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PLUG-IN SPEED UNIT

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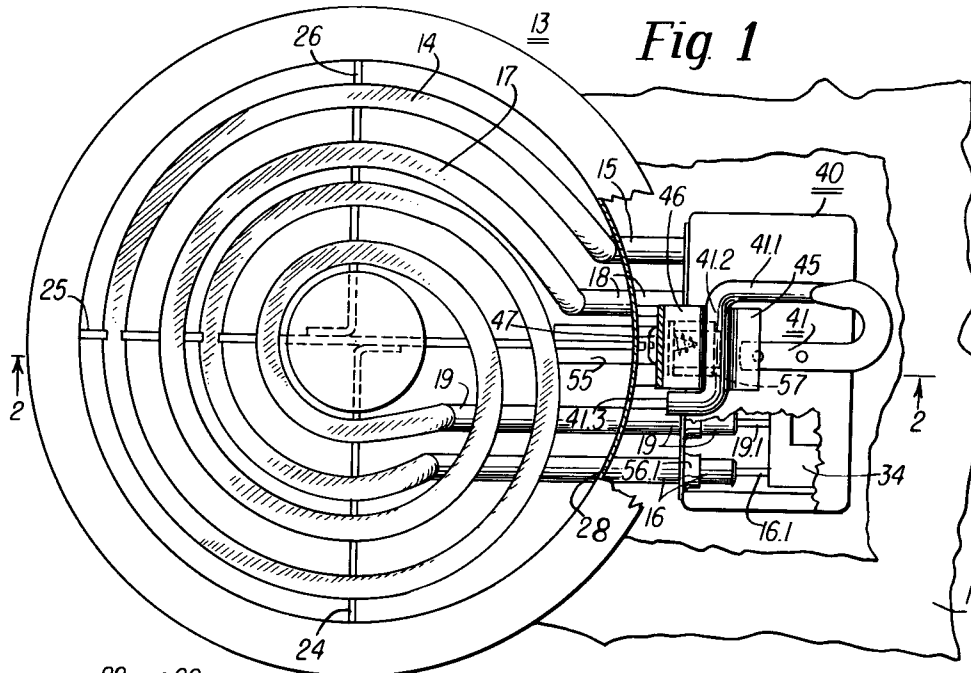


Fig 1

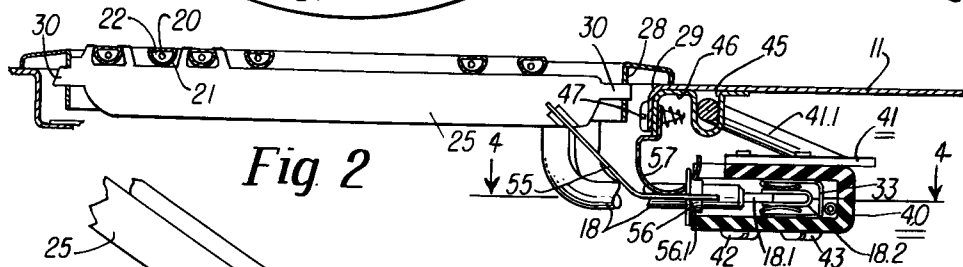


Fig 2

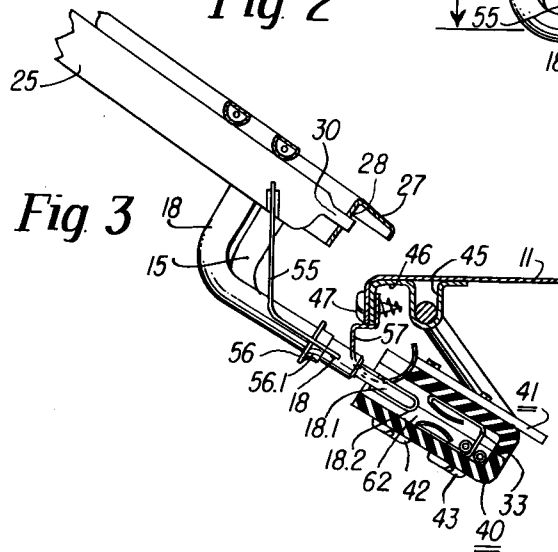


Fig 3

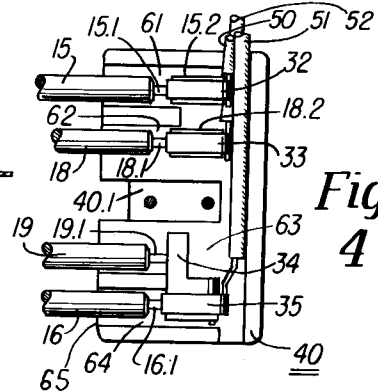


Fig 4

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PLUG-IN SPEED UNIT

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The present invention relates to surface cooking units for use in such applications as electric ranges and more particularly to mechanisms for detachably mounting the cooking unit to the range.

It is an object of the present invention to provide a simple, inexpensive device for maintaining a plug-in type heating unit in contact with the necessary electrical terminals, while allowing ready removal of the heating unit as desired.

It is another object of the invention to provide in a heating unit of the aforementioned type, a terminal assembly which is hinged to rotate through an arc of predetermined length to permit the easy removal of the heating unit therefrom, and which will remain in a position facilitating the return of the heating unit.

The invention in its preferred form includes a heating unit with plug-in connector terminals and a structure for securing the heating unit to a cooking surface. The structure includes a bracket which is mounted interiorly of the cooking surface adjacent a circular cutout in the cooking surface in which is nested the heating unit. The bracket has a rigid upper section and a resilient lower section. The upper section conforms generally in shape to that of the cooking surface and has a depending arched section for accommodating a hinge arm. The hinge arm is part of a support member which is mounted to an insulating terminal block in such a manner that the hinge arm is spaced from the surface of the terminal block and parallel to it. With the heating unit removed, the terminal block will swing toward a position determined by its center of gravity. The swing of the block is arrested by the lower annular resilient section of the mounting bracket which tends to stop and maintain the terminal block in a position receptive to the advance of the heating coil connector terminals. The heat coil terminals may then be advanced into the suitable terminal block sockets to form a solid physical and electrical engagement with the terminal block. With the terminals firmly contacting their cooperating connectors in the terminal block, the unit by virtue of the weight of the heating coil assumes its operative position parallel to the cooking surface.

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

FIG. 1 is a plan view of the complete heating unit with the cooking top partially sectioned away.

FIG. 2 is a side elevational view of the entire unit taken along the lines 2—2 of FIG. 1.

FIG. 3 is a fragmentary side elevational view taken along the lines 2—2 of FIG. 1 with the cooking unit partially removed.

FIG. 4 is a sectioned view of the terminal block taken along the lines 4—4 of FIG. 2.

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 heating unit 13. Usually there are three or four of such heating units suitably arranged about the cooking top.

Each heating unit essentially comprises a first sheathed heating element 14 having respective terminal portions 15 and 16 and a second sheathed heating element 17 hav-

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ing the terminal portions 18 and 19. Preferably, these elements will be constructed as described in the United States Patent No. 1,367,341 to C. C. Abbott, dated February 1, 1921 and in the J. C. Sharp Reissue Patent No. 22,177 of September 8, 1942. Each of the elements, as described in these patents, has a coiled resistance conductor 20 housed in a metallic sheath 21 and supported in uniformly spaced relationship to the sheath by a highly compacted mass 22 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 support 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 each of the support plates with a short tongue 30 brought through a suitable slot in the trim ring wall 28. 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 then rectilinearly beneath the cooking top 11. The conductors 20 of the individual heating units 13 are provided with the respective rigid exposed terminals 15.1, 16.1, 18.1 and 19.1. Terminals 15.1 and 18.1 have individual connection fittings 15.2 and 18.2 (FIG. 4) of generally known design, which are arranged for releasable electrical connection with the terminal receiving contact members 32 and 33 of a terminal block 40. As part of a conventional wiring circuit which provides for several levels of thermal output, the terminals 16.1 and 19.1 are permanently interconnected by an L-shaped bus bar 34, which in turn makes electrical contact with terminal receiving contact member 35 of said terminal block. As is conventional, the block 40 may be of a molded vitreous insulation material.

The respective terminal blocks 40 are each suitably hinged to the underside of the cooking top 11, whereby the associated heating unit 13 is established in hinged relation to its cooking top opening 12 by means of the solid fitting connection between the terminal fittings and bus bar 34 of the heating element terminals with contact members 32, 33 and 35 of terminal block 40. To accomplish this, a rigid hinging member 41 is affixed to the upper surface of the terminal block by means of suitable screw fastening members 42 and 43. The hinge member further has mid-portion 41.1 angled obliquely from the block and a further section 41.2 extending angularly from portion 41.1 in parallel spaced relation to the upper surface of the terminal block. This parallel

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section 41.2 is retained pivotally as a hinge pin within an arched section 45 of a bracket 46. Bracket 46 is generally formed of any suitable rigid metal and shaped to conform to the inner surface of cooking top 11 at its downwardly extending flange 29. The bracket is affixed at this location by means of a suitable self-tapping type screw 47 and holds the hinge pin rotatably in place. An offset finger 41.3 secures against lateral displacement of the hinge pin and acts as an ultimate stop against rotation of the block 40 by engaging with the underside of the cooking top 11.

Recapitulating, the heating unit normally rests with its trim ring horizontal rim 27 resting on the cooking top 11. The terminals extend in a plane parallel to the cooking top and spaced below it. The terminal ends are firmly but releasably held in electrical connection with the terminal receiving members. The terminal block 40 which individually insulates and houses these receiving members is held in place by means of the hinge bracket 41 which in turn is held in place by the mounting bracket arched section 45. This arched section, an integral part of mounting bracket 46, is held against the lower surface of cooking top 11 by means of the self-tapping screw 47.

In the normal operating condition, electrical circuits are completed from the flexible leads 50, 51, and 52 (shown in FIG. 4) of a 230 volt 3 conductor source through the proper terminal receiving members to their mating terminals and the heating elements in the generally known manner.

As is generally the practice the support structure should be grounded to the cooking surface. To accomplish this grounding, a metallic grounding bar 55 is interlaced about support plate 25 to allow for expansion of the element on heating and has as a secondary purpose the stabilization of the structure. The bar is secured to a grounding strip 56 which in turn has integral collars 56.1 which are crimped about the respective terminal portions of the heating element sheaths 21 to make electrical connection therein. The connection to the cooking top is completed through a resilient U shaped metallic grounding spring 57 which in the preferred form is secured to the rigid support bracket 46 and depends therefrom to resiliently contact the ground bar 55 when the heating unit is in its normal operating position. It should be noted that the contact of spring 57 to ground bar 55 is designed to occur before the heating element circuit completion as a safety measure.

If it is desired to clean the cooking top in the area below the trim ring 27, the heating unit 13 may be tilted to approximately the position of FIG. 3 by manually lifting the outer end of the trim ring. The terminal portions of the heating units maintain engagement with the contacts in the terminal block, and the block itself rotates through an equivalent arc about the hinge pin 41.2. The upward movement of terminal block 40 is arrested by the engagement of resilient ground spring 57 with the inwardly formed recess shoulder 40.1 of terminal block 40. In this arrested position, the heating unit may then be freed of the terminal connection by slide motion of the terminals up the plane formed by the terminal block sockets 61, 62, 63, and 64 as they retain the suitable terminals. As indicated in FIG. 3, the heating unit may then be removed completely from the cooking top opening. With the heating unit removed from the terminal block, the terminal block by virtue of its center of gravity and its hinging about hinge pin 41.2 retains the position approximately that of FIG. 3 so that the terminal block sockets are in receptive position for the return of the terminals.

It should also be noted that the grounding strap 56 serves as a stop for the downward movement of the terminals into the terminal block by engaging the outer wall 65 of the terminal block. The heating unit may then be rotated to its normal operative position.

The surface unit mounting means therefore provides

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for the simple hinging of the heating coils to facilitate the casual cleaning of the range cooking top, with the additional advantage of the complete removability of the unit when access to the range body below the cooking top is necessary. It will be observed that the terminal block contacts are so deeply seated in the terminal block that there is literally no possibility of accidental contact of the user's hand into possibly "live" conductors. An important practical advantage of the invention resides in the fact that the terminal block remains in a most advantageous position for the reception of the terminals during replacement of the unit. The user returns the unit to its operating relationship with the terminal block by a direct thrust, without having to engage concealed or difficultly accessible parts.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that 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. In an electric range having a cooking top formed with a cutout for receiving a cooking unit in a normal position parallel to said top and in which said cooking unit comprises a support structure and a flat coil heating element resting on said structure and having a plurality of rigid terminals extending from said coil substantially parallel to said coil and spaced therefrom, means for releasably receiving said heating element terminals for completing an operative circuit to said terminals while facilitating the removal of said cooking unit and the subsequent return thereof to operative position comprising: a terminal block having a plurality of terminal receptive sockets, each bearing therein a terminal connection member for electrical contact with said cooking unit terminals, means for mounting said terminal block from said cooking top for pivotal movement thereunder, said mounting means including a rigid member retaining said terminal block in spaced away relation from said cooking top, said mounting means further including means for positioning the sockets of said terminal block receptively angled toward said cutout for accepting the return of the terminals of said flat coil heating element upon insertion thereof from above the cooking top, and means for guiding said terminals into co-operative electrical contact with said terminal connection members, said hinge means thereupon operative to restore said heating element and said terminal block to a normal operative position parallel to said cooking top.

2. In an electric range having a cooking surface formed with a cutout for receiving a cooking unit in a normal position parallel to said surface and in which said cooking unit comprises a support structure traversing said cutout and a flat coil heating element resting on said structure which has a plurality of terminals extending from said coil substantially parallel to said surface; means for operably mounting said cooking unit to said surface and for completing an electrical circuit to said terminals comprising: a terminal block having a plurality of terminal receptive sockets, means for pivotally suspending said terminal block from said cooking surface, said suspending means comprising a hinge bar fixed to said terminal block, a bracket including an arched portion for retaining therein said hinge bar, said hinge bar positioning said terminal block spaced away from said bracket arched portion and rotatively movable thereabout, a resilient arcuate lower portion of said bracket arresting the free movement of said terminal block in an at rest position, said terminal block receptively angled toward said cutout in said at rest position, and contacts in each of said sockets comprising slide guides for guiding said terminals into readily detachable co-operative electrical contact with said terminal block contacts whereby said cooking unit may be readily removed from and returned to operative position, said cooking unit thereupon controlled by said

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suspending means to move in a direction opposite the resilient restraint of said bracket lower portion and pivot said terminal block until said cooking unit achieves its normal position parallel to said cooking surface.

3. In an electric range having a cooking surface formed with a cutout for receiving a cooking unit in a normal position parallel to said surface and in which said cooking unit comprises a support structure traversing said cutout and a flat coil heating element resting on said structure which has a plurality of terminals extending from said coil substantially parallel to said surface; means for operably mounting said cooking unit to said surface and for completing an electrical circuit to said terminals comprising: a terminal block having a plurality of terminal receptive sockets, means for pivotally suspending said terminal block from the underside of said cooking surface, said suspending means comprising a bracket having a rigid section conforming generally to the shape of the underside of said surface at said cutout and affixed thereto, said bracket rigid section further including an arched portion for retaining therein a hinge bar, said hinge bar positioned to support, said terminal block in spaced away relation from said bracket arched portion and rotatively movable thereabout, a resilient arcuate lower portion of said bracket arresting the free movement of said terminal block and resiliently restraining said terminal block in an at rest position, said terminal block receptively angled toward said cutout in said at rest position, and U-shaped contacts in each of said sockets forming means for guiding said terminals into readily detachable cooperative electrical contact with said sockets, said cooking unit thereupon operative to act in a direction opposite the resilient restraint of said bracket lower portion and pivot said terminal block until said cooking unit achieves its normal position parallel to said cooking surface.

4. In an electric range having a cooking surface formed with a cutout for receiving a cooking unit in a normal position parallel to said surface and in which said cooking unit comprises a support structure traversing said cutout and a flat coil heating element resting on said structure and having a plurality of terminals extending from said coil substantially parallel to said surface; means for operably mounting said cooking unit to said surface and for completing an electrical circuit to said terminals comprising: a terminal block having a plurality of terminal receptive sockets, contact means in each of said sockets for enclosing on three sides a terminal of said plurality in a manner allowing slide removal of said contact from said terminal to thereby position said heating coil to said terminal block in a jointly rotative manner, means for hinging said terminal block spaced from said cooking surface, said hinging means comprising a hinge bar affixed to said terminal block and having a spaced-away portion therefrom, means for pivotally securing said spaced-away portion of said hinge bar to said cooking surface at said cutout, said pivot securing means including a member for arresting the rotative movement of said terminal block and cooking unit obliquely to said cooking surface, a grounding arm extending from said support structure to contact said arresting member to form a ground connection from said cooking unit structure to said cooking surface when said cooking unit is in the normal position.

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5. In an electric range having a cooking surface formed with a cutout for receiving a cooking unit in a normal position parallel to said surface and in which said cooking unit comprises a support structure, and a flat coil heating element resting on said structure, said element including a plurality of rigid terminal members extending in a juxtaposed, spaced relation therefrom; means for securing said cooking unit operatively to said cooking surface comprising: means receptive to said terminal members comprising an insulating terminal structure pivotally secured to said cooking surface, a plurality of sockets in said terminal structure, resilient means in each of said sockets for receiving an individual one of said terminal members, said resilient means each firmly retaining therein the received terminal member in physical and electrical connection thereto, means for pivoting said terminal block for movement through an arc of finite length, means for arresting the pivotal movement of terminal structure, said terminals readily demountable by slide motion out of said sockets with the terminal structure in said arrested position, to thereby remove said heating element from said cutout, said pivoting means thereafter allowing said terminal structure to assume a position receptive to the advance of said terminal members for return of said heating element to said cooking surface.

6. In a cooking top formed with a cutout for receiving a cooking unit of the type including a flat coil heating element with a plurality of extending terminals offset from said coil; means for combinedly hinging said coil to the underside of said cooking top adjacent said cutout and for connecting said terminals to a current source, said means comprising a terminal block having conductors leading to said current source, a hinge bar secured to said terminal block for maintaining said block in spaced-away relation to the underside of said cooking top, means for restricting said hinge bar and consequently said terminal block to pivotal movement with respect to said cooking top, from a first position parallel to said cooking top to a second position oblique to said cook top, a grounding member resiliently depending from said cooking top at said cutout for forming a ground connection with said heating element when said element is in an operative position parallel to said cooking top, said grounding member positioned to rest against said terminal block when said terminal block is in said second position to thereby restrain said terminal block from movement out of said oblique position, said terminal block comprising a plurality of U-shaped cavities therein, a U-shaped resilient contactor within each of said cavities and collateral therewith, said plurality of terminals adapted to enter said cavities and said U-shaped contactors jointly, bias members on said U-shaped contactor arms for conductively connecting said terminals to said conductors, said terminals individually removable from said cavities against the bias of said bias members when said terminal block is maintained in said oblique position.

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