

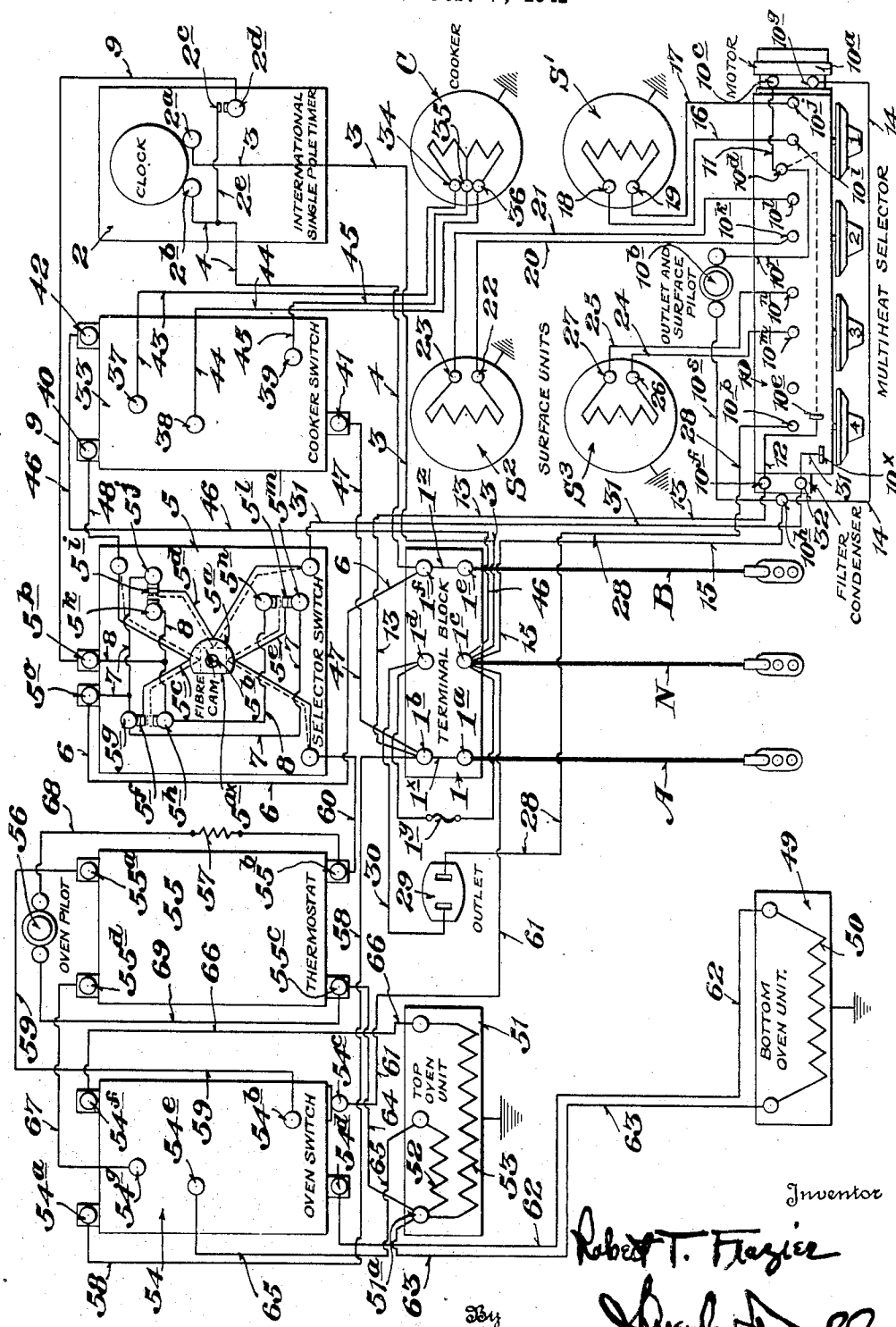
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ELECTRIC RANGE CIRCUIT

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ELECTRIC RANGE CIRCUIT

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2 Claims. (Cl. 219—20)

This invention is a novel improvement in electric range circuits particularly adapted for use in electric stoves or ranges for domestic use or the like; and one object thereof is to provide an electric range having a plurality of surface heating units connected in circuit with a multi-heat selector connected across the power input leads, said selector having pairs of outlet terminals controlled by individual manually adjustable means for regulating the percentage of on-and-off time at each of said pairs of outlet terminals, whereby any desired degree of heat within the limits of the capacity of the circuit from "off" to "high" can be imparted to the individual surface heating units, by merely adjusting said manual means, the use of the multi-selector being a big improvement over the usual electric range circuit in which the heating units are controlled merely by manual switches adapted to be adjusted to give only three or four different degrees of heat.

A further object of the invention is to provide a range circuit of the above type having a convenience outlet connected across one pair of outlet terminals of the multi-heat selector, whereby varying degrees of heat within the limits of the capacity of the circuit from "off" to "high" can be imparted to the convenience outlet in the same manner as above stated with respect to the surface heating units.

A further object of the invention is to provide a clock-actuated timer adapted to close and open the multi-heat selector circuit of the above described type at predetermined times, together with switch means for manually connecting and disconnecting said timer from said selector circuit, whereby when the electric timer is connected in the selector circuit any of the surface heating units, or the convenience outlet, whose selector dials are in "on" position, will have their individual circuits opened and closed at predetermined times by said timer.

A further object of the invention is to provide an electric range circuit including an electric deep-well cooker connected across the power input leads, and an electric oven provided with the customary manual switch connected across said lead, and a plurality of surface heating units connected across the leads, said circuit also including a three-pole double-throw switch having the set of poles at one side thereof connected to one power input lead, and said circuit also including a single pole timer, with the set of poles of the switch at the other side thereof connected through the timer to the same power input lead, the movable contacts of the switch being respectively connected in the circuits of the cooker, oven and surface units, together with means for simultaneously engaging all of the movable contacts with the first set of switch poles so that each of the oven, cooker and surface heat-

ing unit circuits can be simultaneously and individually manually controlled, together with means for selectively engaging the movable switch contacts with their related poles of the second set of the switch while retaining the other movable contacts engaged with the first set of poles, whereby the cooker, oven, or surface units can be individually automatically controlled by the timer without affecting the manual operation of the other circuits of the range.

A further object of the invention is to provide the electric range circuit set forth in the preceding paragraph, with a multi-heat selector connected across the power input leads with one lead of the selector connected to its related movable contact of the double-throw switch, said multi-heat selector having pairs of outlet terminals to which the surface heating units are respectively connected, and having manually operable dials for varying within the capacity of the circuit the amperage across said pairs of outlet terminals.

A still further object is to provide the circuit as set forth in the preceding paragraph, in which a convenience outlet is connected across one pair of the outlet terminals of the multi-heat selector.

I will explain the invention with reference to the accompanying drawing which illustrates one practical embodiment thereof to enable others familiar with the art to adopt and use the same; and will summarize in the claims the essential features of the invention, and novel combinations of parts, for which protection is desired.

The drawing illustrates, conventionally, an electric range circuit according to my invention.

As conventionally shown in the drawing, my circuit includes a terminal block 1 which serves as a junction for the various individual circuits, said block having a pair of hot terminals 1a, 1b, bridged by a jumper 1x; also a pair of neutral terminals 1c, 1d, bridged by a fuse 1y (of about 15 ampere rating), and a second pair of hot terminals 1e, 1f, bridged by a jumper 1z. Terminals 1a, 1c and 1e of said block are respectively connected to the leads A, N and B respectively of a 240 volt three-wire power line, the lead N being the neutral wire.

A timer switch 2 of conventional electric single-pole clock-driven type has one terminal 2a of the clock motor directly connected by wire 3 to neutral terminal 1c of block 1, the other clock motor terminal 2b being directly connected by wire 4 to hot terminal 1f of block 1. Said timer switch 2 has a movable contact 2c connected by wire 2e to wire 4, said contact being normally spaced from a fixed contact 2d adapted to be opened and closed at predetermined times by the action of the clock mechanism in the usual manner.

A selector switch 5 of conventional three-pole double-throw type is provided in the circuit, same being actuated by a disk cam 5a of non-conducting material mounted on a shaft 5b and rotated by a conventional dial (not shown) into one of four different positions respectively denoted "manual," "cooker," "surface units and outlet" and "oven." Cam 5a has a flat side 5ax, as shown, and three leaf springs 5c, 5d, 5e ride the periphery of cam 5a, said springs each being V-shaped with one end anchored on the switch and their apexes respectively contacting said cam at points disposed approximately 90° apart around the periphery thereof, leaving one arc of about 180° clear. The dotted positions of the springs in the drawing indicate their respective positions when contacting the flat side 5ax of the cam, while the full-line positions of the springs indicate their positions when contacting the rounded periphery of cam 5a.

The free end of spring 5c carries a movable contact 5f between spaced fixed contacts 5g, 5h; similarly spring 5d carries a movable contact 5i between fixed contacts 5j, 5k; and similarly spring 5e carries a movable contact 5l between fixed contacts 5m, 5n. In the position of cam 5a shown in the drawing the switch dial is in so-called "manual" position and each of the springs 5c, 5d, 5e is contacting the rounded periphery of the cam 5a thus closing the pairs of switch contacts 5f, 5g; 5i, 5j; and 5l, 5m. However, as cam 5a is rotated in a clockwise direction through successive 90° turns, the flat portion 5ax of the cam will come opposite the apexes of springs 5c, 5d and 5e successively and their related movable contacts will be shifted towards the shaft 5b to engage their related inner fixed contacts 5h, 5k and 5n successively to close their related circuits, two of the three springs in any of the four positions of cam 5a, except that shown in the drawing, riding the rounded periphery of the cam, so that only one of the movable contacts 5f, 5i or 5l can in any position of the cam other than that shown in the drawing contact its related fixed contact 5h, 5k or 5n. Therefore, when cam 5a is rotated in a clockwise direction 90° from the position shown in the drawing, the pairs of contacts 5f, 5h and 5i, 5j and 5l, 5m will be closed. Further rotation of the cam 90° will close the pairs of contacts 5f, 5g and 5i, 5k and 5l, 5m. Still further rotation of cam 5a through 90° will close the pairs of contacts 5f, 5g and 5i, 5j and 5l, 5m. The next rotation of cam 5a through 90° will restore the cam and springs to the positions shown in full lines in the drawing.

Terminal 5o of selector switch 5 is connected by wire 6 to hot terminal 1f of block 1; and each of the fixed contacts 5g, 5j and 5m are connected by wire 7 to contact 5o. Terminal 5p of selector switch 5 is connected by wire 8 to each of the fixed contacts 5h, 5k and 5n; and a wire 9 connects terminal 5p to fixed contact 2d of timer 2, whereby when timer contacts 2c, 2d are closed the terminal 5p will be connected through wires 9, 2e and 4 directly to the same hot terminal 1f of block 1 to which wire 6 is connected.

A multi-heat selector 10 is provided in the circuit, the same being preferably of the type shown and described in U. S. Letters Patent No. 2,194,586 dated March 26, 1940, issued to Tuttle & Kift, Inc., and therefore needs no particular description herein. The selector 10 has a 110 volt synchronous motor 10a driving an internal shaft on which four cams are disposed, each cam actuating a pair of contacts which allow the 240 volt

current to flow from the selector 10 to the individual surface units and convenience outlet. Each pair of contacts is made variable by adjusting individual dials to various positions which in reality vary the clearance between the contacts, thus varying the amount of times the current flows from a constant flow at "high" position to an intermittent flow lasting but a few seconds on the "lowest" position. Motor 10a runs only when any one or more dials of the selector are turned "on."

Motor 10a has one terminal 10c connected by wire 11 to a post 10d which is connected internally of the selector 10 to a post 10e, then connected by wire 12 to post 10f on the selector, which post is connected by wire 13 to hot terminal 1b of block 1. Terminal 10g of motor 10a is connected by wire 14 to contact 10h and then by wire 15 to neutral terminal 1c of block 1. A wire 10r connects one terminal of pilot 10b with post 10d on the selector which post is connected as above described to hot terminal 1b of block 1; and the other terminal of pilot 10b is connected by wire 10s to post 10h which latter is connected to neutral post 1c of block 1. Thus pilot light 10b for the convenience outlet 29 and the surface units S', S2 and S3 operates on the same circuit as the motor 10a thus glowing when any said unit is "on."

The multi-heat selector 10 has one pair of outlet terminals 10i, 10j, connected by wires 16 and 17 respectively to the terminals 18, 19, of one surface heating unit S', whereby the current to the heating unit can be varied by rotation of the dial #1 of selector 10; also a second set of terminals 10k and 10l similarly connected by conductors 20 and 21 to the terminals 22 and 23 of the second surface heating unit S2 for variably controlling the current to said coil by adjusting the dial #2 of selector 10; also a third set of outlet terminals 10m, 10n connected by conductors 24, 25 respectively to the terminals 26 and 27 of a third surface heating unit S3, whereby a variable amount of current can be passed through the heating unit by adjusting the dial #3 of selector 10.

The selector 10 is also provided with a contact 10p connected by wire 28 to one terminal of a convenience outlet 29, the other terminal thereof being connected by a wire 30 to the terminal 1d of block 1, said terminal being connected through fuse 1y to the other neutral terminal 1c of block 1 and from thence by wire 15 to the post 10h of the selector 10. The dial #4 of selector 10 is thus connected internally to vary the amperage of the 120 volt current passing to convenience outlet 29.

To illustrate an example of a circuit through the multi-heat selector 10; if it is desired to turn the surface heating unit S3 on "high," dial #3 of the selector is turned into "high" position thereby immediately actuating motor 10a and causing pilot 10b to glow. The 240 volt current from outlet terminals 10m and 10n on the multi-heat selector 10 will energize the heating element of unit S3 through conductors 24 and 25, since the pairs of outlet contacts on the multi-heat selector 10 for the three surface heater units S', S2, S3, and for the convenience outlet 29 obtain their 240 volt current on one side from post 10p through wires 12 and 13 leading directly to one hot terminal 1b of block 1; and on the other side from post 10r on selector 10 through wire 31 leading to the spring 5d of selector switch 5 and from thence to the movable

contact 5i on spring 5d, which contact 5i when engaging fixed contact 5j of switch 5 is connected directly to terminal 5o of said switch and from thence by wire 6 directly to the other hot terminal 1f of block 1. However, if movable contact 5i of switch 5 should be contacting the fixed contact 5k (instead of contact 5j) the wire 3i would be connected through wires 8, 9, through closed contacts 2c, 2d of timer 2, and through wires 2e and 4 directly to the same hot terminal 1f of block 1. Preferably a filter condenser 32 is connected across the power input leads 12 and 31 of the multi-heat selector 10 to prevent radio interference which might be caused by arcing at the selector contacts.

The deep well cooker C is operated by a conventional six-pole switch 33 in order to impart thereto five different degrees of heat. Cooker C has three terminals 34, 35 and 36 connected to the ends and middle respectively of its heating element; and cooker switch 33 has three contacts 37, 38 and 39 respectively which are energized through various contact positions in the switch from the switch terminals 40, 41 and 42. Switch contact 37 is connected to one end terminal 34 of the cooker by wire 43; switch contact 38 is connected to the opposite end terminal 36 of the cooker by wire 44; and switch contact 39 is connected to the intermediate cooker terminal 35 by wire 45. Switch terminal 42 is connected by wire 46 directly to neutral terminal 1b of block 1; switch terminal 41 is connected directly by wire 47 to one hot terminal 1b of block 1; and switch terminal 40 is connected by wire 48 to spring 5c of switch 5, and hence to movable contact 5f thereof which when contacting fixed contact 5g of switch 5 is connected through wires 7 and 6 directly to the other hot terminal 1f of block 1. However, in event movable contact 5f of switch 5 should be engaging fixed contact 5h (instead of 5g) of switch 5, then wire 48 would be connected through contact 5f, and through wires 8 and 9, through closed contacts 2c, 2d, of timer 2, and through wires 2e and 4 directly to the same hot terminal 1f of block 1.

The oven utilizes a conventional hook up for a two-unit five-heat thermostatically controlled circuit. The bottom oven unit 49 has one heating element 50, and the top oven unit 51 has two separate heating elements 52 and 53. The oven circuit includes a switch 54 having six poles adapted to give five different degrees of heat, also a thermostat 55 of the two-pole single throw hydraulically operated type. A neon pilot lamp 56 is connected in the thermostat circuit and is energized when the thermostat contacts are closed, a pilot circuit having a resistor 57 connected in series with the filament of the neon bulb 56 to lower the voltage across said pilot bulb.

The oven circuit receives current through wire 58 leading to oven switch terminal 54a directly from hot terminal 1b of block 1; also through wire 59 leading from contact 54b of switch 54 to terminal 55a of thermostat 55 and through the internal wiring of said thermostat to terminal 55b thereof, which terminal 55b is connected by wire 60 to the movable contact 5l of spring 5e of selector switch 5, from contact 5l to fixed contact 5m, so that when spring 5e is in the position shown in full lines in the drawing the circuit will be completed, and from thence through wires 7 and 6 directly to the other hot terminal 1f of

block 1. However, if movable contact 5l is in contact with the other fixed contact 5n of switch 5, then the circuit from contact 5l is completed to the same hot terminal 1f of block 1 through wires 8, 9, through closed contact 2c, 2d of timer 2, and through wires 2e and 4 to block terminal 1f. A wire 61 connects the neutral terminal 54c of oven switch 54 directly to the neutral terminal 1c of block 1. The heating element 50 of the bottom oven unit 49 is connected by wire 62 to the terminal 54d of oven switch 54, and is also connected by wire 63 to the common terminal 51a of the top oven unit 51, which common terminal is connected by wire 64 to the terminal 55c of the thermostat. The heating element 52 in the top oven unit 51 has one end connected to the common terminal 51a and its other end connected by wire 65 to pole 54e of oven switch 54. The other heating element 53 of the top oven unit 51 has one end connected to the common terminal 51a and its other end connected by wire 66 to the terminal 54f of oven switch 54. Pole 54g of oven switch 54 is connected by wire 67 to the terminal 55d of thermostat 55. The pilot 56 is connected by wire 68 through resistor 57 to the hot thermostat terminal 55b and also connected by wire 69 to the terminal 55c of said thermostat.

The use of selector switch 5 permits the operator of the range to connect any one of separate circuits of the cooker C, of the surface heating units S', S2, S3 and convenience outlet 29, and of the oven 49—51 into the circuit of automatic timer 2, any one of which said circuits can be set to be closed at any predetermined time, not to exceed twelve hours from the time the timer 2 is actually set, and to thereafter permit said desired circuit to operate for a period not to exceed twelve hours, and then to be automatically turned off. During this time any of the other remaining circuits may be used in the normal manner without in any way effecting the circuit which is automatically time controlled by timer 2.

Operation

In the position of the springs 5c, 5d, 5e of selector switch 5 shown in full lines in the drawing, the movable contacts 5f, 5i, and 5l are each held in contact with the fixed contacts 5g, 5j and 5m respectively, and the timer 2 is therefore disconnected from the circuits of cooker C, of surface units S', S2, S3 and of convenience outlet 29, and of oven 49, 51, and thus cooker C can be manually controlled by actuating the dial of cooker switch 33 to provide any of the five different stages or degrees of heat while switch 33 is turned "on." Also the surface heating units S', S2 and S3 and the convenience outlet 29 can be manually controlled by adjusting their respective dials #1, #2, #3 and #4 of multi-heat selector 10 to send any desired amperage through their respective circuits when any of the said dials are "on." Also the oven 49, 51 can be controlled manually by switch 54 and thermostat 55 to give any of the desired different stages or degrees of heat while the switch 54 is in any of the "on" positions.

If the fibre cam 5a is turned by the selector switch dial in a clockwise direction through an arc of 90°, the flat portion 5ax of cam 5a will be engaged by spring 5c which will then be shifted into the position shown in dotted lines in the drawing, thereby closing contacts 5f, 5h, and the circuit of cooker C from hot contact 1f of block

1 will be completed through wires 4, 2d, through closed contacts 2c, 2d of timer 2, and through wires 9 and 8 to the cooker switch 33, and through wire 47 to the other hot terminal 1b of block 1, so that the timer 2 may be set to close, maintain and open the circuit of cooker C at predetermined times irrespective of the setting of the dial of cooker switch 33 into any "on" position. The pairs of selector switch contacts 5i, 5j and 5l, 5m however are maintained by the rounded periphery of cam 5a in their respective "manual" positions, and therefore the timer circuit will not affect the surface heating units S', S2 and S3 and convenience outlet 29, or of the oven 49-51, which continue to be subject to manual control the same as when the cam 5a is in the position shown in full lines in the drawing.

A further rotation of fibre cam 5a in a clockwise direction through an arc of 90° will bring the flat side 5ax thereof into contact with the spring 5d, thereby engaging movable contact 5i with fixed contact 5k, as shown in dotted lines in the drawing, said contact 5k being connected by wires 8 and 9, through closed timer contacts 2c, 2d, and through wires 2e and 4 to hot contact 1f of block 1. Then if the operator wishes to heat an electric percolator using the convenience outlet 29, and assuming it is nine o'clock in the evening and he wishes hot coffee to be prepared by seven o'clock the following morning, he knowing that it requires about fifteen minutes total time to percolate the coffee, the operator will in such position of the cam 5a of switch 5 set the timer 2 to close the contacts 2c, 2d at 6:45 a. m. and to open said contacts at 7 a. m. Dial #4 of multi-heat selector 10 which controls the amperage of outlet 29 is then turned to "high" and the percolator plugged into outlet 29. The following steps then take place in completing the automatic set up: The timer clock operating constantly will close timer contacts 2c, 2d at 6:45 a. m. to complete the circuit from outlet 29 on one side through wire 30 to neutral terminal 1d of block 1, and on the other side through wire 28 to contact 10p of selector 10, then internally through the selector 10 to contact 10x of selector 10 and from thence through wire 31 to movable contact 5i of selector switch 5, to fixed contact 5k, through wire 8 to switch contact 5p, and through wire 9 and through closed contacts 2c, 2d, through wires 2e and 4 to hot terminal 1f of block 1. After the elapse of fifteen minutes the clock motor of timer 2 will cause the contacts 2c, 2d to open, thereby opening the circuit and stopping the current flow to outlet 29 and to the percolator. During the time the selector switch and timer are set to operate, the remaining surface heating units of the range S', S2, S3 can be operated manually in the normal manner without interference, but will be also subject to the action of timer 2. In such position of cam 5a however the pairs of switch contacts 5f, 5g, and 5l, 5m remain closed as shown in full lines in the drawing, and therefore the cooker C, and oven 49, 51 can be operated manually as above described, independently of the timer 2.

If the fibre cam 5a is rotated in a clockwise direction through another arc of 90° the flat side 5ax thereof will engage spring 5e of switch 5 thereby closing contacts 5l, 5n, as shown in dotted lines in the drawing, thus bringing the timer 2 into circuit with the oven 49, 51 through wires 8 and 9, closed contacts 2c, 2d, and wires 2e and 4. Thus in a similar manner the oven

circuit can be controlled by the automatic timer 2 to close and open at predetermined times, when oven switch 54 is turned into any of the "on" positions. However, since the pairs of switch contacts 5f, 5g and 5l, 5m remain closed as shown in full lines in the drawing, the cooker circuit, and the circuit for the surface units and convenience outlet will remain manually controllable as above explained while the oven circuit is automatically controlled by timer 2.

I do not limit my invention to the exact circuit shown in the drawing, for obviously changes may be made therein within the scope of the claims.

I claim:

1. In an electric range circuit; power input leads including a neutral wire and two hot wires; a plurality of separate heating unit circuits including manual switches connected across said leads; a multi-pole double-throw switch having one set of fixed poles connected to one hot wire; a single pole timer; the other fixed poles of the switch being connected through the timer to the same hot wire; the movable poles of the switch being respectively connected in the separate heating unit circuits; means for selectively engaging any one of the movable poles of the switch with its related fixed pole of the second set while retaining the other movable poles of the switch engaged with their related fixed poles of the first set; a motor; one of said separate circuits including a plurality of multi-heat selectors operated by said motor and connected across said hot wires through the related movable switch pole, each selector having a pair of outlet terminals; manually controlled means in said selectors for varying the average thermal output over a period of time across each of said pairs of outlet terminals; range heating units connected respectively across certain of said pairs of outlet terminals; and a convenience outlet having one lead connected to one terminal of a pair of outlet terminals and having the other lead connected to said neutral wire.

2. In an electric range circuit; power input leads including a neutral wire and two hot wires; a plurality of separate heating unit circuits including manual switches connected across said leads; a multi-pole double-throw switch having one set of fixed poles connected to one hot wire; a single pole timer; the other fixed poles of the switch being connected through the timer to the same hot wire; the movable poles of the switch being respectively connected in the separate heating unit circuits; means for selectively engaging any one of the movable poles of the switch with its related fixed pole of the second set while retaining the other movable poles of the switch engaged with their related fixed poles of the first set; a motor; one of said separate circuits including a plurality of multi-heat selectors operated by said motor and connected across said hot wires through the related movable switch pole, each selector having a pair of outlet terminals; manually controlled means in said selectors for varying the average thermal output over a period of time across each of said pairs of outlet terminals; surface heating units connected respectively across certain of said pairs of outlet terminals, and a convenience outlet having one lead connected to one terminal of a pair of outlet terminals and having the other lead connected to said neutral wire.

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