Jan. 4, 1938. O. A. KNOPP 2,104,045

ELECTRIC HOT WATER RANGE

Original Filed Nov. 19, 1934 2 Sheets-Sheet 1

Fig. 1.

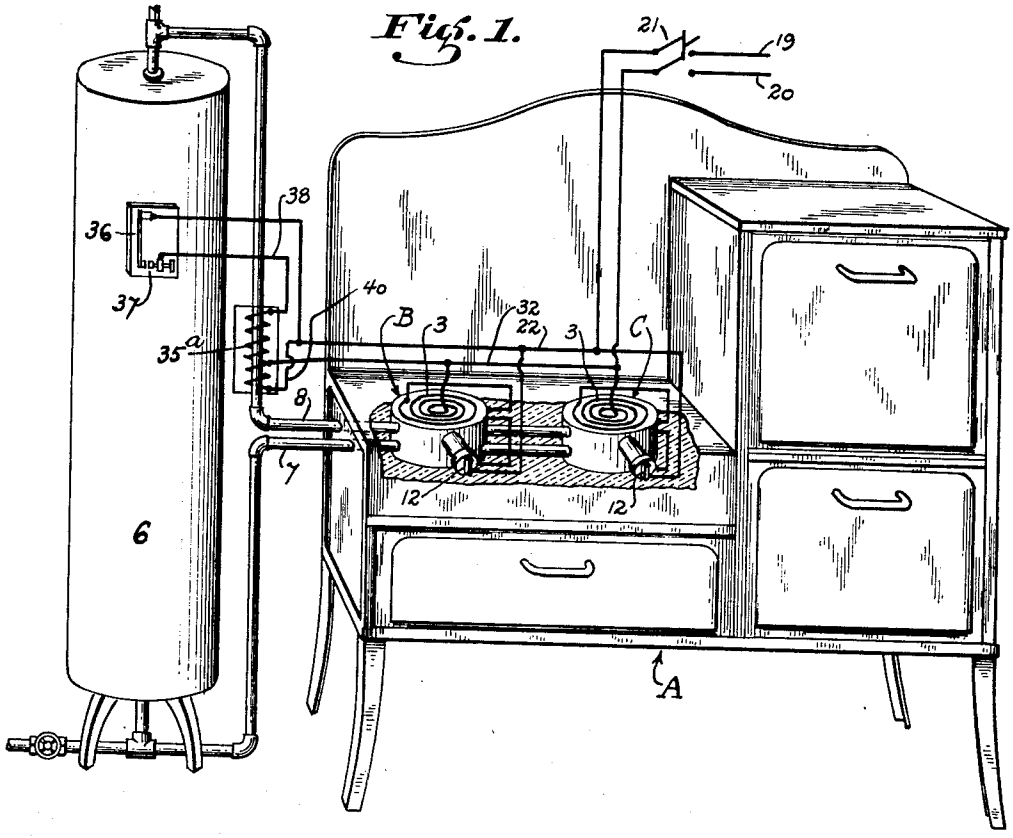


Fig. 2.

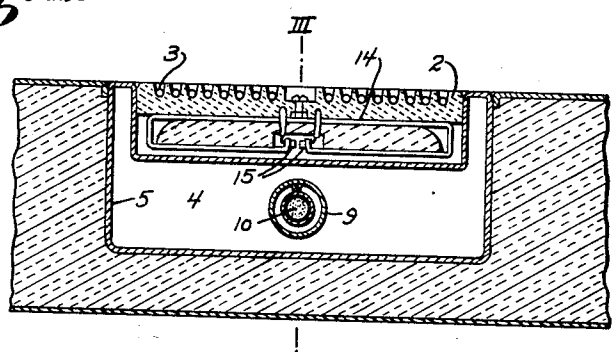
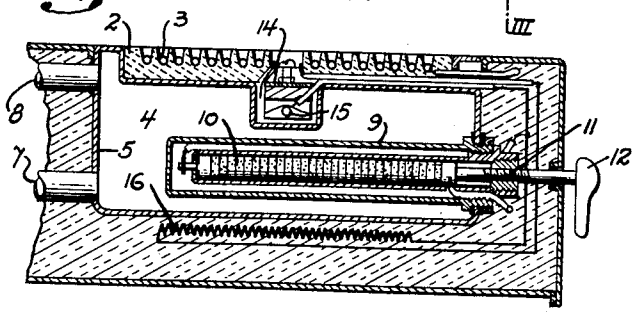


Fig. 3.



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Fig. 4.

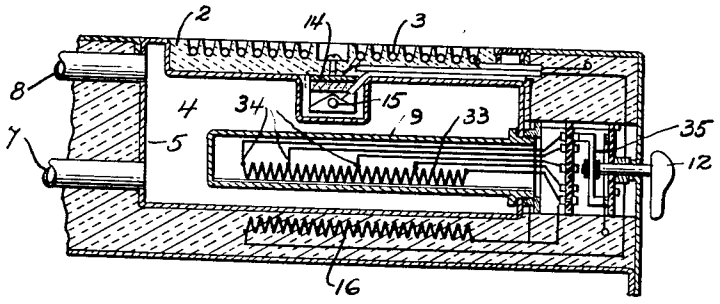


Fig. 5.

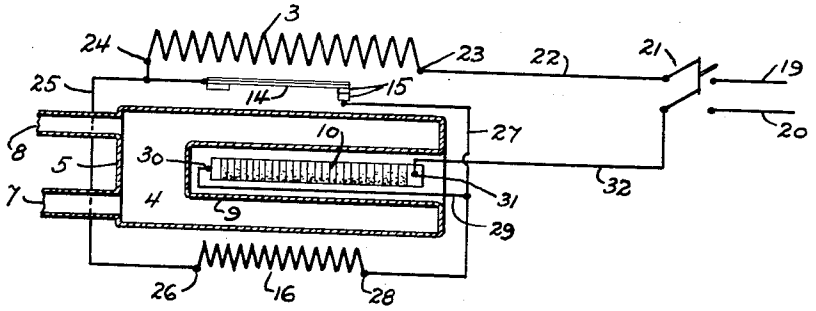
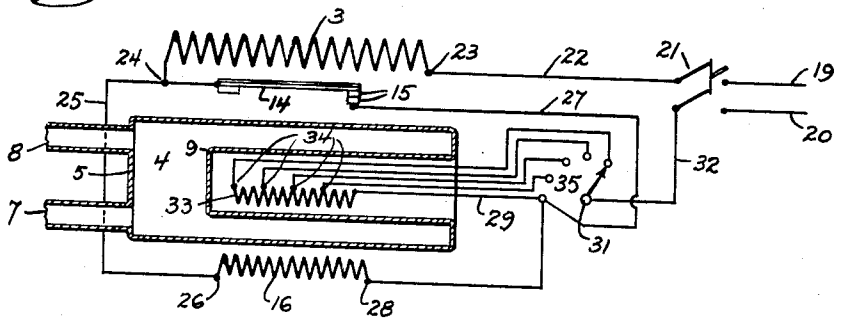


Fig. 6.



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ELECTRIC HOT WATER RANGE

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Application November 19, 1934, Serial No. 753,611
Renewed March 8, 1937

6 Claims. (Cl. 219—37)

This invention relates to electric ranges and particularly to a range in which the heat normally lost by conduction, radiation, and otherwise, is conserved and utilized for the heating of water.

The object of the present invention is generally to improve and simplify the construction and operation of electric ranges; to combine the range with a water heater in such a manner that heat, which would normally be lost by conduction, radiation, and otherwise, will be conserved and utilized for the heating of water; to provide a combination electric range and water heater in which resistance control of the heating unit becomes possible and practical and in which the heat developed at the resistance control is conducted to the water; and, further, to provide an electric heating unit carried by a refractory plate and a control therefor, whereby when the electric circuit is first closed a maximum current flow and an extra high energization will be produced and in conjunction therewith a thermostat for automatically cutting in a resistance to reduce the current flow to normal, when the refractory plate reaches normal temperature, and also including a resistance control whereby the current flow may be further reduced to maintain practically any heat or temperature desired.

The invention is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a partial perspective and partial diagrammatic view of an electric range and a hot water storage tank connected therewith.

Fig. 2 is a cross section of one of the heating elements in the electric range, said cross section showing a thermostat which cooperates with the heating element.

Fig. 3 is a vertical section taken on line III—III at right angles to Fig. 2.

Fig. 4 is a section similar to Fig. 3, showing a modified form of rheostat control.

Fig. 5 is a diagrammatic view of the form of control shown in Fig. 3.

Fig. 6 is a diagrammatic view of the form of control shown in Fig. 4.

Referring to the drawings in detail, and particularly Figs. 1, 2, 3, and 5, A indicates a suitable form of range provided with a top plate in which is mounted a pair of electric heating units B and C. These units are identical in construction and consist of a refractory plate 2 having a spiral groove, or the like, formed in the upper surface in which is placed an electric resistance heating element 3.

Enclosing all of the refractory plate except the upper surface and extending below the same to form a chamber 4 is a jacket or housing 5, which is connected with a hot water storage tank 6 through means of pipes 7 and 8 to permit circulation of water as will hereinafter be described. Extending into the housing 5 is a tube 9 and mounted therein is a carbon compression rheostat 10, which is regulated by a screw 11 and an exterior handle 12. Disposed intermediate the refractory plate 2 of the heating element and the upper portion of the housing 5 is a thermostat arm 14 which terminates in a pair of contacts 15 and disposed below the housing is a resistance element 16, which will be further described.

By referring to Fig. 5 the manner of connecting the several control and resistance elements in an electric circuit will be described. In this view 19 and 20 indicate the supply wires of the circuit and 21 a main switch whereby the circuit is opened or closed. One terminal of the switch is connected through a wire 22 with one terminal 23 of the heating element 3, while the other terminal 24 of the heating element is connected with a wire 25. This wire is, in turn, connected with the thermostat 14 and one of the contacts 15 thereof, while the opposite end of the wire 25 is connected with one terminal 26 of the resistance element 16. The other contact 15 is connected with a wire 27 and this is connected with the other terminal 28 of the resistance element 16. A wire 29 is connected at one end with a wire 27 and at the opposite end with one terminal 30 of the carbon compression rheostat 10 and the other terminal 31 of this rheostat is connected through a wire 32 with the other terminal of the main switch 21.

When the switch 21 is closed current will first flow through the wire 22, the heating element 3, the wire 24, the thermostat 14, and contacts 15, wire 27, and then through the carbon compression rheostat and back through wire 32 to complete the circuit. The circuit through the thermostat and contacts 15 permits the greatest flow of current through the element 3, and accordingly, heats it to its maximum temperature, but as the refractory plate heats up, the thermostat arm 14 also becomes heated and the contacts 15 separate; thus automatically breaking the circuit through the contacts 15. The current passing through the heating element 3 will thus flow through the wires 24 and 25 and through the resistance element 16 and then through the wire 29 and the rheostat back through wire 32 to complete the circuit. This automatic cutting in of the resistance reduces the flow of current through

the element 3 and automatically lowers the temperature in said element, thereby producing a medium heat, and if it is desired to lower the temperature still further it is accomplished by regulating the carbon compression rheostat through means of the screw 11 and handle 12 and by this adjustment or regulation it is possible to obtain practically any temperature desired in the heating element 3.

In Figs. 4 and 6 a similar arrangement is shown. The only difference being that a carbon compression rheostat has been replaced by a permanent wire resistance 33 which is tapped at different points, such as shown at 34; these points being connected with a switch 35, hence making it possible to change the total resistance of the circuit into any number of steps.

By referring to Fig. 1, it will be noted that the wires 22 and 32 have been extended so as to be connected with an auxiliary heating unit 35a disposed within or adjacent the hot water storage tank 6. Wire 22 connects with a thermostat 36. This controls the flow of current through a pair of contacts 37 and these, in turn, are connected through a wire 38 with the heating unit 35 and this, in turn, connects with a wire 32. The auxiliary heating unit 35 functions in the usual manner, and in addition thereto insures thermosiphon circulation through the heating units B and C at all times, as a section of the heating coil 35 is always connected in the main circuit through wire 40, the circuit through the remaining section being controlled by the thermostat 36. As the temperature rises above a predetermined point the thermostat breaks the circuit and when the water temperature falls below a predetermined point the thermostat again closes the circuit, but it will be understood that the unit 35 and thermostat 36 are entirely auxiliary to the units B and C, as they will under normal operating conditions supply sufficient heat to maintain the water in the storage tank at the proper temperature. The tank 6, by the way, may be built directly into the range but obviously it may be placed at a point remote from or in close proximity to the range.

The real purpose of the new appliance shown in this application is to combine in one economical unit the features of a standard domestic electric range and a domestic storage type hot water heater. At the present time the two are separate units. They are sold by different organizations and frequently installed independently, requiring separate floor space, separate connections, unnecessary legs and tops to make each an ornamental independent unit. Combining the two into one unit, for instance by placing the hot water storage tank directly in the range creates a considerable advantage. It brings about economy in construction, reduced cost of handling and installation, and a material saving in floor space.

In the attempt to secure the above economies it was discovered that it was possible to obtain other economies and to materially improve the heat regulation. When the two units are combined it is possible to use the waste heat of the range units B and C for heating water, that is, the heat which would ordinarily be lost by conduction and partial radiation and also the heat that is lost in the resistance 16 and in the rheostat control; this heat being obviously saved as the rheostat is placed directly within the water jacket and the unit 16 below the same. All heat liberated is delivered to the jacket or to the water as the housing will obviously be surrounded by insulating material.

It has also been found that it is not necessary any more to design the top units for maximum efficiency as whatever heat loss there may be will not go to waste as it will be transferred to the water where it will become useful and bring about a saving of electricity otherwise required to heat the water.

The present arrangement makes it possible to use for the heat regulation of the range a system which was not possible or advisable to use without combining the range with the hot water heater; that is, a resistance control of the heating unit. The waste heat in the regulating resistance is sent into the water and an almost ideal method of heat regulation can be obtained which is as perfect as the regulation obtained with a gas range as any degree of heat from maximum to minimum is obtainable.

Another advantage can be secured where it is desired to get extra high starting temperature, this being possible by the use of the thermostat 14. With the new combination of hot water heater and range here disclosed it is possible to place the resistance coil 16, which is cut in and out, in the water heater water circuit, thus accelerating the range unit 3 without sacrificing any of the heating surface or attaching any contacts or complicated mechanism to the unit proper. All regulating resistances or contacts may be permanently installed inside the range and the range unit 3 need consist only of a single spiral or other suitable resistance which engages the whole heating surface, thus obtaining uniform heat radiation from the whole surface at all times and at the same time permitting variation of the degree of heat produced.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a heating apparatus of the character described a plate having an electric resistance heating unit mounted therein, a housing disposed in heat conducting engagement with said plate, and serving as a water heating and circulating housing, a resistance rheostat for regulating the flow of current through the heating unit mounted within the housing and surrounded by the water in the housing, a hot water storage tank, and means for circulating water through the tank and the housing.

2. In a heating apparatus of the character described a plate having an electric resistance heating unit mounted therein, a resistance rheostat for regulating the flow of current through the heating unit, a second resistance unit and a thermostatically actuated switch for automatically connecting the second resistance in series with the resistance heating unit when said unit and the plate supporting the same reaches a predetermined temperature, a housing disposed in heat conducting engagement with the plate, and the second-named resistance and enclosing the rheostat, a hot water storage tank connected with the housing to permit circulation of water through the housing to absorb waste and conducted heat.

3. In a heating apparatus of the character described a plate having an electric resistance heating unit mounted therein, a resistance rheostat for regulating the flow of current through the heating unit, a second resistance unit and a thermostatically actuated switch for automatically connecting the second resistance in series with the resistance heating unit when said unit and

the plate supporting the same reaches a predetermined temperature, a housing disposed in heat conducting engagement with the plate and the second-named resistance and enclosing the rheostat, a hot water storage tank connected with the housing to permit circulation of water through the housing to absorb waste and conducted heat, and a thermostat actuated electric heater connected with the storage tank and operable independent of the first-named heating unit.

4. In a heating apparatus of the character described a plate having an electric resistance heating unit mounted therein, a housing disposed in heat conducting engagement with said plate and serving as a water heating and circulating housing, a resistance rheostat for regulating the flow of current through the heating unit mounted so as to give off most of its heat to the water circulating through the housing, a hot water storage tank, and means for circulating water through the tank and the housing.

5. In a heating apparatus of the character described a plate having an electric resistance heating unit mounted therein, a housing disposed in heat conducting engagement with said plate and serving as a water heating and circulating housing, a resistance rheostat for regulating the flow of current through the heating unit, a second resistance unit and thermostatically actuated switch for automatically connecting the second resistance in series with the resistance heating unit when said unit and the plate supporting the same reaches a predetermined temperature, the resistance rheostat and the second named resistance mounted so as to give off most of its heat to the water circulating through the housing, a hot water storage tank, and means for circulating water through the tank and the housing so as to store most of the waste heat of the resistance heating unit, the second named resistance and the rheostat.

6. In a heating apparatus of the character described a plate having an electric resistance heating unit mounted therein, a housing disposed in heat conducting engagement with said plate and serving as a water heating and circulating housing, a resistance rheostat for regulating the flow of current through the heating unit, a second resistance unit and thermostatically actuated switch for automatically connecting the second resistance in series with the resistance heating unit when said unit and the plate supporting the same reaches a predetermined temperature, the resistance rheostat and the second named resistance mounted so as to give off most of its heat to the water circulating through the housing, a hot water storage tank, and means for circulating water through the tank and the housing so as to store most of the waste heat of the resistance heating unit, the second named resistance and the rheostat, and a thermostat actuated electric heater connected with the storage tank and operable independent of the first named heating unit.

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