

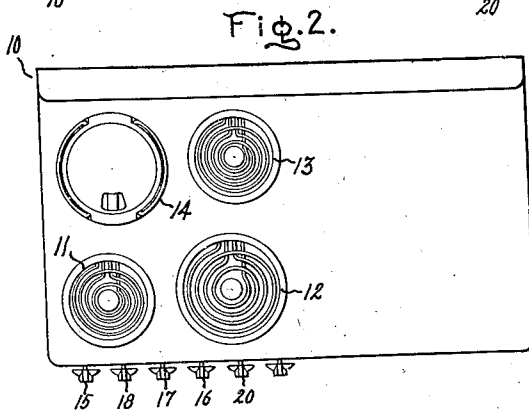
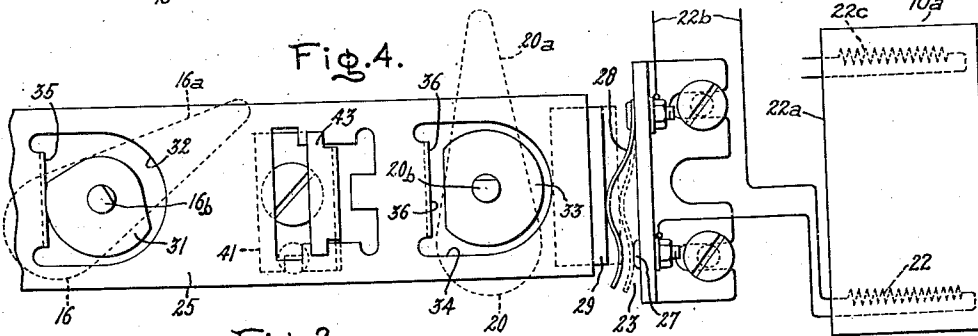
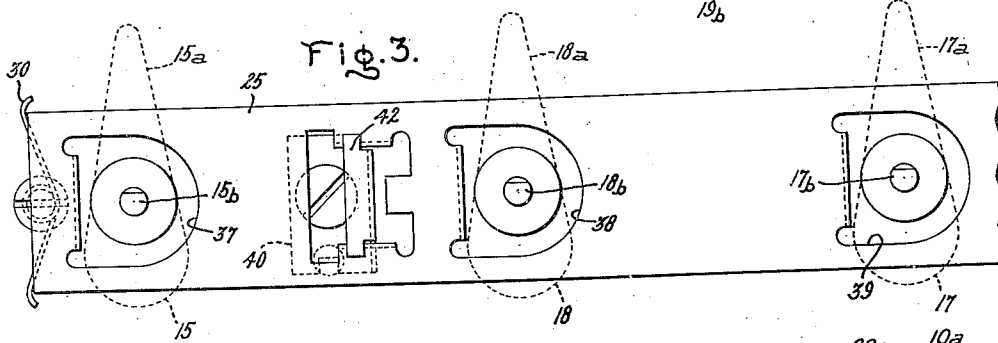
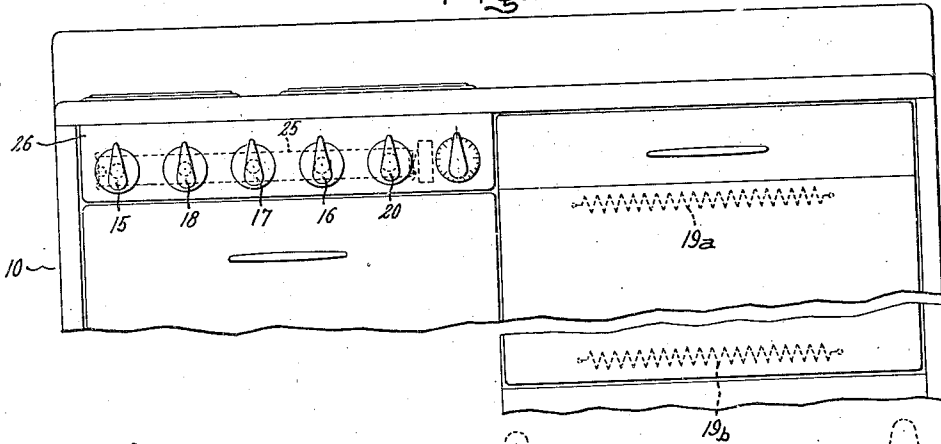
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ELECTRIC HEATING SYSTEM

2,368,488

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Fig. 1.



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ELECTRIC HEATING SYSTEM

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4 Claims. (Cl. 219-20)

This invention relates to electric heating systems, more particularly to electric heating systems for heating devices which are operated intermittently, such as electric ranges and water heaters, and it has for its object the provision of simple and reliable means whereby the operations of the range and water heater are controlled so as to limit the maximum load connected to the supply circuit.

The electric range, which I will term the "primary" load, and the water heater, which I will call the "secondary" load, each is used but a few hours daily. The range, however, must be available for use when needed and its operation must not be interrupted. The water heater on the other hand may be operated during the periods when the range is not being used and hot water heated and stored for future use.

The present day electric ranges are provided with a number of plural heat surface units, at least one of which has a quite high capacity; and also is provided with oven heating units which when energized either for baking or broiling consume a considerable amount of energy and impose a considerable load upon the supply system; moreover, the modern water heaters are provided with relatively high wattage heating units. Therefore, if the high capacity surface unit be operating at its higher heats or if the oven heating means be energized simultaneously with the water heater a relatively heavy load would be applied to the supply circuit. As is well known this is undesirable from the standpoint of good central station operation.

In order to reduce the maximum demand imposed upon the supply system, I limit the energy supplied to the water heater whenever the oven is energized, or the higher capacity surface units are operating to generate their high heats.

In carrying out my invention in one form thereof, I have provided interlocking means between the water heater switch and the oven switch and between the water heater switch and those switches which control the relatively high capacity surface units for preventing operations which will unduly load the supply system.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which Fig. 1 is a fragmentary front elevation of an electric range which is provided with the control system of this invention; Fig. 2 is a plan view of the range shown in Fig. 1, Fig. 2 being drawn to a smaller scale than Fig. 1; and Figs. 3 and 4 taken together illustrate the interlocking means between the

range switches and the water heater switch, the water heater being illustrated diagrammatically in Fig. 4, and these figures being drawn to a larger scale than Figs. 1 and 2.

Referring to the drawing, this invention has been shown in one form as applied to an electric range 10 and an electric water heater 10a. The range is provided with a plurality of surface units 11, 12 and 13, and a deep well cooker 14, the surface units 11 and 13 and the deep well cooker 14 having a relatively low capacity as compared with the surface unit 12. It will be understood that each of the heaters 11, 12, 13 and 14 will be provided with its own heating unit, which unit, as will be understood by those skilled in the art, generally comprises a pair of resistances. The heating units for the four heaters are controlled by switches 15, 16, 17 and 18, respectively, having operating knobs 15a, 16a, 17a and 18a, which drive the switch shafts 15b, 16b, 17b and 18b.

In the specific embodiment of the invention illustrated each of the units will generate five different degrees of heat. For example, the two smaller surface units 11 and 13 operate at the five heats—1250—690—310—170—75 watts; the deep well cooker 14 at the five heats—1200—400—265—100—65 watts; while the high capacity surface unit 12 operates at the five heats—2100—840—505—210—125 watts. The electric oven of the range is provided with upper and lower heating resistances 19a and 19b which are controlled by a multiple position oven switch 20 having an operating knob 20a and switch shaft 20b. The heaters 19a and 19b are controlled by the multiple position switch 20 to generate broiling and bake heats. In the specific example illustrated, the oven switch has a "preheat" position which controls the heating means to generate 4000 watts; a bake position which calls for 2800 watts; a speed broil position which calls for 4000 watts; and a broil position which calls for 2400 watts.

While any suitable switches and heating systems may be used, I prefer to use substantially the arrangements disclosed in the U. S. patent to C. P. Randolph et al., No. 2,203,236, dated June 4, 1940.

The water heater 10a which is shown diagrammatically in Fig. 4 is provided with a primary or main heating element 22 located in the lower portion of the water heater storage tank 22a. Generally this heater has a high capacity, such as 1500-3000 watts, and it is used to heat the entire contents of the tank to the desired temperature. The heating element 22 is energized

from a suitable source of electrical supply 22b and its energization is controlled by means of a switch 23. The water heater may also be provided with a secondary heating element 22c located at the top of the tank, this heater generally being controlled to be energized quickly to supply hot water in the event the hot water in the tank has been substantially depleted. This heating element also has a high capacity. This heating element 22c also may be energized from the source 22b, but in the specific example of the invention illustrated it is not controlled by the switch 23. It will be understood, however, that it may be controlled by the switch 23 so that when this switch is in its "off" position the entire heater is deenergized; on the other hand, the switch 23 may be used to control the upper heater 22c alone.

As pointed out previously, it is an object of this invention to limit the maximum load that can be imposed upon the common supply system provided for the range and water heater. In the specific example illustrated, the water heater may be connected to the supply source when the switches 15, 17 and 18 for the heaters 11, 13 and 14 are in their "off" or in any of their heat controlling positions, and also may be energized when the switch 16 for the large surface unit 12 is in the two lower heat positions, or in the "off" position, but cannot be energized if this switch is in its three higher switch positions—all assuming that the oven is deenergized completely. It is contemplated that when the oven switch 20 is moved from its "off" position to any of its heat controlling positions then the water heater will be cut off from the supply circuit.

In order to accomplish the foregoing, I mechanically interconnect the switch 16 for the high capacity surface unit 12, and the switch 20 for the oven with the water heater switch 23. I accomplish this by means of a rigid slide bar 25 which is mounted back of the range front plate 26, as shown in Fig. 1. This slide bar is arranged to control the operation of the water heater switch 23. This switch, as shown, has a fixed contact 27 with which a movable contact 28 cooperates so that when the two contacts are in engagement the heating element 22 is energized, whereas when they are open the element is deenergized. The slide bar 25 carries an insulating block 29 which is arranged to engage the switch arm 28 to close it when the slide bar is moved toward the right, as viewed in the drawing, whereas when the slide bar is moved toward the left, the switch bar 28 opens by reason of its inherent resiliency. The slide bar is biased toward the right to close the switch 23 by means of a spring 30 coacting with its left-hand end, as viewed in Figs. 1 and 3.

The switch knob 16a for the high capacity surface unit 12 operates a cam 31 mounted on the switch shaft 16b, and which is positioned within an aperture 32 provided for it in the bar 25, and the switch knob 20a of the switch 20 operates a cam 33 mounted on the switch shaft 20b, and which operates within an opening 34 provided in the bar 25. The cams are arranged to operate against the edges 35 and 36 of the two openings 32 and 34, respectively. The shape of the cam 31 is such that whenever the knob 16a is moved to its three positions corresponding to the three higher heats for the unit 12 it will hold the bar 25 toward the left against the force of the spring 30, as shown in Fig. 4, in order to keep the switch 23 in its open position,

and thereby prevent undesirable energization of the water heater. The cam 33 of the oven switch 20 is so arranged that it will hold the bar 25 toward the left to prevent energization of the water heater in any of its heat controlling positions; in other words, whenever the knob 20a is turned from its "off" position to an oven heat position, the water heater will be deenergized.

The slide bar 25 is further provided with slots 37, 38 and 39 having the same shape as the slots 32 and 34, but which perform no function in controlling the water heater. In other words, these openings are provided merely to accommodate the associated switch shafts 15b, 17b and 18b for the heaters 11, 13 and 14, respectively. However, if it be desired to further limit the connected load, these three shafts may be provided with cams suitably shaped to disconnect the water heater for the higher heat positions of the associated heaters.

The switch bar 25 may be mounted to slide in any suitable guideways or tracks, but as shown it is mounted to slide upon suitable fixed brackets 40 and 41 which have forwardly projecting retaining members 42 and 43, respectively.

As will be understood by those skilled in the art, the water heater switch 23 may control the heater 22 through a suitable relay, if it is desired to use a switch 23 of smaller capacity.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A system of control for a plurality of electrical devices constituting primary and secondary loads, said primary load having a plurality of separate multiple heat heating means of different capacity, and said secondary load having a heating element, said system comprising separate multiple position switches for controlling said separate primary load heating means respectively to generate different degrees of heat in each, a switch for controlling said heating element of said secondary load, and interlocking means between said multiple position switches and said secondary load switch constructed and arranged so that the latter switch is operated to energize said secondary load heating element when all of said multiple position switches are in their "off" positions, and is operated to deenergize said secondary load heating element when any one of the multiple position switches of the higher capacity heating means is in any one of its positions which cause its associated heating means to generate its higher degree of heat, and further is reoperated to reenergize said secondary load heating element when said one switch is operated to cause its said associated heating means to generate its lower degrees of heat.

2. A system of control for an electric range and an electric water heater, said range having at least two multiple heat heating means, one of which consumes a relatively great amount of energy in all of its heat conditions, and the other of which consumes a relatively great amount of energy in certain ones only of its higher heat conditions, separate multiple position switches controlling said heating means respectively, each when operated from its "off" position controlling

its heating means to generate a degree of heat depending upon the position of the switch, said water heater having a heating element and a switch for controlling said heating element, an interlocking means between said switches so that when said one heating means is energized by the movement of its switch from its "off" position to any of its heat generating positions, said water heater switch is operated to deenergize said water heater, and when said other switch is moved from its "off" position to any of its positions for causing the associated heating means to generate said higher heat conditions, said water heater switch is likewise operated to deenergize the water heater, but when said other switch is moved to positions corresponding to the lower heat conditions of its associated heating means, said water heater switch is closed to energize said water heater heating element, all providing said switch for said one heating element is in its "off" position.

3. A system of control for an electric range and an electric water heater, said range having a multiple heat surface unit, and an oven provided with relatively high heat capacity heating means therein, and said water heater having heating means, said system comprising a multiple position switch for controlling said surface unit to generate different degrees of heat by the movement of said switch from its "off" position to its different heat "on" controlling positions, a switch controlling said oven heating means operating to energize said heating means when operated from its "off" position to heat "on" positions, a switch for controlling said water heater heating means so that when it is moved from its "off" to an "on" position it energizes said heating means, and interlocking means between said switches constructed and arranged so that when said surface unit switch is in certain of its positions for effecting the higher degrees of heat in said surface unit said water heater switch is

opened, and when it is in its lower heat positions said water heater switch is closed, all provided said oven switch is in its "off" position, and further so that whenever said oven switch is operated from its "off" position to its heat "on" positions said water heater switch is opened.

4. A system of control for an electric range and an electric water heater, said range having a multiple heat surface unit, and an oven provided with relatively high heat capacity heating means therein, and said water heater having heating means, said system comprising a multiple position switch for controlling said surface unit to generate different degrees of heat by the movement of said switch from its "off" position to its different heat "on" controlling positions, a switch controlling said oven heating means operating to energize said heating means when operated from its "off" to heat "on" positions, a switch for controlling said water heater heating means so that when it is moved from its "off" to an "on" position it energizes said heating means, a slide bar for operating said water heating switch operable when moved in one direction to close said switch and when moved in the other direction to open said switch, means biasing said bar in said one direction, and cam means operated by said surface unit and oven switches controlling the motion of said bar so that whenever said oven switch is moved from its "off" position said bar is moved against the pressure of said spring to open said water heater switch, and when said oven switch is in its "off" position and said surface unit switch is in any of its positions corresponding to the lower degree of heat said spring forces said bar to close said water heater switch, but when said multiple position surface unit switch is in its positions for effecting the higher degrees of heat in said surface unit, said bar is moved against the force of said spring to open said water heater switch.

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