitable opening provided therein, a coil immersed in the water of the tank and permanently carried by the casing and having the ends thereof opening through the wall of the casing, said coil communicating, adjacent one end, with the water in the tank and adjacent the other end with a source of exterior water supply, and electric heaters inserted within the ends of the coils and immersed in the water of the coil, said heaters closing the ends of the coil and being entered through the casing.

2. The combination with a water tank and a service pipe leading therefrom, of a casing permanently secured to the wall of the tank and entering the tank through a suitable opening therein, a plurality of similar coils immersed in the water of the tank and permanently carried by the wall of the casing and having the ends thereof opening to the exterior through the wall of the casing, said coils being in communication one with the other and with the water in the tank and with a source of exterior water supply and electric heaters inserted in the coils and immersed in the water in the coils, said heaters closing the ends of the coils and being entered through the casing.

3. The combination with a water tank and a service pipe leading therefrom, of a casing permanently secured to the wall of the tank and entering the tank through a suitable opening provided therein, a plurality of similar coils positioned one above the other and immersed in the water of the tank and permanently carried by the casing and having the ends thereof opening to the exterior through the wall of the casing, said coils having their adjacent ends interconnected and the uppermost coil opening to the water of the tank and the lowermost coil in communication with an exterior source of water supply, and electric heaters inserted in the coils and immersed in the water of the coils, said heaters closing the ends of the coils and being entered through the casing.

4. The combination with a water tank and a service pipe leading therefrom, of a casing permanently secured to the tank and entering the tank through a suitable opening provided in the wall thereof, similar upper and lower coils immersed in the water of the tank and permanently carried by the casing and having the ends thereof opening to the exterior through the wall of the casing, an inlet pipe leading from the upper leg of the upper coil to the bottom of the tank, a water supply pipe communicating with the lower leg of the lower coil, a pipe connecting the adjacent legs of the coils and electric heaters in-

serted in the legs of the coils and immersed in the water of the coils, said heaters closing the ends of the coils and being entered through the casing.

5. The combination with a water tank and a service pipe leading therefrom, of a casing permanently secured to the tank and entering the tank through a suitable opening provided in the wall thereof, similar upper and lower coils immersed in the water of the tank and permanently carried by the casing and having the ends thereof opening to the exterior through the wall of the casing, an inlet pipe leading from the upper leg of the upper coil to the bottom of the casing, a pipe connecting the adjacent legs of the coils, a preheating coil within the tank and connected to the lower leg of the lower coil and to an exterior source of water supply and electric heaters inserted in the legs of the coils and immersed in the water of the coils, said heaters closing the ends of the coils and being entered through the casing.

6. The combination with a water tank and a service pipe leading therefrom, of a member secured to the wall of the tank and covering an opening provided in said wall, a coil immersed in the water of the tank and carried by the member and having the ends thereof opening to the exterior of the tank through said member, said coil communicating adjacent one end with the water in the tank and adjacent the other end with a source of exterior water supply and heaters inserted within the ends of the coil and immersed in the water of the coil, said heaters closing the ends of the coil and being entered through the member.

7. The combination with a water tank and a service pipe leading therefrom, of a member demountably secured to the wall of the tank and covering an opening provided in said wall, a coil immersed in the water of the tank and carried by the member and having the ends thereof opening to the exterior of the tank through said member, said coil communicating adjacent one end with the water in the tank and adjacent the other end and through the member with a source of exterior water supply and heaters inserted within the ends of the coil and immersed in the water of the coil and being entered through the member.

8. The combination with a water tank and a service pipe leading therefrom, of a member demountably secured to the wall of the tank and covering an opening provided in said wall, a plurality of similar coils immersed in the water of the tank and carried by the said member and having the ends thereof opening to the exterior of the tank through said member, said coils being in communication one with the other and with the water in the tank and with a source of exterior water supply entering through the member, and heaters inserted in the coils and immersed in the water of the coils, said heaters closing the ends of the coils and being entered through the member.

9. The combination with a water tank and a service pipe leading therefrom, of a member detachably secured to the wall of the tank and covering an opening provided in said wall, similar upper and lower coils immersed in the water of the tank and carried by the member and having the ends thereof opening to the exterior of the tank through said member, an inlet pipe leading from the upper leg of the upper coil to the lower part of the tank, a water supply pipe communicating through said member with the lower leg of the lower coil, a pipe connecting the adjacent legs of the coils and heaters inserted in the legs of the coils and immersed in the waters of the coils, said heaters closing the ends of the coils and being entered through the member.

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