

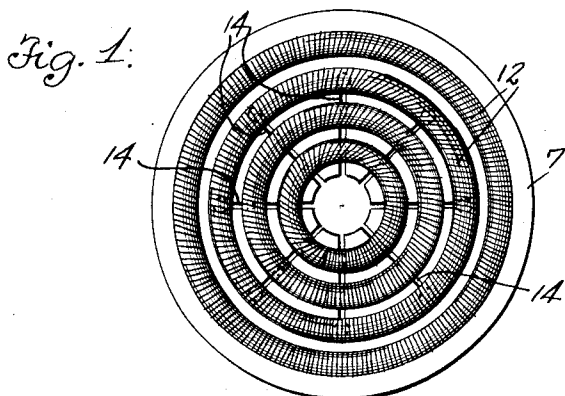
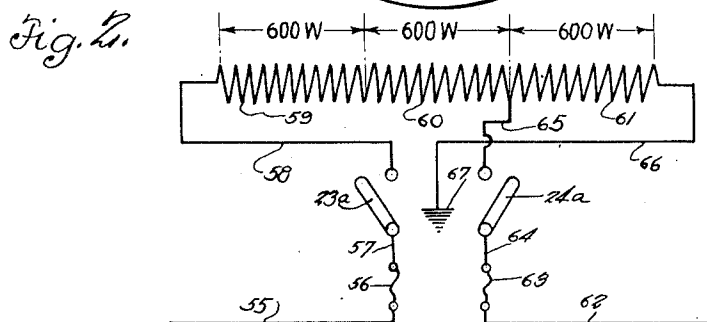
Dec. 22, 1936.

C. L. GOUGHNOUR

2,065,451

ELECTRIC HEATING CIRCUIT CONTROL

Original Filed Feb. 3, 1930



Charles L. Goughmour. ^{Inventor}

By

Raymond Lowry
Attorney.

UNITED STATES PATENT OFFICE

2,065,451

ELECTRIC HEATING CIRCUIT CONTROL

Charles L. Goughnour, York, Pa.

Original application February 3, 1930, Serial No. 425,658. Divided and this application August 16, 1933, Serial No. 685,469

4 Claims. (Cl. 219—20)

This invention relates to certain new and useful improvements in electric heating circuit control, and is a division of application filed by Charles L. Goughnour on February 3, 1930, for electric heating elements for steam cookers, Serial No. 425,658 (Patent No. 1,931,190).

The primary object of this invention is to provide an electric heating circuit control comprising a resistance heater element for cookers or other devices wherein more than two different temperatures may be attained from the resistance heater element, a plurality of control switches for the resistance being provided whereby different degrees of heat are obtained.

With the above and other objects in view that will become apparent as the nature of the invention is better understood, the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawing and claimed.

In the drawing:

Figure 1 is a top plan view of an insulation block or disc annularly grooved for the support of resistance coils; and

Figure 2 is a diagrammatic view of one wiring arrangement embodying a three wire circuit for producing pre-heat in the ratio of one, three and nine.

The heating element disclosed herein is especially designed for use in connection with steam cookers or the like, although the same may be employed for other purposes and as shown in Figure 1, the porcelain disk 7 is provided with a series of concentric annular grooves in which a resistance element 12 is seated, the porcelain disk 7 being radially slotted as at 14 to provide for expansion and contraction during operation.

The electric heating circuit control illustrated in Figure 2 is of the three-wire type—two feed lines, with the third line forming a common return; the two feed lines being indicated at 55 and 62, with the return line—shown as grounded—being indicated at 66; the two feed lines are each assumed to be of the 220 volt value. The resistance element is indicated at 60, in the form of a continuous resistance coil, one end of which is connected with feed line 55, by lead 58, single-throw switch 23a, and lead 57, the latter carrying the fuse 56; the opposite end of the resistance coil 60 is connected to the ground 67—the return—by lead 66.

For illustrating the conditions, the coil 60 is indicated as of a type which would set up the conditions of three 600-watt sections, the sections being of equal value in this respect. Actu-

ally, the coil utilizes but a single tap—indicated by lead 65—with this tap arranged at the return end of the coil, and spaced from said end a distance such that if the tap be rendered active, the section of the coil between it and the return end will provide a 600-watt section characteristic. Lead 65 is connected to line 62 by single-throw switch 24a and lead 64, the latter carrying fuse 69. With the coil presenting the equivalent of a three-section unit, it can be understood that with the section supplied by line 62 as of 600-watt character, the portion of the coil between the feed end and this tap, will present a 1200 watt characteristic, or two 600-watt section equivalent, the latter being indicated for convenience of explanation.

Obviously, if switch 24a be closed and switch 23a left open, the circuit would be complete between line 62 and ground 67. If the status of the switches is reversed—switch 23a closed and switch 24a closed—the circuit would be complete between line 55 and ground 67.

In practice, the supply of current is by transformer secondary, with the coil of the latter tapped by the return 66 at the center point of the coil; this is the usual 110 and 220 volt system in general use, due to the fact that the potential between lines 55 and 62 is 220 volts, but the return location on the transformer coil places a potential of 110 volts between either line—55 or 62—and the return, as of 110 volts. When, therefore, one of the switches is open and the other closed, the voltage through coil 60 is at 110 volts, since the circuit potential is then between one of the lines and the return line. If, however, both switches 23a and 24a are closed, this condition is present between both feed lines and the return, with the result that the voltage of the system is then the equivalent of a 220 volt potential between the lines.

Hence, when switch 24a is closed, and the feed is from line 62, the section 61 of the resistance coil is made active, to produce the characteristic of a 600-watt condition. If, instead, switch 23a is closed, both sections 59 and 61 are added to the intermediate section specifically indicated at 60, and since the three are in series, the characteristics of a 200-watt condition. However, when both switches are closed, these two watt conditions are not only present, but, in addition, the potential characteristics change, since the potential between lines 55 and 62 is added, through the fact that sections 59 and 60 are operating on the basis of 220 volts; since these two sections are in series, the voltage is doubled with respect

to the 600 watt condition, thus totaling 1200 watts as the added increment, the three watt conditions referred to totaling 1800 watts, as the value when both switches are closed.

5 From this it can be seen that the three stages possible would be those of 200 watts, 600 watts, or 1800 watts, depending upon the manipulation of the two single-throw switches 23a and 24a. These stages thus have the characteristic of 1, 3 and 9, and these represent the heat value relationships that are possible with the system as indicated in Fig. 2. Obviously, the 600-watt reference is illustrative only, being used for the purpose of presenting the characteristics of a controlled system operating under the conditions indicated.

As will be seen from the above, the diagram discloses a heating unit capable of providing variable heat values at will by the use of a resistance coil unit of single-length characteristic, circuit connections therein which include two single-throw switches in addition to the usual line control switches and which single-throw switches provide the control of the heat value of the coil. In action, the single-throw switches are operative to render predetermined portions of the coil active at will by the switch manipulation, the connections being so arranged that they cause the coil length of one active portion of the complete length to be double or multiple of that of the length of another portion, the switches permitting individual or collective activity of the portions dependent upon individual or collective closing of the switches, and, by such manipulation to provide a heat value within a range of heat values having three definite heat values differing one from the other in a definite progression, Fig. 2 indicating a progression of 1, 3 and 9.

From the above detailed description of the invention, it is believed that the operations of the several wiring arrangements will be at once apparent and while there are herein shown and described the preferred embodiments of the invention it is nevertheless to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

What I claim as new is:

1. In an electric heating system for providing variable heat values at will, and wherein the circuit is operatively connected with a two-wire system having a common return, a resistance unit of single length characteristic, circuit connections

therefor including two single throw switches additional to the usual line control switches and operative in the control of the circuit by individual or collective manipulation, said unit having one end in permanent connection with the common return wire of the system, with the other end of the unit and an intermediate point in the unit controllably connected to the respective wires of the two-wire portion of the system, with the switches operative respectively in the control of the latter connections, whereby the switches may be manipulated individually or collectively to permit utilization of the potential relation between a wire and such return with respect to either wire or the utilization of these collectively with the added potential of the potential relationship between the two wires to provide heat values in the ratio of 1, 3 and 9 by switch manipulation.

2. In an electric heating circuit for providing variable heat values at will, and wherein the circuit supply is of the two-wire feed and common return type, a resistance unit of single length characteristic, said unit being divided into a pair of divisions of unequal resistance value, one end of the unit being in permanent connection with the common return of the system, the other end of the unit and the division point being controllably connected with the two feed lines of the system and with the connections individual to the lines and each individually controllable by a single throw switch individual to and operative in such connection, whereby three definite individual heat values may be established at will.

3. A circuit as in claim 2 characterized in that the resistance unit is of uniform resistance value throughout its length with the division point located to present one of the divisions as double the length of the other and with the division of smaller length located in the end zone of the unit having the permanent connection with the return, whereby heat values having the ratio of 1, 3 and 9 may be established by manipulation of the single-throw control switches.

4. In an electric heater, an electric circuit with a resistance element in the circuit including a lead-in wire connected with one end of the resistance element, a second lead-in wire connected with the resistance element intermediate its ends, a neutral wire forming a common return for the lead-in wires connected to the other end of the resistance element, and a single-throw switch in each lead-in wire.

CHARLES L. GOUGHNOUR.