April 15, 1947. J. W. MYERS 2,419,083

ELECTRICAL COOKING APPARATUS

Filed Jan. 12, 1943 2 Sheets-Sheet 1

Fig. 1.

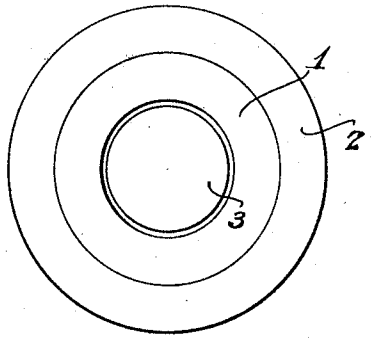
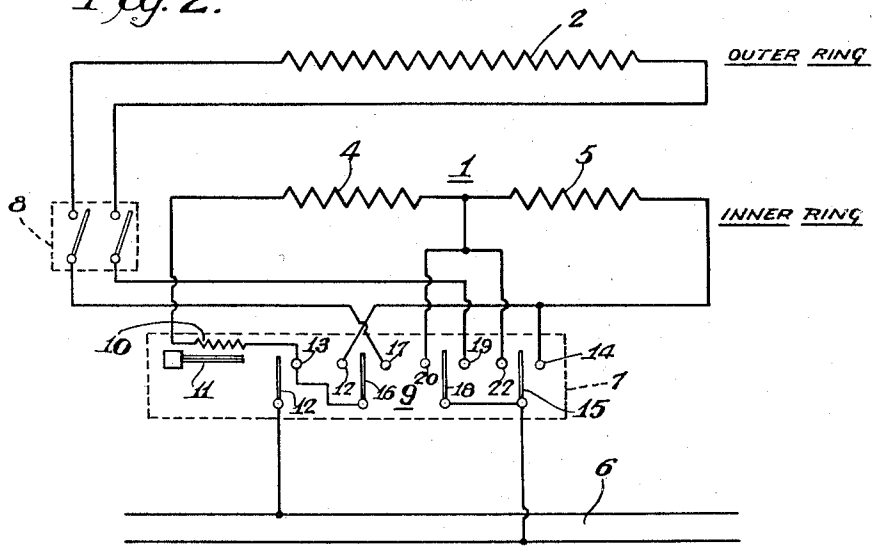


Fig. 2.



NORMAL

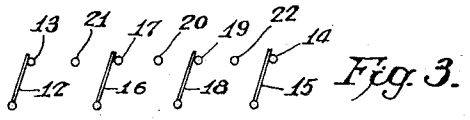


Fig. 3.

FLASH

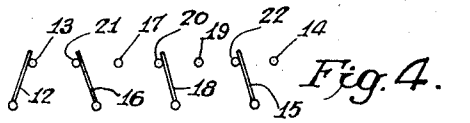


Fig. 4.

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ELECTRICAL COOKING APPARATUS

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Fig. 5.

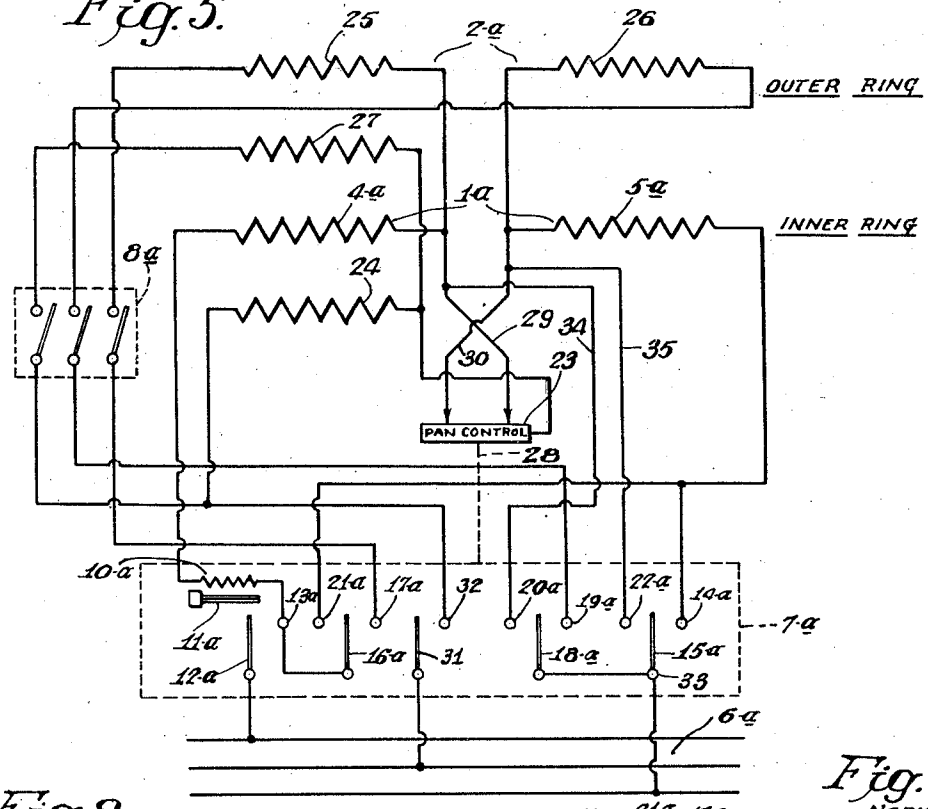


Fig. 6.

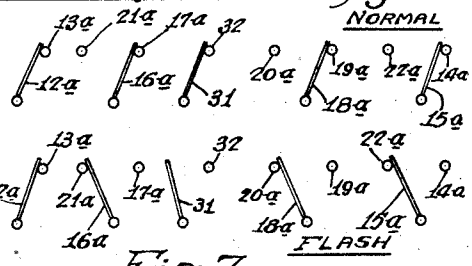
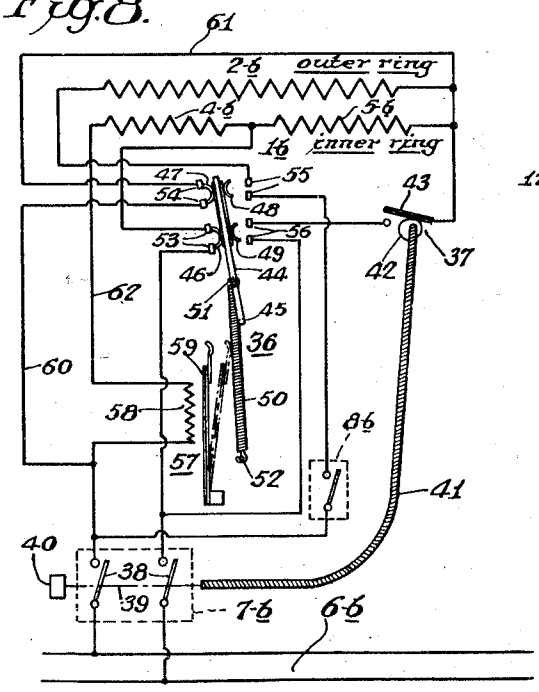


Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE

2,419,083

ELECTRICAL COOKING APPARATUS

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Application January 12, 1943, Serial No. 472,114

6 Claims. (Cl. 219—20)

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This invention relates to electrical cooking apparatus and more particularly to a novel control apparatus for a surface cooking unit comprising inner and outer concentric sections or rings.

The objects or purposes of the invention, as well as certain illustrative forms thereof, may be more clearly understood by first considering certain recently developed features of the electric range art with which the present invention is particularly concerned. To impart to an electric range unit a speed of initial heating comparable to that of a gas unit, it has been found desirable to provide suitable "flashing" means for greatly increasing the energization of the electric range unit until the desired temperature level has been reached and then automatically restoring the normal energization of the unit. The flashing operation is performed by switching circuit connections of the range unit. An example of a flashing device of this character is disclosed and claimed in the Myers and Roesch Patent No. 2,207,634, granted July 9, 1940.

It is also desirable in some instances to provide a manually-adjustable thermostatic control device for an electric range unit, which device is responsive to the temperature of a cooking vessel placed on the unit and operates the unit at the desired temperature level. Such device has been aptly termed a "pan control device." A device of this specific character is also disclosed in the above-mentioned patent, as well as in the Myers and Roesch Patent No. 2,140,479, granted December 13, 1938, which is directed particularly to such a device.

In some instances, it is also desirable to employ a heating unit comprising two concentric rings and to provide for operation of one or both of said rings, as shown generally in the Myers and Roesch Patent No. 2,140,479.

By the present invention, there is provided a novel control apparatus for a two-ring unit having provision for normal energization of the inner ring alone or both rings simultaneously, and also having provision for flashing the inner ring and for rendering the outer ring inoperative during the flashing operation. Preferably, but not necessarily, the control apparatus also embodies a pan control device which is adjustable by means of the same control manual that controls the flashing of the inner ring.

The principal object of the present invention therefore is to provide a novel control apparatus of the above-stated character.

Another object of the invention is to provide a control apparatus for a two-ring cooking unit,

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comprising a manually operable switch for controlling the normal energization of the unit and the flashing of the inner ring, and a second switch for controlling the energization of the outer ring, and embodying means for rendering the outer ring inoperative during flashing of the inner ring.

A further object of the invention is to provide an apparatus of this character including a pan control device which is preferably controlled by the first switch and which is ineffective during flashing of the inner ring.

Other objects and features of the invention will be apparent hereinafter.

In the accompanying drawings:

Fig. 1 is a plan view of a two-ring cooking unit with which the present invention is concerned;

Fig. 2 is a diagrammatic illustration of one form of the control apparatus provided by the present invention;

Figs. 3 and 4 illustrate respectively the normal and flash energization positions of the principal control switch of Fig. 3;

Fig. 5 is a diagrammatic illustration of another embodiment of the invention;

Figs. 6 and 7 illustrate the normal and flash conditions of the principal control switch of Fig. 5; and

Fig. 8 is a diagrammatic illustration of still another embodiment of the invention.

Referring to Fig. 1, there is shown a surface cooking unit comprising an inner section 1 and an outer section 2 arranged concentrically with respect to one another. Preferably, the two sections comprise concentric rings as illustrated, each having an electrical heating element. The two-ring cooking unit may take any suitable form since the invention is not concerned with the specific construction of the unit itself. Preferably, however, the cooking unit is constructed in the manner disclosed in the copending Myers and Roesch application Serial No. 425,330, filed January 1, 1942. In the preferred form of the invention, there is also provided a pan control device 3, a portion of which extends into the central space within the inner ring 1 for engagement by a cooking vessel placed upon the cooking unit.

I have found that in addition to selective operation of the inner ring alone or both rings simultaneously, it is desirable to be able to flash the inner ring alone since this ring is operated during any operation of the unit. It is not necessary to provide for flashing of the outer ring, since this ring is only employed occasionally to accommodate a large cooking vessel, and further-

more the flashing of the inner ring is considered sufficient in any event. Moreover, it is desirable that the outer ring be rendered inoperative during flashing of the inner ring to prevent overloading of the supply line. Where a pan control device is employed, it should be rendered ineffective during flashing of the inner ring. The present invention accomplishes these desired results.

In Figs. 2 to 4, there is illustrated a simple form of the invention in which the sections of the cooking unit are of simple form and a pan control device is not employed. Referring to Fig. 2, the inner ring 1 of the cooking unit comprises two similar heating element sections 4 and 5 for the purpose of flashing, as described hereinafter. The outer ring 2 comprises a single heating element as illustrated. The inner and outer rings are energized from the electrical supply line 6 and are controlled by devices 7 and 8. In the embodiment of the apparatus in an electric range, the devices 7 and 8 may be arranged side by side on the front control panel of the range.

Device 7 controls the energization of the cooking unit as a whole and it also controls the flashing of the inner ring to the exclusion of the outer ring. Device 8 provides additional control of the outer ring to permit normal energization of both rings simultaneously or of the inner ring alone.

Device 7 is preferably constructed as disclosed in the copending Roesch and Myers application Serial No. 433,394, filed March 4, 1942, now Patent No. 2,357,225, issued August 29, 1944. This device comprises a multi-contact switch 9 adapted to be conditioned for normal and flash operation, as shown in Figs. 3 and 4, and thermostatically controlled means for automatically terminating the flash connections and for restoring the normal connections. In the form of such device disclosed in the said Roesch and Myers application, the switch contacts are positioned for normal energization by rotation of a control manual which rotates a shaft carrying cams, and the contacts are positioned for flash operation by momentarily depressing the same control manual which operates an actuator for the contact blades. In such device, the contacts are latched in the flash condition, and the flash operation is terminated by a thermostatic latch-tripping device including a heater element and an associated bimetallic thermostatic element. These elements are shown diagrammatically in Fig. 2 at 10 and 11.

The device 8 is a simple on-off switch and may comprise a conventional toggle switch.

Considering the operation of the apparatus, let it be assumed first that it is desired to supply normal energization to the cooking unit. The device 7 is actuated in a manner to effect the normal energization connections as shown in Fig. 3. The sections 4 and 5 of the inner ring are then serially connected across the supply line 6 through a circuit extending from the upper supply line through contacts 12 and 13, heater 10, sections 4 and 5 in series, and contacts 14 and 15 to the lower side of the supply line. At the same time, contacts 16 and 17 are closed and contacts 18 and 19 are also closed, so that the outer ring 2 may be energized by closing switch 8. If switch 8 is closed, the outer ring is connected across the supply line in parallel with the inner ring, as will be apparent from inspection. Thus, during normal energization of the cooking unit, both rings may be energized simultaneously by actuating both of the devices 7 and 8, and the inner ring may be energized alone by actuating device 7 only.

Assume now that it is desired to flash the inner ring. The device 7 is actuated in a manner to effect the flashing operation, thereby disposing its contacts in the flash condition illustrated in Fig. 4. The sections 4 and 5 of the inner ring are then connected in parallel relation across the supply line through a circuit as follows: from the upper supply line through contacts 12 and 13 and thence through parallel branch circuits, one including heater 10, section 4 and contacts 18 and 20, and the other including contacts 16 and 21, section 5, and contacts 15 and 22, and thence to the lower supply line. The parallel connection of sections 4 and 5 increases the wattage of the inner ring to four times its normal wattage, causing rapid heating thereof. At this time, the contacts 16—17 and 18—19 are disengaged and, therefore, the outer ring is rendered inoperative during the flashing of the inner ring, regardless of the condition of switch 8. Thus, device 7 incorporates means for preventing energization of the outer ring during the flashing of the inner ring. When the flashing of the inner ring is automatically terminated, as described above, the normal energization connections of Fig. 3 are established. If the switch 8 has been closed, the termination of the flashing operation will automatically energize the outer ring 2.

Referring now to Figs. 5 to 7, there is illustrated a preferred form of the apparatus which embodies a pan control device, as previously mentioned. In Fig. 5, there is illustrated diagrammatically at 23 a pan control device of the type disclosed in the copending Myers application Serial No. 380,341, filed February 24, 1941. In this instance, the inner ring of the cooking unit comprises the main sections 4a and 5a and a low wattage heating element 24, and the outer ring similarly comprises main sections 25 and 26 and a low wattage heating element 27. Both of the multi-section rings are connected to the pan control device 23 and are controlled thereby in the manner set forth in the said Myers application. The details of construction of the particular pan control device and its specific mode of operation in conjunction with each ring of the cooking unit are not of importance here and need not be illustrated or described. It suffices to state that the particular pan control device diagrammatically illustrated in Fig. 5 is merely illustrative of any device of that general type in which a thermostatic switch controls the normal energization of the cooking unit. If desired, a simple form of pan control device, such as that disclosed in the above-mentioned Myers and Roesch Patent No. 2,207,634 could be used.

In this instance also, the main control device 7a may take the form disclosed in the above-mentioned Roesch and Myers Patent No. 2,357,225, and the said device not only performs the functions above described but also serves to adjust the pan control device for normal energization of the cooking unit at different temperature levels. The latter function is performed by rotation of the control manual which operates a driving connection between device 7a and the pan control device 23, as indicated by the broken line 28.

In this instance, a three-wire supply line 6a is employed to accommodate the low wattage heating elements 24 and 27, as described in the above-mentioned Myers application Serial No. 380,341. The device 7a includes switch contacts corre-

sponding to those of the device 7 in Fig. 1 and correspondingly designated. The device 8a in this instance is a three-pole switch.

When the control device 7a is conditioned for normal energization, as shown in Fig. 6, the sections 4a and 5a of the inner ring are serially connected across the outer supply conductors through a circuit as follows: from the upper supply conductor through contacts 12a and 13a, heater 10a, section 4a, conductor 29, through the pan control device 23 to conductor 30, section 5a and contacts 14a and 15a to the lowermost supply conductor. At the same time, the contacts 16a—17a and 18a—19a are closed and, if the switch 8a is closed, the main sections 25 and 26 of the outer ring are serially connected across the outer supply conductors in parallel relation with the inner ring. The energizing circuit for sections 25 and 26 also extends through the pan control device via conductors 29 and 30 and may be readily traced from the foregoing explanation. If desired, the outer ring may be deenergized by opening switch 8a. Thus, provision is made for normal energization of both rings or for normal energization of the inner ring alone and, in either case, the rings are under control of the adjustable pan control device 23.

During normal operation, the contacts 31 and 32 of device 7a are closed and serve to connect the low wattage heating elements 24 and 27 to the intermediate or neutral supply conductor. The reason for this is not of importance here but is fully explained in the above-mentioned Myers application Serial No. 380,341.

When the device 7a is conditioned for flash operation, as shown in Fig. 7, the pan control device is rendered ineffective and the sections 4a and 5a of the inner ring are connected in parallel relation across the outer supply conductors through a circuit as follows: from the uppermost supply conductor through contacts 12a and 13a and thence through parallel branch circuits to point 33 which is connected to the lowermost supply conductor. One of the parallel branch circuits extends through heater 10a, section 4a, conductor 34 and contacts 18a and 20a, while the other branch circuit extends through contacts 16a and 21a, section 5a, conductor 35 and contacts 15a and 22a. The inner ring is thus conditioned for flash operation.

At the same time, contacts 16a—17a and 18a—19a are open, thereby rendering the outer ring inoperative during the flashing of the inner ring, regardless of the condition of switch 8a. It will be noted also that contacts 31 and 32 are open so that the outer ring is entirely disconnected from the supply line.

Thus, in this instance also, the switch 7a embodies means for rendering the outer ring inoperative during flashing of the inner ring, and the switch also renders the pan control device ineffective.

As mentioned above, a simple pan control device of the type shown in the Myers and Roesch Patent No. 2,207,634 may be used, in which case the low wattage heating elements 24 and 27 may be eliminated. If desired, the pan control device may be adjusted during normal energization by a control manual separate from that of device 7a. That is to say, the pan control device need not be mechanically coupled to device 7a to be adjustable thereby.

In Fig. 8, there is illustrated a further embodiment of the invention which utilizes a flash contactor 36 to perform the desired functions. In this instance, the main control switch 7b is a simple on-off switch which controls the energization of the cooking unit and also controls the adjustment of a thermostatic switch 37. The device 7b may comprise contacts 38 operable by simple cams (not shown) on a rotatable shaft 39 having a control knob 40. Thus, when the knob 40 is rotated from the "off" position, the contacts 38 are closed and remain closed during further rotation of the knob. A flexible shaft 41 connects shaft 39 to a cam 42 on the thermostatic control device which embodies a thermostatic element 43 whose position is adjusted by the cam 42. The device 37 may take the form of a simple pan control device, such as that disclosed in the above-mentioned Myers and Roesch Patent No. 2,207,634.

The flash contactor 36 is of the general type shown in the Myers and Roesch Patent No. 2,207,634. It comprises a rod 44 pivoted at 45 and movable between two operative positions. The rod carries contact bridges 46, 47, 48 and 49 which are suitably insulated from one another. A spring 50 having one end connected to the rod at 51 and its other end anchored at 52 normally maintains the contactor in its left hand position, as shown, in which the contact bridges 46 and 47 engage stationary contacts 53 and 54, respectively. When the contactor is moved to its other position, these contacts are disengaged and the contact bridges 48 and 49 engage stationary contacts 55 and 56, respectively. The latter stationary contacts are so arranged in relation to the other elements that the contactor will remain in its last-mentioned position only as long as it is positively held in such position, the spring 50 tending to urge it to its left hand position.

A thermostatic control device 57 controls the flash contactor in the manner hereinafter described. This device comprises a heater element 58 connected in circuit with the cooking unit and a bimetallic thermostatic element 59 arranged cooperatively with the heater element and movable thereby, as indicated by the dot-and-dash outline. The device 57 is constructed and arranged to interrupt the flashing of the inner element or ring of the cooking unit when said element reaches its normal high operating temperature.

This embodiment of the invention may best be understood by considering the operation thereof. Assuming that the parts are in the positions shown, the user rotates the control knob 40 from the off position to a position in which the thermostatic control device 37 is adjusted for operation of the cooking unit at the desired temperature level. This will be indicated, of course, by suitable indicia associated with the control knob. The closing of contacts 38 initiates flash operation of the inner element or ring 1b by connecting the sections 4b and 5b thereof in parallel relation. One of the parallel branch circuits includes conductor 60, contacts 47—54, conductor 61, and section 5b, while the other branch circuit includes heater element 58 and section 4b. At this time, the outer element or ring 2b is inoperative and the thermostatic control device 37 is ineffective.

The inner heating element 1b heats rapidly and the thermostatic element 59 flexes under the influence of the heater element 58. During its flexing movement, the element 59 engages the spring 50 and distorts it sufficiently to move the flash contactor to its right hand position. This occurs when the heating element 1b has substan-

tially reached its normal high operating temperature.

The movement of the flash contactor from one position to the other interrupts the flash operation, connects the sections 4b and 5b in series across the supply line, conditions the outer element or ring 2b for operation, and renders the thermostatic control device 37 effective. The series connection of sections 4b and 5b extends through heater element 58, conductor 62, the two sections in series, thermostatic switch 43, and contacts 49—56. The inner element or ring 1b is thus supplied with normal energizing current and is operated at the desired temperature level under control of the thermostatic control device 37. The heater element 58 is continuously energized and is supplied with sufficient current to maintain the thermostatic element 59 in its flexed position so that the contactor is held in its right hand position until the switch 7b is turned off and the heater element 58 is permitted to cool.

During the normal energization of the inner heating element 1b, the outer heating element or ring 2b may be energized at will by closing switch 8b which, in this instance, is a simple two-pole switch. When this switch is closed, the outer element 2b is connected in parallel with the inner element 1b through the closed contacts 48—55.

Thus, it will be seen that this embodiment of the invention is adapted to perform the same functions as the previously-described embodiments, employing a simple manual control switch in combination with a flash contactor.

From the foregoing description, it will be seen that the invention provides a novel control apparatus for a two-ring cooking unit embodying the novel features hereinbefore mentioned. Although certain embodiments of the invention have been illustrated for the purpose of disclosure, it will be understood that the invention is not limited thereto but is capable of further modifications and changes within the scope of the appended claims.

I claim:

1. In an electrical cooking apparatus, an electrical cooking unit comprising inner and outer heating elements, each comprising two main sections and a low wattage section, an adjustable thermostatic control device, means normally connecting the main sections of each heating element in series through said control device and across the outer conductors of a three-wire supply line, means normally connecting the low wattage section of each heating element to said control device and to the neutral conductor of the supply line, means operative at will to connect the main sections of the inner heating element in parallel relation across said outer conductors and to exclude the thermostatic control device from the circuit of the inner heating element, thereby to flash the inner heating element at will, and means for rendering the entire outer heating element and the low wattage section of the inner heating element inoperative during the flashing of the inner heating element.

2. In an electrical cooking apparatus, an electrical cooking unit comprising inner and outer heating elements, each comprising two main sections and a low wattage section, an adjustable thermostatic control device, means normally connecting the main sections of each heating element in series through said control device and across the outer conductors of a three-wire supply line, means normally connecting the low wattage section of each heating element to said control device and to the neutral conductor of the supply line, means operative at will to render the entire outer heating element inoperative, means operative at will to connect the main sections of the inner heating element in parallel relation across said outer conductors and to exclude the thermostatic control device from the circuit of the inner heating element, thereby to flash the inner heating element at will, and means for rendering the entire outer heating element and the low wattage section of the inner heating element inoperative during the flashing of the inner heating element.

3. In an electrical cooking apparatus, an electrical cooking unit comprising inner and outer concentric heating elements, each comprising two main sections and a low wattage section, an adjustable thermostatic control device having a portion disposed within said inner heating element for engagement by a cooking vessel placed on the cooking unit, means normally connecting the main sections of each heating element in series through said control device and across the outer conductors of a three-wire supply line, means normally connecting the low wattage section of each heating element to said control device and to the neutral conductor of the supply line, means operative at will to connect the main sections of the inner heating element in parallel relation across said outer conductors and to exclude the thermostatic control device from the circuit of the inner heating element, thereby to flash the inner heating element at will, and means for rendering the entire outer heating element and the low wattage section of the inner heating element inoperative during the flashing of the inner heating element.

4. In an electrical cooking apparatus, an electrical cooking unit comprising inner and outer heating elements, each comprising two main sections and a low wattage section, an adjustable thermostatic control device, means normally connecting the main sections of each heating element in series through said control device and across the outer conductors of a three-wire supply line, means normally connecting the low wattage section of each heating element to said control device and to the neutral conductor of the supply line, means for connecting the main sections of the inner heating element in parallel relation across said outer conductors and for excluding the thermostatic control device from the circuit of the inner heating element, thereby to flash the inner heating element at will, common manually-controllable means for initiating the flashing of said inner heating element and for controlling the operation of said thermostatic control device during normal energization of the cooking unit, and means for rendering the entire outer heating element and the low wattage section of the inner heating element inoperative during the flashing of the inner heating element.

5. In an electrical cooking apparatus, an electrical cooking unit comprising inner and outer heating elements, each comprising two main sections and a low wattage section, an adjustable thermostatic control device connected to one end of each of said sections, said device being responsive to the temperature of a cooking vessel placed on said unit and being adapted to control the energization of said sections according to the adjustment of said device, a manually-operable control device adapted to adjust said thermostatic device and also adapted to effect flashing of the inner heating element, connections controlled by said last-named device for connecting the

other ends of said sections to a three-wire supply line, other connections controlled by said last-named device for connecting the main sections of the inner heating element in parallel and for short circuiting said thermostatic device, and contacts on said last-named device for disconnecting the entire outer heating element and the low wattage section of the entire heating element during the parallel connection of the main sections of the inner heating element.

6. In an electrical cooking apparatus, an electrical heating unit including a pair of main sections and a low wattage section, an adjustable thermostatic control device connected to one end of each of said sections, said device being responsive to the temperature of a cooking vessel placed on said unit and being adapted to control the energization of said sections according to the adjustment of said device, a manually-operable control device adapted to adjust said thermostatic device and also adapted to effect flashing of said unit, connections controlled by said last-named device for connecting the other ends of said main

sections to the outer conductors of a three-wire supply line and for connecting the other end of said low wattage section to the neutral conductor of said line, other connections controlled by said last-named device for connecting said main sections in parallel across said outer conductors and for rendering said thermostatic device ineffective, and contacts on said last-named device for disconnecting said low wattage section during the parallel connection of said main sections.

JOSEPH W. MYERS.

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