Dec. 31, 1963 J. McORLLY 3,116,400

ELECTRIC HEATERS

Filed Feb. 26, 1960 3 Sheets-Sheet 1

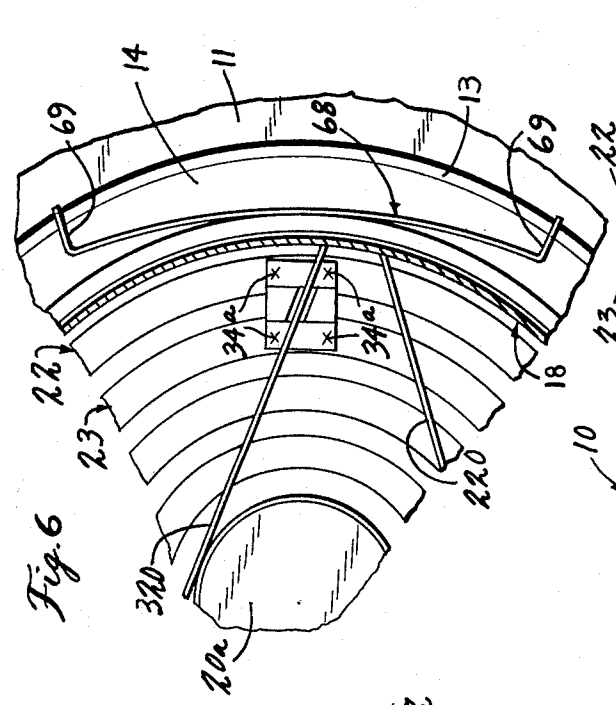


Fig. 6

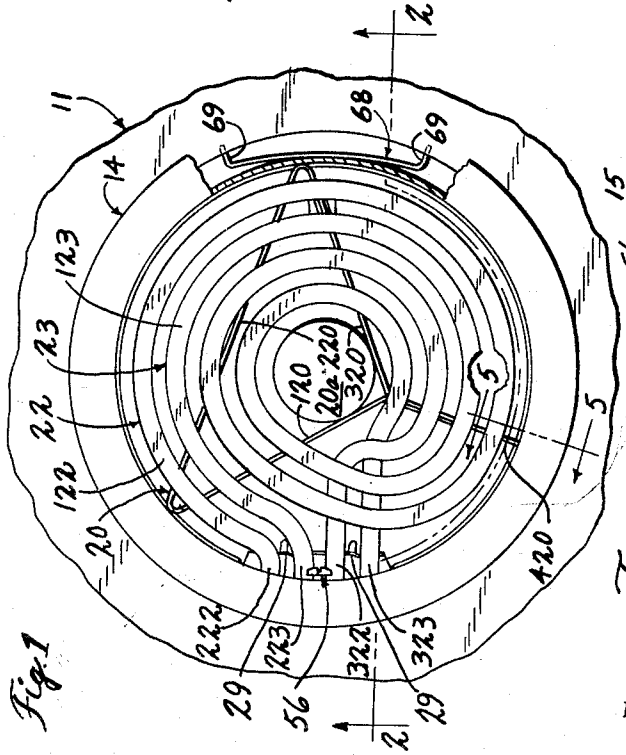


Fig. 1

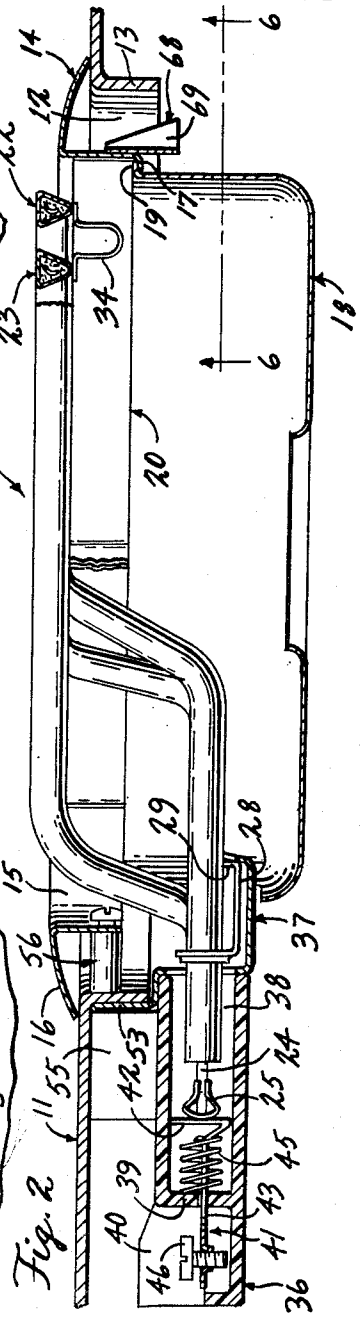


Fig. 2

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ELECTRIC HEATERS

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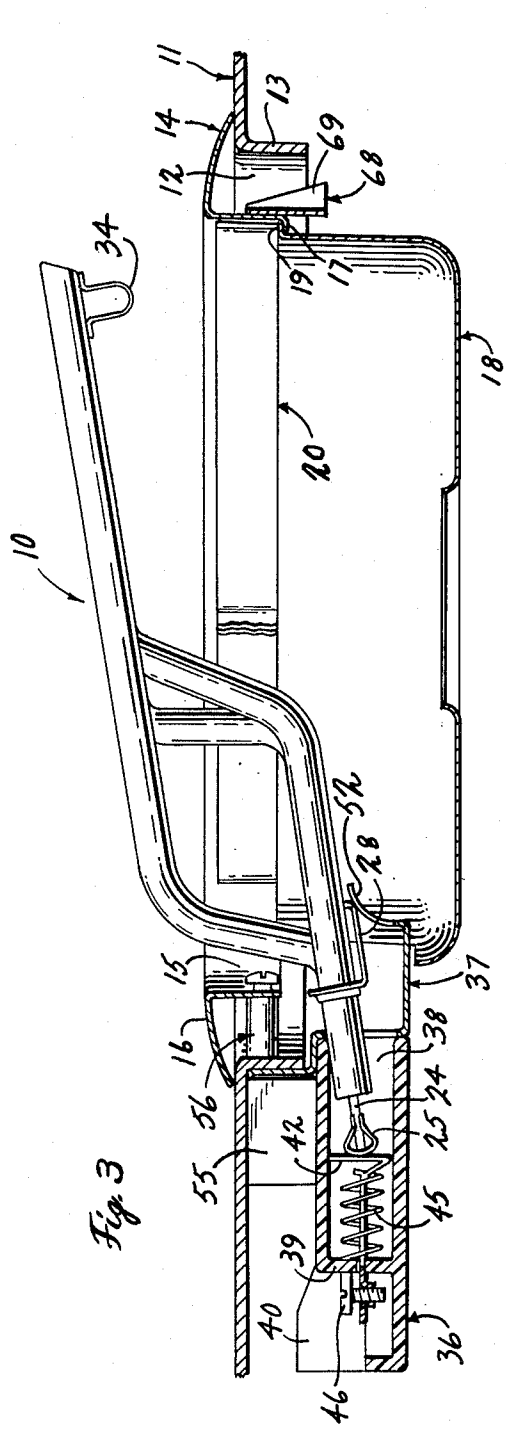


Fig. 3

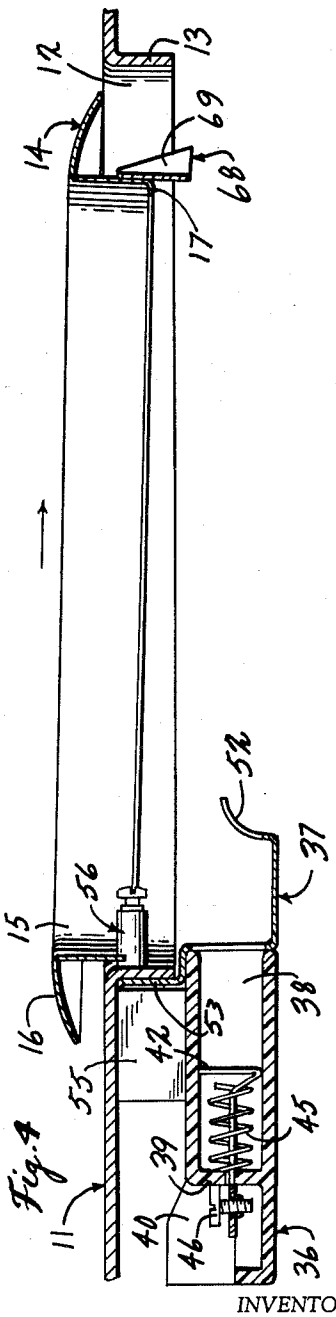


Fig. 4

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ELECTRIC HEATERS

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Fig. 5

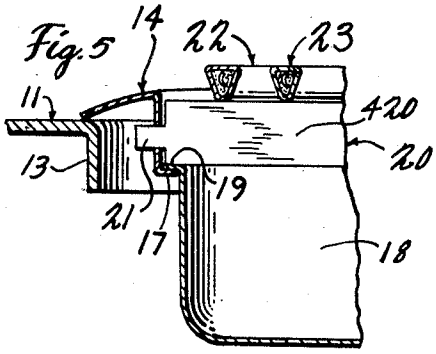


Fig. 7

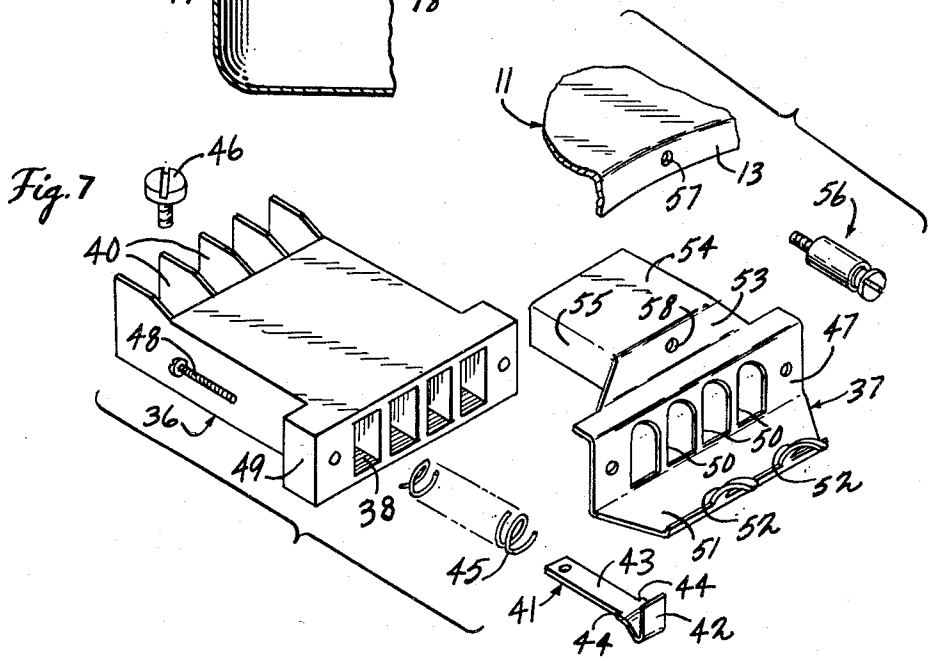


Fig. 8

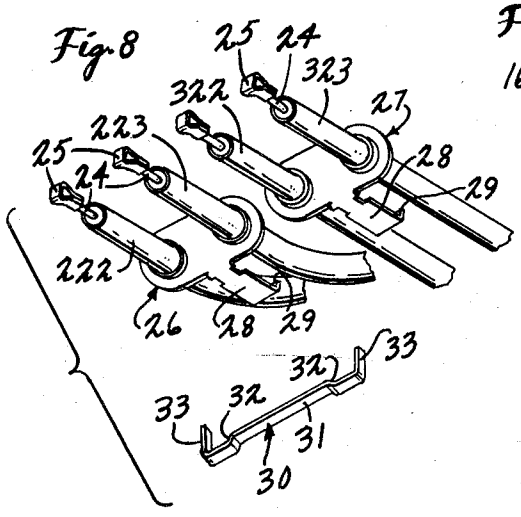
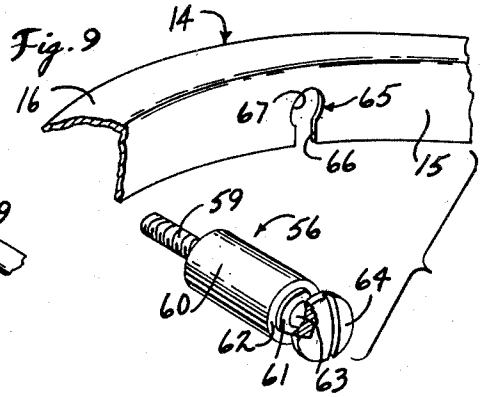


Fig. 9



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3,116,400
ELECTRIC HEATERS

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Filed Feb. 26, 1960, Ser. No. 11,297
6 Claims. (Cl. 219—37)

The present invention relates to electric heaters, more particularly to electric heaters adapted for use with ranges and the like, and the principal object of the invention is to provide new and improved electric heaters of the character described.

Practically all present day range-type surface heater assemblies have heating elements which are removably supported in heating position to provide for cleaning of the assembly portions and/or the underlying adjoining range portions. In most of these assemblies, however, the electrical leads are attached directly to the heating element resulting in two important disadvantages. Firstly, the attached leads limit free movement of the element and therefore, even in those constructions wherein the element is readily detachable from the remainder of the assembly and from the range, the cleaning operation is still difficult because the element remains attached to the leads and thus cannot be set aside out of the way. Secondly, and more importantly, constant flexure of the leads caused by shifting of the element results in breakage of the leads, or even worse, destruction of the insulated covering of the leads with the attendant danger of shorts or grounds.

In order to simplify cleaning, prevent lead damage, and facilitate replacement of inoperative heating elements, it has been proposed to provide elements which can be plugged into position in a manner somewhat similar to that employed in plugging an electrical appliance into an electrical outlet. However, most of these prior art, so-called plug-in units have not been commercially successful on a large scale because of high initial and service costs, erratic mechanical and electrical operation, difficulty of removal and replacement of the element, and other deficiencies of both major and minor importance.

A notable exception to most prior art, plug-in type, surface heater assemblies have been those of the type disclosed in Patent Number 2,790,062, and in the patent application of Joseph McOrlly for Electric Heaters, Serial No. 783,579, filed December 29, 1958, now Patent No. 3,017,490. Heater assemblies of this type have functioned extremely well and have achieved wide commercial success. Nevertheless, the manufacturing cost of such assemblies has been higher than desired and they have presented some minor service problems. Most importantly, such heater assemblies, because of their design, require more vertical space than many range manufacturers desire.

The present invention is an improvement of the previously mentioned patent and application in that it provides a simplified, lower-cost construction which requires materially less vertical space. These and other advantages will readily become apparent from a study of the following description and from the drawings appended hereto.

In the drawings accompanying this specification and forming a part of this application there is shown, for purpose of illustration, an embodiment which the invention may assume, and in these drawings:

FIGURE 1 is a top plan view of the invention, partially broken away to illustrate underlying structure,

FIGURE 2 is an enlarged sectional view generally corresponding to the line 2—2 of FIGURE 1,

FIGURE 3 is a view similar to FIGURE 2 but with certain parts in other positions,

FIGURE 4 is a view similar to FIGURE 3 but with certain parts removed and illustrating a stage in the assembly operation,

FIGURE 5 is a fragmentary sectional view generally corresponding to the line 5—5 of FIGURE 1,

FIGURE 6 is a fragmentary sectional view generally corresponding to the line 6—6 of FIGURE 2,

FIGURE 7 is an exploded perspective view of certain details,

FIGURE 8 is an exploded, bottom side perspective view of certain details, and

FIGURE 9 is a further enlarged, separated, fragmentary perspective view of certain details.

With particular reference to FIGURES 1 and 2, the present invention comprises a surface-type, electric heater assembly **10** which is adapted to be carried by the top **11** of a range or the like. As herein disclosed, the heater assembly **10** fits within an opening **12** formed in the range top **11**, the latter being formed to provide an annular depending wall **13** which defines such opening.

Heater assembly **10** presently comprises a trim ring **14** having a tubular portion **15** of a size smaller than the range top opening **12** so as to fit therewithin and an upper, outwardly turned, annular flange portion **16** which overlies the range top opening and rests upon the upper range top surface. Tubular portion **15** of the trim ring provides at its lower end an inwardly turned, annular flange forming a shoulder **17**. Adapted to be carried by trim ring **14** is the usual drip, or reflector, pan **18** having at its upper end an outwardly turned, annular flange **19** which rests upon the trim ring shoulder **17**.

Resting upon the drip pan annular flange **19** is the usual spider **20** which is presently formed of a length of strip material positioned on edge and formed to a triangular configuration (see FIGURE 1) to provide legs **120**, **220** and **320**. Extending from the juncture of spider legs **120**, **320** and outwardly of the triangular configuration is a fourth leg **420**. As shown in FIGURE 5, the free end of leg **420** is reduced in size to provide a tongue **21** which projects through an aperture in the tubular trim ring portion **15** thus insuring disposition of the spider in a predetermined position with respect to the trim ring. As herein disclosed, the spider may carry the usual medallion **20***a* which is centered in the central opening of the heating surface of the later to be described heating element.

Adapted to rest upon the spider **20** for support thereby is the usual elongated, tubular, metallic sheathed electric resistance heating element having its intermediate portion convoluted to provide a generally circular, plane heating surface upon which the vessel to be heated may be disposed. In the present embodiment, a pair of such elements **22** and **23** are provided, the former having a convoluted, intermediate heat-generating portion **122** and terminal end portions **222**, **322**, and the latter having a convoluted, intermediate heat-generating portion **123**, interwound with portion **122**, and terminal end portions **223**, **323**. As in the usual constructions, the element terminal ends are grouped together beneath the convoluted, intermediate element portions to extend in side-by-side relation beyond the heating surface provided by the latter. The free end of each element terminal end has the usual terminal pin **24** extending therefrom which conducts electrical energy to the resistor conductor embedded in the intermediate element portion and to each terminal pin there is secured by welding or the like a contact **25** preferably of the type disclosed in the previously identified patent application of Joseph McOrlly et al.

Means are provided for securing the elements **22**, **23** together to provide a unitary structure and in the present embodiment, as best seen in FIGURE 8, a flange member **26** extends between the adjoining element terminal ends **222**, **223**, and a flange member **27** extends between the

element terminal ends 322, 323. Each flange member is apertured to pass a respective element terminal end portion and each is secured in any suitable manner to respective terminal ends in spaced relation to the latter's free ends. At the present time, each flange aperture is margined by an annular boss which is crimped about the element to hold the parts permanently assembled; however, these flanges could be welded, brazed or otherwise secured in position if desired. For a purpose to appear, the lower margin of each flange member has a transversely projecting tab 28 which extends along the element terminal ends in a direction toward the convoluted portions of the elements. The free ends of tabs 28 are bent upwardly to provide an abutment 29 for a purpose to be seen and each abutment preferably has an arcuate surface as illustrated in FIGURE 8.

Each tab 28 is reduced in width adjacent its flange to provide spaced shoulders for confining therebetween a flange connecting member 30. Prior to assembly, as seen in FIGURE 8, member 30 is a U-shaped metal strip, of a width to closely fit between the tab shoulders, whose bight portion 31 is indented to provide spaced, oppositely facing abutments 32. Member 30 is adapted to be assembled with the flange tabs 28 whereby the reduced size portion of each tab is seated between a respective member leg 33 and a respective adjoining member abutment 32. The free ends of the member legs 33 are then bent toward each other to overlie respective tabs and thus retain the parts assembled. With the parts thus assembled, it will be understood that the member 30 retains the flanges 26, 27 and therefore their element terminal end pairs 222, 223 and 322, 323 is the desired spaced relation.

Additional means are also provided for securing together the elements 22, 23 and as best seen in FIGURE 2, a U-shaped spring member 34 has outwardly turned leg portions welded at 34*a* to the underside of respective adjoining outermost element convolutions whereby the member 34 depends from the element convolutions in generally opposed relation to the element terminal ends. As best seen in FIGURE 6, spring member 34 is slotted at 35 to straddle the leg 320 of the spider 20 and thus insure centralization of the element convolutions with the trim ring.

Turning now to the means provided for establishing electrical connections to the element terminal ends, such means comprises a dielectric terminal block 36 for receiving the element terminal ends and a supporting bracket 37 therefor. Considering first the terminal block 36 and referring particularly to FIGURES 2 and 7, such block is provided with a plurality of horizontally extending recesses 38 each for receiving a respective element terminal end. In the position of parts illustrated, each recess is open in a direction toward the element convolutions and each is bottomed by a wall 39. Each wall is slotted for a purpose to appear and the left end of the block provides a plurality of pockets 40, each aligned with a respective recess and each open at the top for a purpose to appear. As herein shown, the block portions defining and separating respective pockets 40 extend upwardly some distance to insure adequate electrical clearance above certain later to be described electrically conductive parts disposed in respective block pockets.

Disposed within each block recess 38 (see FIGURE 2) is a contact member 41 having a head portion 42 disposed in a respective block recess and a shank portion 43 extending through a respective slotted block wall 39. Each member head portion 42 is of a size to slidably fit within its respective recess while each shank portion 43 is reduced in width (see FIGURE 7) to provide shoulders 44 adjacent the head portion. Surrounding each shank portion 43 and abutting a respective recess wall 39 and shank portion shoulders 44 is a helical spring 45 which resiliently urges each contact member to the right to engage its head portion with a respective contact 25 to thus establish an electrical connection therebetween.

As best seen in FIGURES 2, 3 and 4, that part of each shank portion 43 which projects beyond the block wall 39 has a threaded aperture for receiving a screw 46 by means of which the usual electrical leads (not shown) may be attached to respective contact members. Each screw 46 also serves another function and as shown in FIGURES 3 and 4, the head of such screw engages a respective block wall 39 to limit movement of a respective contact member to the right. Obviously, assembly and removal of a contact member 41 with the terminal block 36 may readily be effected following removal of its screw 46 through the open top of the pocket 40 in which it is positioned.

Turning now to the previously mentioned bracket 37 and referring particularly to FIGURE 7, such bracket comprises an upright portion 47 securable to the recessed face of the terminal block by means of screws 48 which pass through laterally extending ears 49, formed on respective sides of the terminal block, and which are threaded into the bracket. As illustrated, portion 47 of the bracket has a plurality of apertures 50 of generally the same size as and aligned with respective block recesses 38. Extending generally horizontally from the bracket portion 47 is a portion 51 which terminates in a pair of tongues 52 which, in the present embodiment, are formed to an arcuate configuration (see FIGURE 4) and provide upwardly extending, inclined cam surfaces spaced from the bracket portion 47 in a direction toward the heat-generating portions of the heating elements for a purpose to appear. Tongues 52, it is to be understood, are so positioned that each engages a respective tab abutment 29 of a respective element flange member 27 when the element terminal ends are disposed as seen in FIGURE 2 extending through respective bracket apertures 50 and within respective block recesses 38.

To provide for securing the bracket 37 to the range top 11, such bracket is provided with an off-set, generally vertical flange 53 for abutting the outside of the range top annular wall 13 (FIGURE 2) and a generally horizontally extending portion 54 which underlies and abuts the underside of the range top. Side margins 55 of portion 54 are bent downwardly to engagement with the upper surface of the terminal block for a purpose to appear. Means are provided for removably securing the bracket 37 to the range top and as presently disclosed, a screw 56 passes through an enlarged aperture 57 in the range top flange 13 and is threaded into an aperture 58 in the bracket flange 53 to retain the parts assembled as seen in FIGURE 2.

For reasons later to be seen and as best shown in FIGURE 9, screw 56 has a threaded shank portion 59 for passing through the aforesaid apertures 57, 58, an enlarged diameter portion 60, a reduced diameter portion 61 providing a shoulder 62, a further reduced diameter portion 63, and a slotted, enlarged head portion 64. Screw 56, when assembled with the range top as seen in FIGURE 2, projects radially inwardly of the range top opening 12 to dispose its shoulder 62 for engagement with the trim ring tubular portion 15 when the latter is centered within the range top opening. Although screw 56 is herein shown to be formed in one piece, it will readily be apparent that it could be formed of a plurality of parts such as a conventional screw upon which a tubular sleeve is assembled.

Still referring to FIGURE 9, trim ring 13 has a slot 65 extending upwardly of the lower margin of its tubular trim ring portion 15. The lower portion 66 of slot 65 is of a size to pass portion 63 of screw 56 but small enough not to pass screw portion 61. The upper portion 67 of slot 65 is enlarged to pass screw portion 61 but small enough not to pass screw portion 60. In the assembled position of parts seen in FIGURE 2, the tubular trim ring portion 15 abuts the screw flange 62 to thus locate the trim ring centrally of the range top opening with screw portion 61 extending through the

enlarged slot portion **67** to thus orient the trim ring with the range top. It is to be noted that since screw portion **61** is too large to pass through the reduced size slot portion **66**, the ring is held against elevation from the position seen in FIGURE 2 until the ring is first shifted to the right (as viewed in FIGURE 2), to align its slot with the screw portion **63**.

Means are provided for resiliently maintaining the tubular flange portion **15** of the trim ring in engagement with the flange **62** of the screw **56** and as herein disclosed, see FIGURES 1 and 6, a spring metal strip **68** has its intermediate portion spot welded or otherwise secured to the exterior of the tubular trim ring portion **15** in opposed relation to the trim ring slot **65**. Strip **68** has its end portions **69** bent transversely to extend radially outwardly of the trim ring and the free ends of portions **69** are inclined, as shown in FIGURE 2, for engagement with the lower margin of the range top annular wall **13**. It will be noted that with the parts assembled as seen in FIGURE 2, strip portions **69** are resiliently engaged with the range top wall **13** thus urging the trim ring to the left to engagement with the screw shoulder **62**. Furthermore, because of the inclination of the free ends of strip portions **69**, the right side of the trim ring annular flange **16** will be resiliently seated against the range top surface.

With the parts assembled in the normal heating position seen in FIGURE 2 and assuming the unit is to be disassembled for cleaning, the elements **22**, **23** will first be raised as a unit to the position seen in FIGURE 3. During such movement of the elements, it will be understood that the abutments **29** of the element flange members **26** and **27** will slide upwardly along the cam surface provided by respective bracket tongues **52** and that the contacts **25** carried by the free ends of the element terminal end portions will move to the right under the urging of the helical springs **45** within the terminal block recesses. With the elements positioned as seen in FIGURE 3, their terminal end portions may be withdrawn from the terminal block recess by a slight additional upward movement of the elements and by shifting the latter to the right. The elements may then be set aside out of the way as they seldom require cleaning because their high operating temperature normally burns off any matter which may be spilled thereon.

Assuming the heating elements to be removed from the assembly as above described, the spider **20** will be removed by lifting it out of the trim ring tubular flange **15** and withdrawing its tongue **21** from the flange aperture. The drip pan **18** may then be raised from its resting place on the trim ring shoulder **17** by first elevating its right end (in the position of parts shown) so as to withdraw its left end from beneath the terminal block bracket **37**. Removal of the trim ring may now be effectuated by moving the latter to the right, against the resiliency of the spring strip **68**, until the trim ring slot **65** is vertically aligned with the portion **63** of the screw **56**. The left end of the trim ring may then be elevated to disengage it from the screw **56** so that the ring may be removed from the range top.

Normally, no further disassembly is required since that portion of the bracket **37** which may require cleaning together with the portion of the range top adjacent the range top opening are now readily accessible for cleaning. The trim ring, spider and drip pan, of course, may be immersed in water and washed in the same manner as a dish. In the event, however, that further disassembly is necessary; such as, for example, if a broken spring **45** were to be replaced, it is only necessary to remove the screw **56** whereupon the bracket and terminal block may be withdrawn through the range top opening an amount sufficient to allow the previously mentioned but not illustrated electrical leads to be disconnected from the terminal block. The latter may then be separated from the bracket by removing the screws **48** and the broken spring withdrawn from the block by removing the appropriate screw **46** and its contact member **41**. Assembly of the terminal block, the bracket and the parts carried by the terminal block will be effectuated by reversing the foregoing disassembly operations.

Assuming that the bracket **37** has not been disturbed, or if it has, that it and the parts connected therewith have been replaced, normal reassembly of the unit following cleaning will be as follows: Referring to FIGURE 4, the trim ring **14** will be positioned as illustrated with its left side resting upon the screw **56**, the ring slot **65** being aligned with the screw, and with its right side disposed within the range top opening. The trim ring will then be shifted in the direction of the arrow, against the urging of the spring strip **68**, until the ring slot **65** is vertically aligned with the screw portion **63**. The left side of the ring may then be dropped to permit the ring flange **16** to rest upon the upper surface of the range top. The trim ring may then be released whereupon the spring strip will shift the ring to the left to abutment with the screw shoulder **62**.

The drip pan **18** will then be inserted within the trim ring and lowered to its resting place upon the latter's shoulder **17**. Next, the spider will be inserted within the ring to rest upon the drip pan flange **19**, the spider tongue **21**, of course, being projected through the slot provided therefor in the ring tubular portion. Finally, the element terminal ends will be inserted within respective terminal block recesses **38** to engagement with respective contact members **41** whereby the element will be positioned as seen in FIGURE 3 with its flange abutments **29** resting upon the upper ends of the bracket tongues **52**.

The element may now be pressed downwardly to rest upon the upper surface of the spider **20** as shown in FIGURE 2. During movement of the element from the position seen in FIGURE 3 to the position seen in FIGURE 2, the element flange abutments **29** will slide downwardly along the cam surfaces provided by respective bracket tongues **52** to urge the element terminal ends to the left. Movement of the element terminal ends to the left will cause a corresponding movement of the contact members **41**, the coil springs **45** yielding to permit such movement of the contact members and functioning to maintain the latter in constant engagement with respective element contacts **25** to thus insure good electrical contact therebetween.

It is to be understood that during movement of the element from the position seen in FIGURE 3 to the position seen in FIGURE 2, there will be a tendency for the bracket **37** and its attached terminal block to rotate in a clockwise direction about the place of attachment of the bracket with the range top because of the resistance to such element movement offered by the springs **45**. However, since portion **54** of the bracket underlies and abuts the range top and since bracket side portions **55** abut the top of the terminal block, such clockwise movement will effectively be resisted despite the fact that the bracket **37** is attached to the range top by the single screw **56**.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiment is illustrative only and that my invention is not limited thereto.

I claim:

1. A surface type electric heater assembly for a range top, comprising a dielectric terminal block fixed beneath said range top and adjacent to the defining surface of an opening in said range top, said terminal block having an elongated recess opening in a direction toward the range

top opening and said recess being non-circular in cross-section, a sheet-metal contact member movable longitudinally within said recess and having one end directed toward the recess opening bent transversely to form a head which slidably engages spaced side walls of said recess to hold said contact member against rotation, and said contact member having its opposite end slidably projecting through a slot in the bottom wall of said recess, a coil spring disposed about said contact member and having one end bearing against the interior of said bottom wall and its opposite end bearing against said head, and an electric heating element supported by said range top and normally disposed within the range top opening, said heating element having a terminal portion projecting through the opening of said elongated recess and removably fitting within the latter in engagement with said contact member.

2. The construction according to claim 1 wherein a screw is threaded into that part of said opposite end which extends outwardly of said recess, said screw being adapted to clamp a conductor to said contact member and being abuttable with the exterior of said bottom wall to limit inward projection of said contact member.

3. The construction according to claim 2 wherein said screw is movably disposed within a stall having an upper open end and formed by parts of said dielectric terminal block.

4. A surface type electric heater assembly for a range top, comprising a dielectric terminal block fixed beneath said range top and adjacent to the defining surface of an opening in said range top, said terminal block having four parallel elongated recesses each opening in a direction toward the range top opening, a contact member movable longitudinally within each recess, an electric heating element supported by said range top and normally disposed within the range top opening, said heating element comprising a pair of sheathed heating units having intermediate active heating portions convoluted and interlaced to form a horizontal heating surface, the two terminal ends of each unit being disposed beneath and extending to one side of said heating surface, the four terminal ends being disposed in alternate side by side relation and projecting through openings of respective recesses and removably fitting within such recesses in engagement with a respective contact member, a flange

member rigidly secured to and extending between each of a pair of terminal portions, each flange member having a projecting tab, the tabs extending in the same direction, and a flange connecting member extending across the two tabs and having seats for receiving the same, said flange connecting member holding said flange members in connected relation.

5. A surface type electric heater assembly for a range top, comprising a dielectric terminal block beneath said range top and at one side of an aperture therein, said block having a horizontally elongated recess whose mouth faces toward said range top aperture, an electric heating element normally supported by said range top in alignment with said range top aperture and having a terminal portion extending through the mouth of said block recess for disposition within the latter, a contact member bodily movable longitudinally within said block recess and having a stem portion extending longitudinally of said recess and terminating in a transversely extending face engaged with the free end of said element terminal portion, a coil spring within said block recess and encircling said contact member stem portion and normally biasing said contact member face toward said recess mouth to abutment with said element terminal portion, and means for connecting an electrical lead to said contact member stem portion in spaced relation to said contact member face.

6. The construction according to claim 5 wherein a bracket is carried underneath said range top and said terminal block is carried by said bracket, and wherein cam means in part carried by said bracket and in part carried by said heating element releasably holds said terminal portion within said recess and in abutment with said contact member.

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