Jan. 9, 1962 G. LIEN, JR 3,016,445

SURFACE HEATING UNIT CONSTRUCTION

Filed Nov. 20, 1959 2 Sheets-Sheet 1

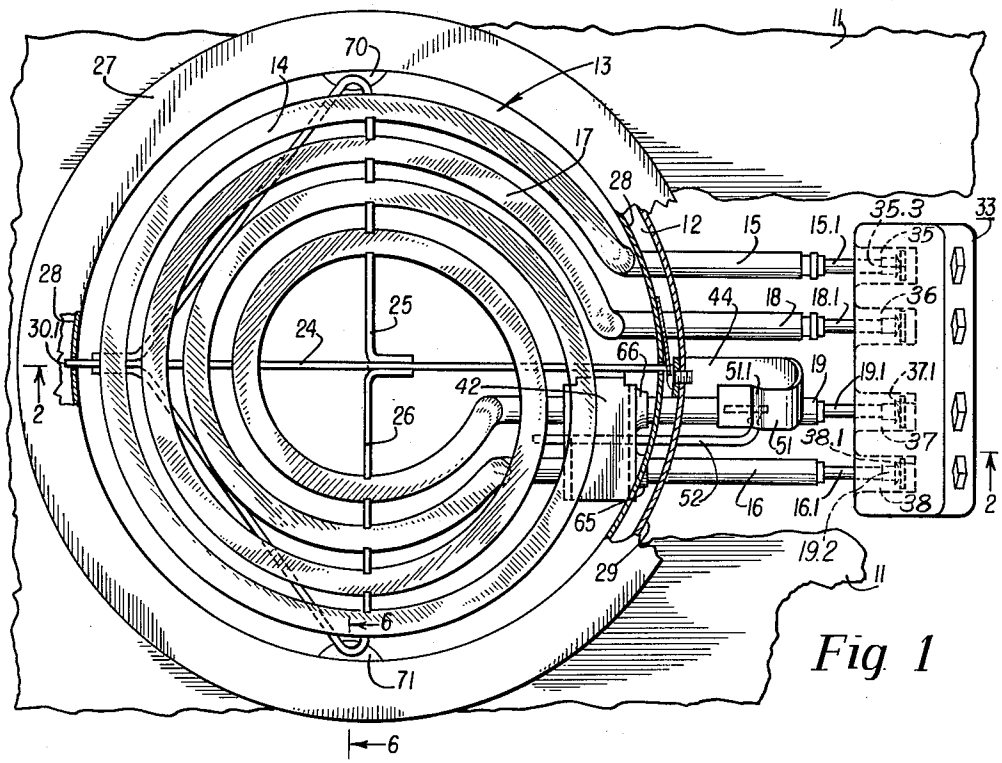


Fig. 1

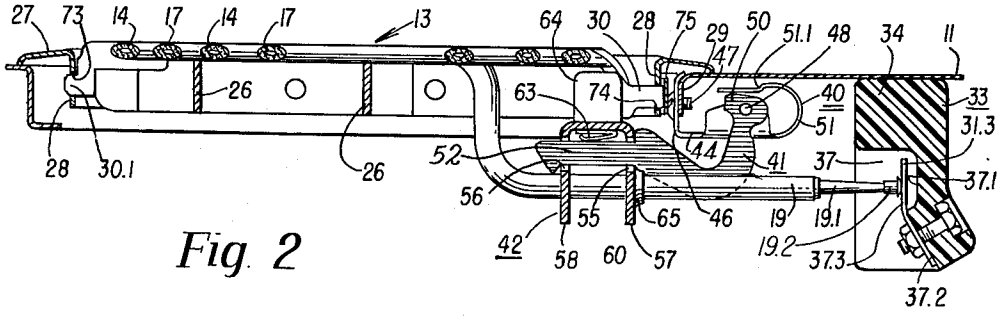


Fig. 2

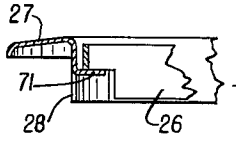


Fig. 6

INVENTOR.
GUNDER LIEN, JR.
BY Andrew P. Hubbard
ATTY.

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Fig. 3

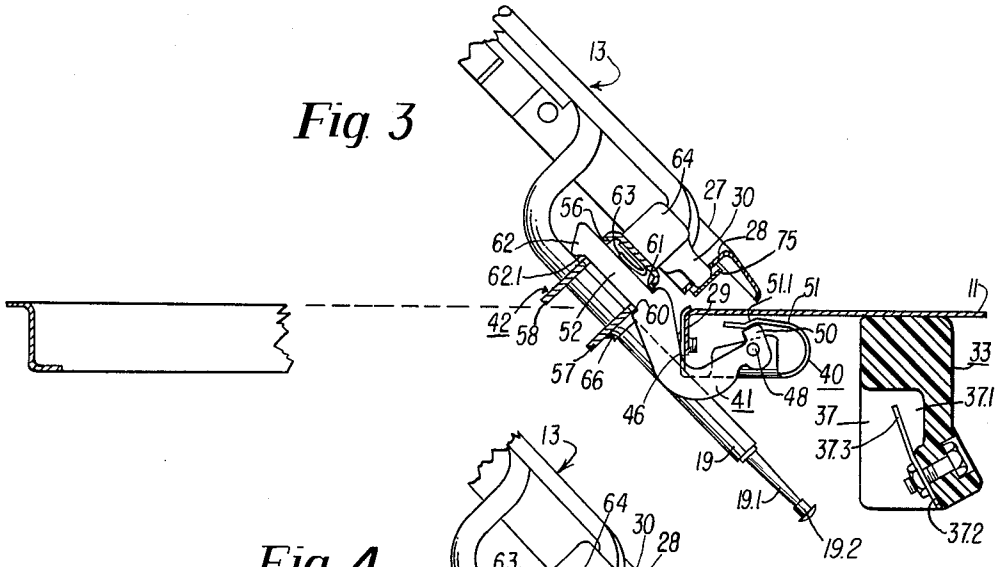


Fig. 4

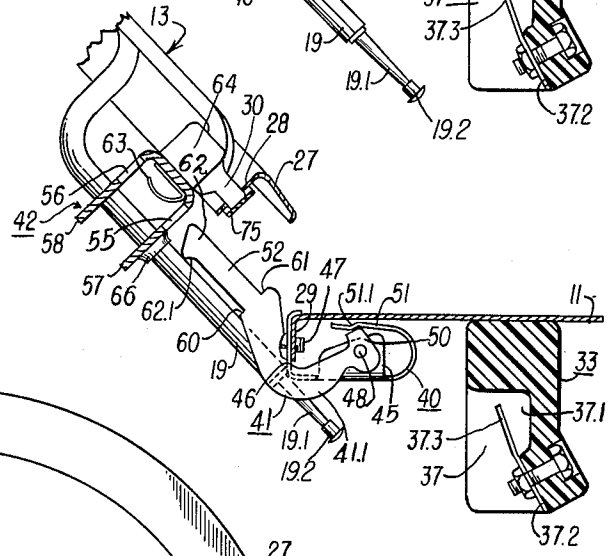
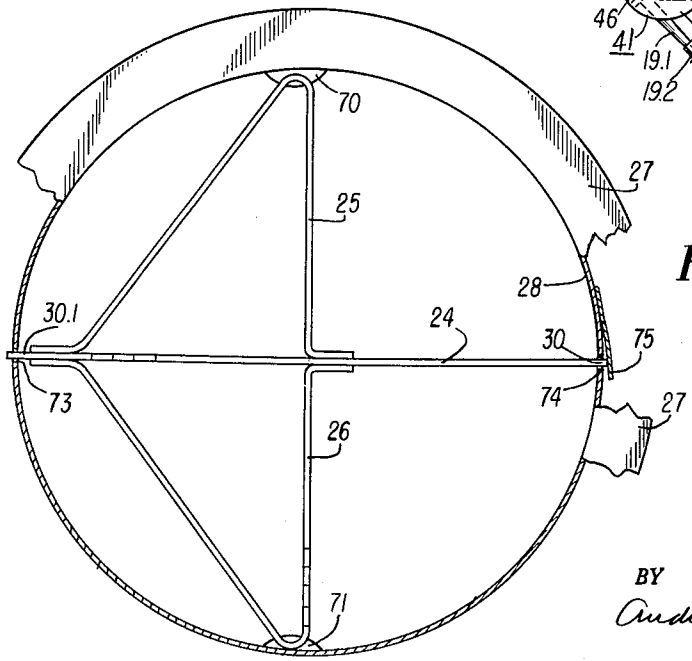


Fig. 5



INVENTOR.
GUNDER LIEN, JR.
BY
Andrew B. Hubbard
ATTY.

United States Patent Office

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SURFACE HEATING UNIT CONSTRUCTION

Gunder Lien, Jr., Wheaton, Ill., assignor to General Electric Company, a corporation of New York

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9 Claims. (Cl. 219—37)

The present invention relates to electric surface cooking units and more particularly to hinging mechanisms for the same.

It is a principal object of the invention to provide an improved hinge construction which will position the cooking unit in an operative manner on the cooking surface and which will permit the unit to be swung upward to a stable raised position at which the cooking unit may be completely removed.

It is another object of the invention to provide an improved hinge mechanism which latches the hinge mechanism in the raised position so that the cooking unit or as it may be called, a heating unit, may be removed from the hinge, after which the hinge remains in its unit receptive position to facilitate replacement of the unit on the hinge.

It is a further object of the invention to provide a support structure for the cooking unit heating coils from which the heating coils may be readily demounted.

In the embodiment described herein, there is a spring hinge mechanism affixed internally to the cooking surface adjacent to the periphery of the heating coil cutout. The hinge mechanism has as its main operative member a generally L-shaped hinge bracket pivoted near the outer tip of the short leg of the L. At the outermost end of the short leg of the L is a crowned tip co-operating with a retaining spring for holding the hinge arm in one of two desired positions. The long section of the L is removably inserted through suitable slots in a support bracket mounted to the underside of the heating coil support structure. By this construction the heating coil may be tilted about the hinge arm pivot from the operative horizontal position to a raised position; a crowned tip of the L bracket short leg being resiliently engaged to hold the hinge firmly in the raised position. By sliding the heating unit up the plane of the hinge arm in the raised position, the heating unit may be withdrawn from the hinge arm and removed for cleaning or replacement as required.

The invention further comprises a trim ring surrounding the heating coils and detachably mounted to the heating unit support structure. The detachable feature is achieved by having the trim ring vertical sidewall formed with two diametrically opposed inwardly directed embosses. Displaced angularly from the embosses are two slots arranged in opposed sections of the sidewall. One of the slots is backed by a resilient flat spring. The heat coil support structure embodies angularly disposed arms adapted to rest on an emboss, an additionally a second set of arms, the tips of which are designed to fit into the sidewall slots. One of these tips is contacted by the flat spring and the arm is retained in place. By manual pressure on the arm against the bias the flat spring, the opposing tip may be displaced out of its slot releasing the trim ring. The reverse of this operation is performed on re-assembly of the coil structure and trim ring.

The invention both as to its organization and principle of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings in which:

FIG. 1 is a fragmentary top plan view of an electric range and cooking unit with portions of the range cooking top broken away, and portions of the cooking unit in section;

FIG. 2 is a vertical section taken along the lines 2—2 of FIG. 1;

FIG. 3 is a vertical sectioned side elevation of the hinge element showing the unit in raised position.

FIG. 4 is also a vertical sectioned side elevation of the hinge element showing the unit in the raised position with the unit partially removed from the hinge.

FIG. 5 is a top plan view of the support structure and trim ring with the heating coil removed.

FIG. 6 is a fragmentary sectional view taken along the line 6—6 of FIG. 5.

In the typical installation, the heating units are mounted in a conventional electric range having a cooking top 11 provided with a suitable number of circular openings 12, each adapted to receive a cooking unit 13. Usually there are three or four of such cooking units suitably arranged about the cooking top.

Each cooking unit generally comprises a first sheathed heating element 14 having respective terminal portions 15 and 16 and a second sheathed heating element 17 having the terminal portions 18 and 19. Preferably, these elements will be constructed as described in the United States Patent to C. C. Abbott, No. 1,367,341 dated February 1, 1921, and in the J. C. Sharp Reissue Patent No. 22,177 of September 8, 1942. Each of these elements, as described in the cited patents, has a coiled resistance conductor housed in a metallic sheath and supported in uniformly spaced relationship to the sheath by a highly compacted mass of a suitable heat conducting and electrically insulating material such as powdered magnesium oxide. As is conventional, the heating elements are arranged to form flat spirals of several convolutions and are nested one within the other on a carriage structure which may include a plurality of radially extending vertically arranged plates 24, 25, and 26 joined together at a central hub and extending radially therefrom. The upper edges of these plates lie in a common plane and support the heating elements as shown.

The support structure is carried by a trim ring having a horizontal rim 27 resting on the cooking top 11 about the opening therein and a downwardly extending circular sidewall flange 28 which is spaced inwardly from the depending flange 29 defining the cooking top opening 12. An advantageous manner of securing the support structure to the trim ring is by providing certain of the support plates with a short tongue 30 brought through a suitable slot in the trim ring wall 28 as will be explained more fully later in this specification. The trim ring thus establishes the plane of the upper edges of the support plates parallel to the plane of the cooking top 11. A suitable drip and reflector pan (not shown) may be removably supported below the heating unit as required.

The respective heating elements rest on the upper edges of the radial support plates, and each element is secured to only one of the plates at only one point. As shown in FIG. 2, an outer convolution of each of the heating elements is anchored to the support plate 25 by means of upwardly extending pairs of jaws which grip the sheath of the respective heating elements. Except for this single point of attachment of the heating elements to the support structure, the elements are free to move on the upper edges of the supporting structure as they expand and contract with temperature changes. The terminal portions of the heating elements extend downwardly from the support plates and rectilinearly beneath the cooking top 11 and have conductor terminals 15.1, 16.1, 18.1, and 19.1 extending therefrom. These conductor terminals may have welded thereto rivets such as 19.2 shown in FIGS. 2, 3, and 4 of suitable contact material, i.e. nickel silver.

In order to form a connection from these terminals

to a conventional source of 230 volt, 3 conductor power, a terminal block 33 preferably of molded vitreous refractory material is mounted stationarily in any known manner to the underside of the cooking top 11 adjacent the cooking top cutout 12. The terminal block has a solid upper half 34 and four terminal receiving channels 35, 36, 37, and 38 in its lower half, each channel being adapted to receive respective terminal ends 15.1, 18.1, 19.1, and 16.1. The channels are separated by suitable internal walls which tend to electrically insulate each channel from the adjacent channel. Each of the channels has an upstanding rear wall 35.1, 36.1, 37.1, and 38.1. Each rear wall at its lower end terminates in an angled section such as 37.2 of channel 37. Each of the angled sections has secured therein a single resilient blade contactor such as 37.3 which extends freely upwardly into the channel for the purpose of engaging the proper terminal end such as 19.1. To provide the several levels of thermal output normally required, a bus-bar (not shown) could be provided between adjacent contactors such as between 35.3 and 36.3 or between 37.3 and 38.3. Utilizing this latter alternative for example, an electrical circuit would be completed from the first source lead through contactor 38.3, the conductor of terminal end 16.1, heating element 14, and terminal end 15.1 to contactor 35.3 and the second source lead. A parallel circuit would also be completed from contactor 38.3 to contactor 37.3 and through the conductor of terminal end 19.1, heating element 17 and terminal end 18.1, and contactor 36.3 to the third source lead.

Referring more particularly to FIGS. 2, 3 and 4, there is shown a hinging and grounding structure which embodies the present invention. The structure has as its main components, a hinge strap 40 secured to the cooking top, a pivotable hinge arm 41 and a hinge arm receiving member 42 secured to the support structure. The hinge strap 40 comprises a rigid base plate 44 from which extend upwardly both a pivot plate 45 and a rigid attachment strap 46 which strap is arranged to be mounted flush against the flange 29 around the cooking top opening. The strap is secured to the range frame at the cooking top opening by means of a self-tapping screw 47 or equivalent which secures the attachment strap 46 firmly against the opening flange 29.

Toward the upper end of pivot plate is secured a hinge pin 48 about which the heating unit hinge arm 41 is pivoted. Hinge arm 41 comprises a substantially L-shaped member, with the hinge pin 48 adjacent the end of the short leg 41.1. At the outer tip of the leg 41.1 is a crowned portion 50 which nests within a resilient recurved section 51 of hinge strap 40 to firmly hold the hinge arm in position. The longer leg of the L-shaped hinge arm terminates in a blade-like extension 52 which when the heating unit is in normal operating position is substantially parallel to the cooking top and the plane established by the heating element convolutions. This blade-like extension 52 is designed to fit, bayonet arm fashion, through slots 55 and 56 respectively aligned in legs 57 and 58 of the inverted U-shaped, arm-receiving frame member 42 which is part of the heating unit supporting structure or carriage. The legs 57 and 58 depend from the base of the U member and are aligned normal to the plane described by the hinge blade extension 52. The blade extension 52 is latched firmly within the slots by virtue of its enlarged shoulder sections 60 and 61 which abut leg 57 and a head section 62 which projects through slot 56 with the sloping head section latching surface 62.1 abutting leg 58. Affixed within the base of the U member 42 is a formed-over grounding spring 63 which tends to bias the blade extension by downward pressure along its upper surface thus yieldably maintaining the latched relationship between the member 42 and blade extension 52. Member 42 has extending upwardly om its inverted base a support arm 64 which is permanently affixed to support plate 24 of the heating element support structure to provide a thrust receiving member which stabilizes the structure and alleviates the forces which would otherwise be applied to the heating element.

The inverted U member is further permanently affixed to the heating element by the embossed collars 65 and 66 which are crimped about the sheaths of adjacent terminals 16 and 19. It should be noted that collars 65 and 66 are both integral to leg 57 and that the other leg, 58, also surrounds terminals 16 and 19 to form a more solid structure.

In all such range applications where high voltages are to be impressed upon the conductors of the sheathed heating element, it is necessary that the heating element sheathing be grounded to the cooking top. In the hinge mechanism as previously described, a ground path can be traced from the heating element sheaths, through the collars 65 and 66, grounding spring 63, inverted U member 42, pivotable hinge arm 41, hinge strap 40 and its attachment strap 46 to the cooking top metal surface at self-tapping screw 47.

The advantages of the present embodiment may be most readily appreciated by a description of the co-operation of the components as the heating unit is moved from the normal position described previously to the raised position and the detached position. The heating element may be tilted from its operative position to the raised position of FIG. 3, by manually lifting on the outer end of the trim ring. The firm connection of the inverted support member 42 to the mating blade extension 52 causes the L-shaped hinge arm 41 to follow and pivot about hinge pin 48. The travel of the hinge arm 41 is stopped by engagement with the lower portion of depending cooking top flange 29. At the time this occurs, crowned tip 50 nests in offset 51.1 of the hinge strap recurved section 51 to resiliently hold the hinge arm and the heating element in the raised position. As the heating element is tilted, it can be seen that the terminal ends will rotate away from their matching contactors and thus will be freed of the terminal block area. It should be noted that after the terminal ends are freed of the contactors, the grounding of the sheath remains completed.

With the heating element in the raised position, the heating element may be removed from the hinge by firmly grasping the heating element and pulling the heating element up the plane established; spring 63 is thereby compressed freeing the interference contact of head section 62 of the hinge arm from the abutting U member leg 58. The heating element may then be removed as the blade extension may slide freely within slots 55 and 56. With the heating element removed, the hinge arm is positively retained in a position receptive to the return of the heating element by the previously described nesting of the hinge arm crowned tip 50 in the offset 51.1. The heating element may then be returned to the hinge by an obvious reversal of the steps listed for the removal.

A further feature of the present embodiment lies in the removability of the trim ring from the support structure as may most readily be seen in FIGS. 5 and 6. For the sake of simplicity in FIGS. 5 and 6, the heating element has been shown removed, although in actuality this would not be the case. As can be seen, the depending flange 28 of the trim ring has opposed embosses 70 and 71 formed inwardly near the bottom edge of the wall. Spaced 90° from these embosses are opposed slots 73 and 74 in the trim ring side wall 28. Outwardly of slot 74, there is secured to the trim ring sidewall a spring member 75 which is biased toward the sidewall 28. To fit within the trim ring as described, the support structure is formed generally in the shape of an arrow with plate 24 acting as the central shaft of the arrow. Central plate 24 of the support structure has its opposite ends formed with tongues 30 and 30.1 designed to fit into opposed slots 73 and 74. The side plates 25 and 26 are formed generally into V shapes, each of the bases of

which are shaped to conform and rest upon the opposed embosses 70 and 71.

To remove the trim ring, radial pressure would be exerted along plate 24 against the bias of leaf spring 75 to allow tongue 30.1 to be freed of slot 73. By then raising this end of plate 24, the V bases can be raised off their mating embosses and tongue 30 may then be freed of slot 74.

By the invention shown, the entire heating element can be removed from the cooking top for cleaning and further the trim ring may be removed from the support structure and heating element for further ease of cleaning of the components individually.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A heating unit adapted to be mounted in the top surface of a range and comprising a heating element and a carriage structure for supporting said element in an operative position parallel to said top surface, a hinge member engaging said heating element carriage structure for retaining said unit in said operative position, means for resiliently holding said hinge member in a second position oblique to said surface to thereby maintain said heating unit in an inoperative position oblique to said surface, means for normally retaining said hinge member in engagement with said carriage structure, and means responsive to upward movement of said heating unit with respect to said hinge member to release the engagement of said heating element carriage structure and said hinge member, said holding means thereafter maintaining said hinge member in said second position receptive to the return of said heating unit.

2. A heating unit adapted to be mounted in the top surface of a range and comprising a heating element and a carriage structure for supporting said element in an operative position parallel to said top surface, a hinge member affixed to said surface and releasably secured to said structure to allow rotation of said unit from said operative position to a second inoperative position angled from said surface, means for holding said hinge member in said second position, and means for releasably retaining said hinge member engaged to said carriage structure, said releasable retaining means including a resilient member capable of yielding to upward movement of said heating unit along the plane established by said heating unit in said second position for releasing said engagement to allow slide action detachment of said heating unit from said hinge member, said holding means thereafter restraining said hinge member in said second position receptive to the slide action return of said heating unit to said hinge member.

3. A heating unit adapted to be mounted in the top surface of a range and comprising a heating element and structure for supporting said element in an operative position parallel to said top surface, a hinge member affixed to said surface and including a bayonet arm, said structure including a depending frame encircling said bayonet arm for retaining said unit in said operative position, means for holding said bayonet arm in a second position oblique to said surface to thereby maintain said heating unit in an inoperative position, and means for releasably retaining said frame encirclement of said bayonet arm thereby retaining said hinge member engaged to said structure, said releasable retaining means comprising a resilient member biasing said bayonet arm within said depending frame, said resilient member yielding to upward movement of said heating unit oblique to said surface for releasing said bias to allow removal of said heating unit from said hinge member, said holding means thereafter operative to hold said bayonet arm in said second position receptive to the return of said frame to said arm.

4. In an electric range having a structure providing a cooking surface formed with an opening for the reception of a cooking unit in an operative position substantially parallel to said cooking surface; said cooking unit comprising a support structure, a flat heating coil resting on said support structure, a plurality of rigid terminals extending from said coil; means for providing a source of current for said unit comprising a stationary terminal box affixed to said cooking surface for receiving said terminals to maintain electrical contact with said cooking unit in the operative position; hinge means secured to said cooking surface adjacent said opening for controlling the movement of said cooking unit from said operative position to an inoperative position oblique to said cooking surface, said hinge means comprising a latch blade member engaging said support structure for governing the movement thereof, spring means engaging said latch member for retaining said latch blade in a first position parallel to said cooking surface for thereby maintaining said cooking unit in said operative position, said spring means further being effective to retain said latch blade in a second position oblique to said cooking surface for maintaining said cooking unit in said inoperative position with said terminals out of contact with terminal box; a bifurcated carriage depending from said support structure normal to said cooking surface, said carriage having fork portions encircling certain ones of said terminal extensions, said fork portions having aligned slots for receiving said latch blade, bias means for releasably retaining said latch blade in said slots, said bias means being responsive to pressure exerted along the plane of said blade with said latch blade in said oblique position to release said latch blade from said carriage thereby allowing said cooking unit to be removed from said cooking surface and hinge means.

5. In an electric range having a structure providing a cooking surface formed with an opening for the reception of a cooking unit in an operative position substantially parallel to said cooking surface; said cooking unit comprising a support structure bridging said opening, a flat heating coil resting on said support structure and a plurality of rigid terminals extending from said coil; the combination comprising a stationary terminal member affixed to said cooking surface and having a plurality of individual contacts for receiving said terminals in electrical contact with said cooking unit in the operative position; hinge means secured to said cooking surface adjacent said opening for controlling the movement of said cooking unit from said operative position to an inoperative position oblique to said cooking surface in which said terminals are disengaged from said contacts, said hinge means comprising an L-shaped member engaging said support structure for governing the movement thereof, spring means engaging the shorter arm of said L-shaped member thereby retaining the longer arm of said L-shaped member in a first position parallel to said cooking surface thus maintaining said cooking unit in its operative position with the terminals contacting said individual contacts, said spring means also engaging the shorter arm for retaining the longer arm of said L-shaped member in a second position oblique to said cooking surface thus maintaining said cooking unit in said inoperative position; a carriage structure depending from said support structure normal to the longer arm of said L-shaped member, said carriage structure having rigid members engaging certain ones of said terminal extensions in axially spaced relation, said rigid members having means for receiving said longer arm, and means including a biasing member for releasably retaining said longer arm in said receiving means, said biasing member yielding to effort exerted along the plane of said longer arm with said L-shaped member in said second position to release said longer arm for disengagement

from said carriage structure, thereby allowing said heating coil to be removed from said cooking surface.

6. In an electric range having a structure providing a cooking surface formed with an opening for the reception of a cooking unit in an operative position substantially parallel to said cooking surface; a cooking unit comprising a support structure bridging said opening, a flat heating coil resting on said support structure, a plurality of rigid terminals extending from said coil, a stationary terminal box affixed to said cooking surface for releasably receiving said terminals in electrical contact with said cooking unit in the operative position, hinge means secured to said cooking surface adjacent said opening for controlling the movement of said cooking unit from said operative position to a raised inoperative position, said hinge means comprising an angled member engaging said support structure for governing the movement thereof, spring means operative for retaining one leg of said angled member in a first position parallel to said cooking surface thus maintaining said cooking unit in said operative position and for retaining said one leg of said angled member in a second position oblique to said cooking surface thereby maintaining said cooking unit in said inoperative position, a carriage structure depending from and secured to said support structure normal to said one leg of said angled member and means on said carriage structure for releasably receiving said one leg, whereby said cooking unit may be separated from said hinge means leg for removal of said cooking unit from said cooking surface, with the said spring means retaining said hinge means with the said one leg thereof in an angular position receptive to the return of said cooking unit thereon.

7. An electric cooking range, comprising structure providing a horizontal cooking surface having an opening, an electric heating unit, combination hinging and release means for supporting said heating unit in an operative position within said opening or in an inoperative position in raised angular relation to said cooking top, said combination hinging and release means including a hinge structure fixed to said range structure adjacent to said surface opening, a hinge member extending substantially diametrically into said opening, carriage means for said heating unit, including means for mounting said carriage means on said hinge member for slidable withdrawal therefrom, latch means co-operating between said hinge member and said carriage means, and resilient means interfaced between said carriage means and said hinge member for normally maintaining the same in engaged relationship while yielding to a direct withdrawal of said carriage means from said hinge member following angular displacement of said heating unit relative to said cooking surface.

8. An electric cooking range, comprising structure providing a horizontal cooking surface, an electric heating unit, and means for hingedly supporting said heating unit on said structure for movement between a horizontal operating position and an angular inoperative position, said supporting means including structure providing a carriage for said heating unit, a hinge fixed to said cooking surface structure and having a blade-like member projecting substantially diametrically into said heating unit, means on said heating unit carriage for releasably receiving said blade-like member for engagement therewith or disengagement therefrom by direct effort longitudinally of said blade-like member, means establishing a latching connection between said carriage means and said blade-like member, spring means yieldably maintaining said latching connection to permit desired angular displacement of said heating unit relative to said cooking surface while permitting withdrawal of said carriage means from said hinge member, and means for maintaining said hinge member in a position receptive to the return of said carriage means to said hinge member.

9. A heating unit adapted to be mounted in a cooking top surface and comprising a coiled heating element and a carriage structure joined thereto for supporting said element in an operative position parallel to said top surface, means for hinging said heating element for movement between a first position parallel to said top surface and an inoperative position oblique to said top surface, terminal members extending in stepped fashion from said element to connect said heating element to a source of electric power, a stationary terminal block depending from said top surface, means in said block receptive to said terminals with said heating element in said first position for completing the connection of said terminals to said power source, said circuit completing means opening said connection to said power source with the heating element in said second position, means for detachably locking said heating element to said hinging means to allow ready removal of said heating element from said hinging means, and means for latching said hinging means in said second position receptively poised for return of the heating element thereto.

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