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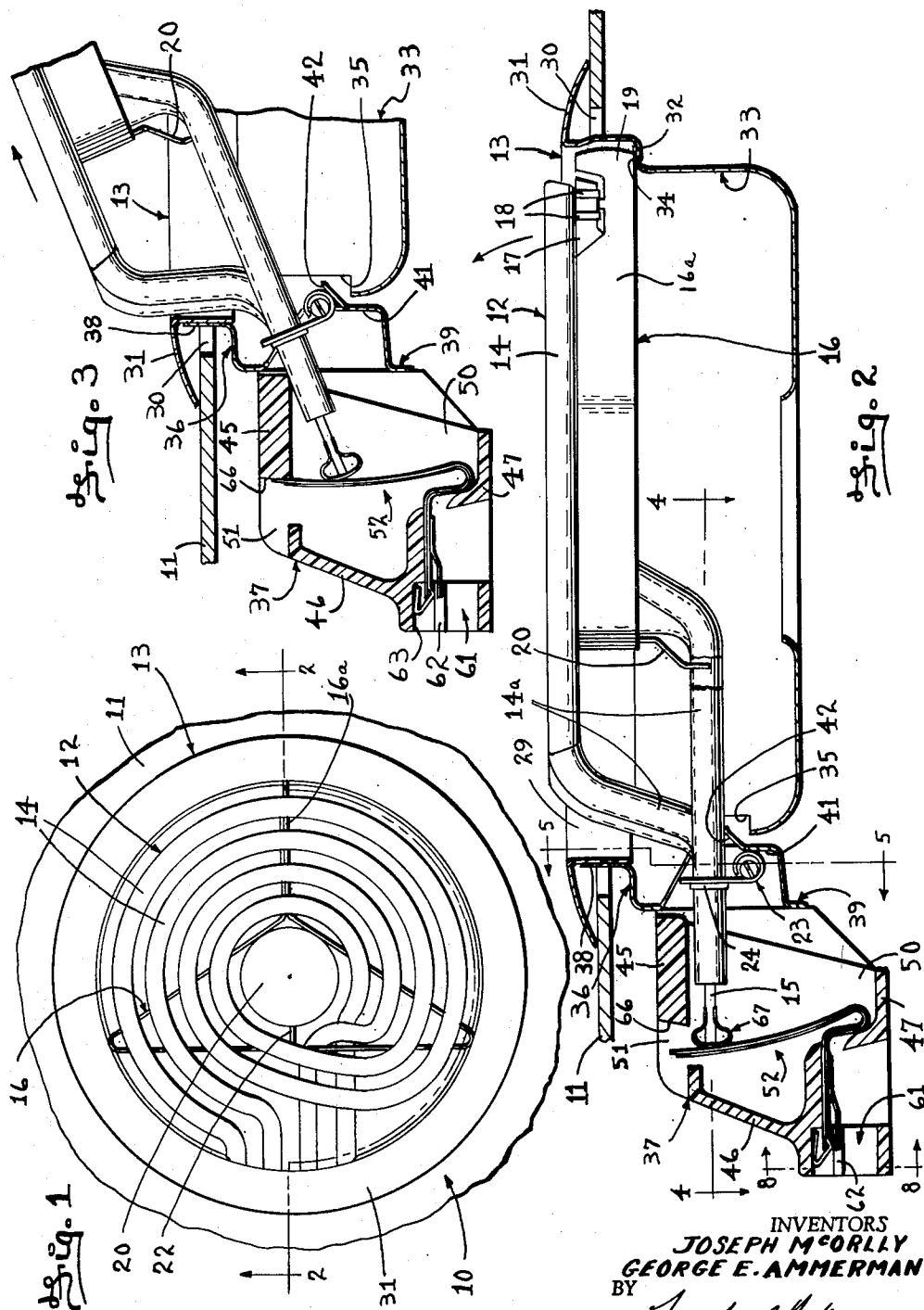
J. McORLLY ETAL

3,017,490

ELECTRIC HEATERS

Filed Dec. 29, 1958

3 Sheets-Sheet 1



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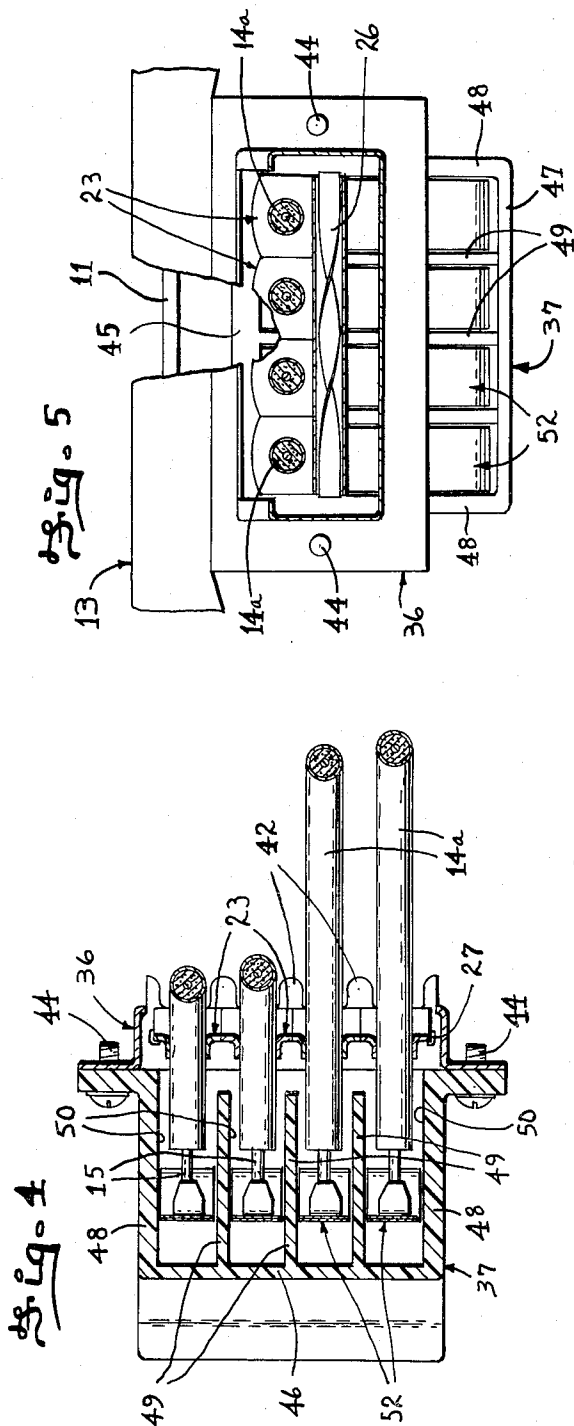
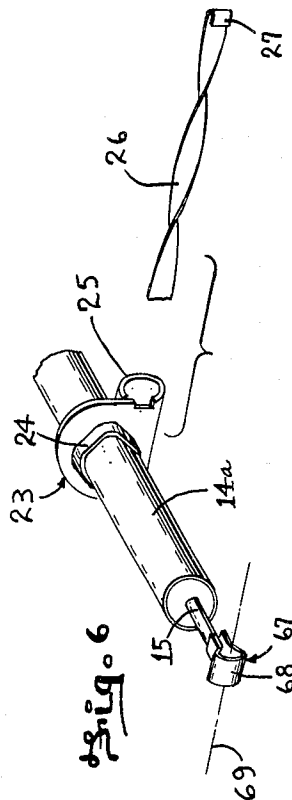
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3 Sheets-Sheet 2



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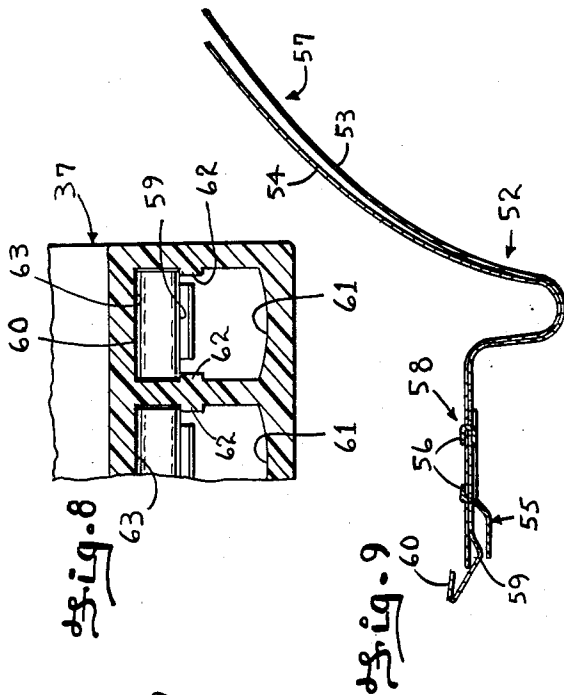
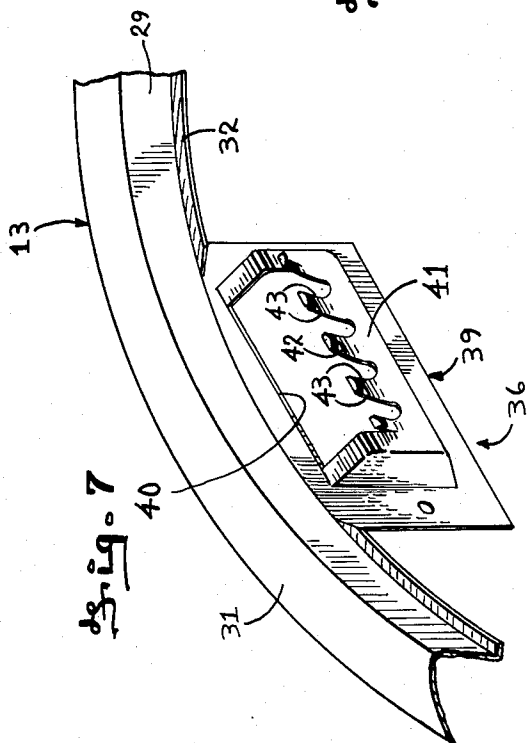
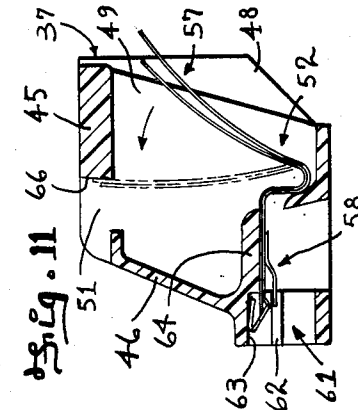
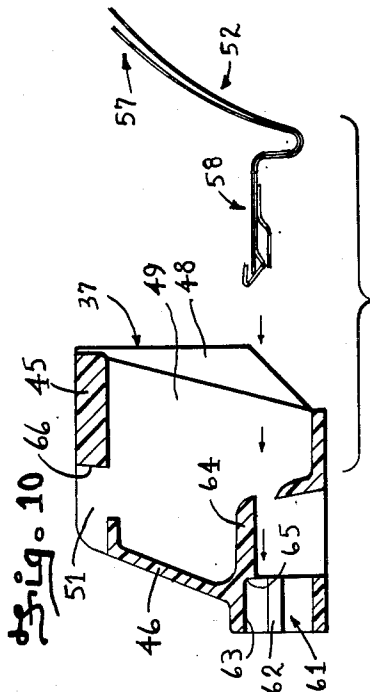
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3 Sheets-Sheet 3



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3,017,490

ELECTRIC HEATERS

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Filed Dec. 29, 1958, Ser. No. 783,579

26 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 range portions which underlie the element. 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. Accordingly, even in those constructions where 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 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, none of these prior art constructions have been commercially successful on a large scale because of high initial and service costs, erratic mechanical and electrical operation, difficulty of replacing the element following its removal, and other deficiencies of both major and minor importance.

The present invention provides a range-type surface heater assembly which eliminates the above mentioned deficiencies of prior-art constructions. 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,

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

FIGURE 3 is a fragmentary view similar to FIGURE 2 but with certain parts in another position,

FIGURE 4 is a fragmentary sectional view generally corresponding to the line 4—4 of FIGURE 2,

FIGURE 5 is a fragmentary sectional view generally corresponding to the line 5—5 of FIGURE 2,

FIGURE 6 is a fragmentary, exploded perspective view of certain details,

FIGURE 7 is a fragmentary perspective view of another detail,

FIGURE 8 is a further enlarged fragmentary sectional view generally corresponding to the line 8—8 of FIGURE 2,

FIGURE 9 is an enlarged sectional view of a detail seen in FIGURE 2,

FIGURE 10 is a reduced size elevational view of the view of the detail seen in FIGURE 9 together with a sec-

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tional view of another detail seen in FIGURE 3 during a stage of assembly thereof, and

FIGURE 11 is a view similar to FIGURE 10 but showing another stage of assembly.

With 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. In the present embodiment, assembly 10 comprises two major subassemblies; i.e., a heating element assembly 12 and a trim ring assembly 13, the latter of which is supported by the range top 11 and in turn supports the element assembly.

Heating element assembly 12 preferably includes a pair of tubular sheathed heating elements 14. Such heating elements usually comprise an elongated tubular metallic sheath filled with compacted electric-insulating, heat conductive material in which is embedded an electric resistance member, or resistor. Such resistor normally terminates short of respective sheath ends and each end thereof is electrically connected to respective terminal pins 15 which project beyond respective sheath ends for conducting electrical energy to the resistor.

As in the usual construction, each heating element 14 has its intermediate portion (that portion which contains the resistor member) convoluted to provide a generally flat, vessel supporting, heat-generating surface. As illustrated, the convoluted intermediate portions of respective elements are arranged to cooperate with each other to provide the above mentioned surface. The terminal ends of respective elements 14 are bent to provide generally parallel, spaced-apart legs 14a which are spaced below (in position of parts seen in FIGURE 2) the heat generating surface and which extend beyond the margin of the surface for a purpose to appear.

It is an important feature of the present invention that two elements 14 are provided instead of one as was heretofore employed in prior-art units of this general type. The use of two units provides for greater heat output while at the same providing for greater flexibility of operation since the elements may, if desired, be energized separately. It is a further feature of the invention that while two elements are employed in each assembly, either may be readily replaced in the field without special tools or equipment in the event of element failure. This is an important factor in reducing service costs as will be evident.

The means for connecting respective elements 14 together to provide the element assembly 12 in part comprises a spider member 16 which underlies the convoluted heat-generating portions of the elements. This spider is preferably of the type shown and described in detail in the patent application of Joseph McOrlly et al., entitled Electric Heaters, filed July 24, 1956, Serial No. 599,825, now Patent 2,877,334. Briefly, such spider comprises a length of strip material positioned on edge and formed to a triangular configuration (see FIGURE 1). A leg 16a, formed by the juxtapositioned ends of the strip, projects from the aforementioned triangular configuration and one of the strip ends provides a tongue 17 which passes through loops 18 which are welded or otherwise secured to and depend from adjoining portions of respective elements 14. The other end of the strip has an abutment 19 and such strip end will be bent to dispose the abutment 19 in alignment with the end of tongue 17 to prevent its withdrawal from the loops 18. Obviously, the foregoing connects together the spider and those portions of elements 14 which are spaced furthest from respective element terminal legs 14a.

Means are provided for retaining that portion of the spider 16 which is adjacent the terminal legs 14a in position beneath the convoluted element portions. At the

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present time, such means comprises a bracket 20 (see FIGURE 2) welded or otherwise secured to the spider and overlying and abutting one of the terminal legs 14a. The portion of the bracket adjacent the one leg 14a is preferably forked to straddle such leg and therefore retain the spider in proper alignment beneath the elements. If desired and as seen in FIGURE 1, a medallion 21 or the like may be carried by the spider in the center of the element convolutions in a manner similar to that disclosed in the above mentioned patent application of McOrlly et al. Such medallion may be conveniently held in place by means of a tongue 22 carried by the bracket.

Means are provided for removably connecting the terminal leg portions 14a of the elements 14 together (and for another purpose later to be disclosed) and as best seen in FIGURE 6, such means comprises a flange member 23 secured to each terminal leg portion. Each flange member 23 has an extruded portion providing an opening for passing a respective terminal leg and such extruded portion provides an annular collar 24 extending axially of the terminal leg. Each flange member 23 is preferably secured to a respective terminal leg by deforming opposed portions of collar 24 radially inwardly into locking engagement with its terminal leg. The deformation of collar 24 is preferably such that the deformed collar portions are actually embedded somewhat into the terminal leg to insure against movement of the collar either axially of the leg or movement thereof radially about the leg. Obviously, flange members 23 could be welded or otherwise secured to the terminal legs if the increased cost of such construction can be justified.

Each flange 23 is formed to provide a tubular portion 25 whose axis extends transversely of its terminal leg and which, in the position of parts seen in FIGURES 2 and 6, is disposed beneath such leg. It is to be understood, of course, that the flange members 23 are secured to respective terminal legs 14a to dispose the tubular portions 25 in axial alignment for a purpose to be seen.

As best illustrated in FIGURE 6, a spiraled metal strip 26 extends through the aligned tubular flange portions 25 to function as a pin for retaining such portions in alignment. Respective ends of strip 26 are bent back on themselves at 27 to overlie the exterior of respective endmost tubular flange portions to retain the strip assembled with the flanges. To prevent rotation of the strip within the tubular flange portions, a notch 28 is preferably formed in the latter for receiving respective strip ends 27. With reference to FIGURE 2, it will be noted that the inside diameter of tubular flange portions 25 is somewhat greater than the effective outside diameter of the spiraled strip 26. This permits a certain limited amount of floating movement of the terminal ends of the element to compensate for slight manufacturing tolerances and to accommodate expansion and contraction of the elements during heating and cooling.

With the construction thus far disclosed, it will be apparent that the elements 14 may readily be separated from the spider in the event a non-operative element or a damaged spider is to be replaced by straightening an end 27 of strip 26 to thus permit the latter's withdrawal from the aligned tubular flange portions 25 and by disengaging the elements from the spider by withdrawing tongue 17 thereof from the loops 18 (after first bending the spider leg portion 15a which carries abutment 19 so that the latter does not overlie the free end of the tongue 17). Reassembly will be effectuated by reversing the foregoing.

Turning now to the previously mentioned assembly 13, the presently disclosed embodiment comprises a trim ring having a tubular portion 29 (see FIGURE 2) for fitting within an aperture 30 formed in the range top 11 and an upper, radially outwardly extending flange portion 31 which rests upon the range top adjacent the range aperture. Although not shown, the trim ring may carry

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any suitable clips or the like for resiliently retaining the ring in position within the range top aperture. As best seen in FIGURES 2 and 7, the lower end of the tubular ring portion 29 is provided with a radially inwardly turned flange 32. A reflector pan 33, having a radially outwardly turned flange 34, rests upon and is supported by ring flange 32 and a portion of the pan wall is cut away at 35 to pass element legs 14a. As will be understood, pan flange 34 provides an annular ledge upon which rests the above described spider 16 when the parts are assembled in normal heating relationship as seen in FIGURE 2.

In the present embodiment, the trim ring carries means arranged to provide for movement of the heating element assembly 12 toward and away from its normal heating position and further arranged to provide for automatic connection and disconnection of such assembly with a source of electrical energy. Briefly, such means comprises a bracket 36 secured to and depending from tubular trim ring portion 29 and a hollow terminal block 37 carried by such bracket.

Bracket 36 has an upper arcuate portion 38 for close fitting engagement with the exterior of tubular ring portion 29 and such bracket portion is welded or otherwise rigidly secured to such ring portion. Depending from bracket portion 38 to extend transversely of the element terminal legs 14a is a bracket portion 39 which is apertured at 40 (see especially FIGURE 7) to pass the terminal legs 14a. For a purpose to be seen, that portion of bracket 36 which defines the lower margin of aperture 40 is deformed radially inwardly of the trim ring to provide a generally upright wall 41 (see FIGURE 2) and an upwardly inclined ramp 42 which are spaced radially inwardly of the trim ring from the main body of bracket portion 39. The bracket portions margining the sides of aperture 40 are also deformed radially inwardly as best may be seen in FIGURE 7 to adequately support wall 41 and ramp 42 against undue deflection relative to the main body of bracket portion 39. Ramp 42 is provided with a plurality of slots 43, herein shown to be four in number, which are in register with respective element terminal legs 14a. Such slots are of sufficient size greater than respective terminal legs to insure that the ramp will not interfere with vertical leg movement.

As best seen in FIGURE 4, the previously mentioned terminal block 37 is removably secured, by means of screws 44 or the like, to that side of bracket portion 39 which faces away from the center of the trim ring. Terminal block 37, as herein shown, has a top wall 45, a rear wall 46, a bottom wall 47, and side walls 48. Walls 45, 46 and 47 may best be seen in FIGURE 2 while walls 48 are best shown in FIGURE 4. Still referring to the last mentioned figure, the hollow interior of terminal block 37 is divided by means of walls 49 into a plurality of compartments 50 herein shown to be four in number each for receiving a respective element terminal leg 14a. Openings 51 (see FIGURE 2) are formed in top wall 45 at the upper rear of each compartment 50 to provide free circulation of air therethrough for cooling purposes and for another purpose later to be disclosed.

As will later be described in detail, each compartment 50 carries an electrical contact member 52 by means of which electrical energy may be fed to the elements 14. Each contact member 52 (see FIGURE 9) is preferably formed of a pair of strips 53, 54 mechanically and electrically secured together in generally coextensive relation. At the present time such strips are secured together by means of a connector 55 having tabs 56 which are passed through aligned apertures in the members and are then clinched over to effectuate the assembly. It will readily be apparent, however, that strips 53, 54 could be secured together by welding or the like. As herein disclosed, strip 53 is formed of a low electrical resistance material while strip 54 is formed of spring-like material.

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Each contact member 52 is generally U-shaped with one leg providing a first portion 57 for disposition in a respective terminal block compartment 50 and with the other leg bent transversely to provide a second portion 58 which is adapted to be anchored to the block. That portion of strip 53 which forms the terminal end of contact member portion 58 is bent back on itself to provide vertically spaced portions 59 and 60.

As best seen in FIGURES 2, 8 and 10, a plurality of openings 61, each aligned with a respective compartment 50, are provided in the lower rear wall of the terminal block. A pair of horizontally extending, opposed ribs 62 vertically divide each opening to provide a slot 63. Spaced forwardly of each slot 63 is a horizontally extending wall 64 whose underside is spaced slightly below the top of a respective slot 63 to provide an abutment 65.

To assemble a contact member 52 with the terminal block (prior to the latter's assembly with the bracket 36) and as shown in FIGURE 10, the contact member portion 58 will be slid beneath a horizontal wall 64 and into a respective slot 63. As a result of the resiliency of strip 53, portions 59, 60 thereof will spring together to permit entrance of the contact member within the slot and will spring apart once again when the contact member is fully inserted therein as seen in FIGURE 11. Note that with the parts positioned as seen in full lines in the latter figure, contact member portion 60 will be positioned for engagement with terminal block abutment 65 to thus retain the contact member within its slot.

Still referring to the parts as positioned in full lines in FIGURE 11, completion of the assembly of the contact member with the terminal block will be effectuated by forcing contact member portion 57 in the direction of the arrow until such portion springs past top wall 45 of the block to its phantom line position wherein it is resiliently engaged with an abutment 66 provided by that portion of the top wall which defines the forward margin of block opening 51. Each contact member 52 will be assembled with the block as above described in its respective slot 63 as will be evident.

Following assembly of the contact members as above described, the block will be secured to the bracket 36 by means of the previously mentioned screws 44. The trim ring will then be positioned within the range top aperture 30 as seen in FIGURE 2. The usual electrical leads (not shown) will be inserted within respective terminal block openings 61 and each will be attached to a connector 55 of a respective contact member 52 preferably before the trim ring is seated in the range top aperture. In the present embodiment, the above mentioned leads are preferably designed for frictional engagement with the connectors 55; however, the leads could as well be attached by means of suitable screws or the like if such an arrangement should be preferred.

Means are provided for establishing a low electrical resistance connection between the heating elements 14 and respective contact members 52, such means comprising a member 67 carried by the free end of a respective terminal pin 15 for engagement with a respective contact member 52. At the present time and as best seen in FIGURE 6, each member 67 is formed of sheet metal and has an intermediate portion providing an electrical contact surface 68 which is curved in a single direction about a rectilinear axis 69 and which is elongated in the direction of such axis for a purpose to appear. Respective end portions of member 67 are doubled back on its intermediate portion and such end portions are welded to opposed sides of a respective terminal pin to provide a unitary structure between the pin and the member. For a purpose to appear, each member 67 is so attached to its terminal pin that its axis 69 extends generally parallel with the axis of the tubular flange portion 25 carried by a respective element terminal leg.

With the parts positioned in normal heating relation as seen in FIGURE 2, it is to be noted that tubular por-

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tions 25 of the flanges 23 are engaged behind the wall 41 of the bracket 36 while members 67 carried by the free ends of the terminal pins 15 have their contact surfaces 58 engaged with respective contact members 52. Note also that the spacing between the tubular flange portions 25 and the contact member surfaces 68 is such that the contact members 52 will be sprung to the full line position shown.

It is an important feature of the present invention that the configuration of the contact surface 68 of respective members 67 carried by the terminal pins is such that line contact is effectuated with respective contact members 52. This line contact is a marked improvement over the point contact heretofore employed in units of this general type since with line contact, a larger area is provided through which current may flow to the heating elements with a resulting decrease in electrical resistance. With a decrease in electrical resistance, there is less heating of the contact surfaces of members 52 and 67 and thus longer, more trouble-free contact life is assured together with greater efficiency of the heating elements. Obviously, electrical contact between members 52 and respective members 67 is maintained at all times that the parts are positioned as seen in FIGURE 2 because the resiliency of the electrical contact members 52 urges them toward the members 67.

When it is desired to remove the reflector pan 33 for cleaning, the right-hand side of the element assembly 12 (in the position of parts viewed in FIGURE 2) will be elevated to thus shift such assembly in the direction of the arrow from the position seen in FIGURE 2 to the position seen in FIGURE 3. In moving to the position seen in FIGURE 3, the element assembly will pivot about a fulcrum provided by the lower right-hand margin of top wall 45 of the terminal block, tubular flange portions 25 sliding upwardly and to the right along ramp 42 of bracket 36 and members 67, carried by the ends of the terminal pins, sliding downwardly along respective contact members 52 to relieve the tension thereon and permit their return to the position seen in FIGURE 3 wherein they engage abutment 66 of the terminal blocks top wall 45. As a result of the resiliency of contact members 52, the element assembly 12 will be retained in the position seen in FIGURE 3 since the weight of such assembly will not be sufficient to deflect the contact members. Note that abutment 66 provides a positive stop for the contact members so that the element assembly will be supported in the predetermined position seen in FIGURE 3.

With the parts positioned as seen in FIGURE 3, reflector pan 33 may readily be removed by tilting its right side up and then withdrawing it from its resting place on flange 32 of the trim ring. If desired, the element assembly 12 may also be removed (either before or after removal of the reflector pan) by shifting it in the direction of the arrow seen in FIGURE 3 to thus withdraw the terminal legs 14a of the elements 14 from within respective terminal block chambers 50.

Reassembly of the unit is simplicity itself: Assuming that the element assembly 12 is positioned as seen in FIGURE 3 or, if it has been removed, its terminal legs have been reinserted within the terminal block compartments 50 to thus dispose the element assembly in such position, reflector pan 33 will be tilted to permit its insertion between the inclined element and the trim rim and positioned with its outwardly turned flange 34 resting upon the inwardly turned flange 32 of the trim ring.

Downward pressure upon the element assembly will then cause the latter to pivot about the previously mentioned fulcrum provided by the terminal block's top wall 45 until the element assembly is disposed once again in the normal heating position seen in FIGURE 2 wherein the spider member 16 rests upon the reflector pan flange 35. During such pivotal movement of the element assembly, tubular flange portions 25 thereof will slide downwardly along ramp 42 of bracket 36 thus shifting the element to the left to deflect the contact members 52.

At the same time, members 67, carried by the terminal pins, will slide upwardly along respective contact members thereby effectuating a highly desirable wiping engagement therewith.

While bracket 36 has been disclosed as being secured to a trim ring which is separable from the range, it is contemplated that such bracket may, in certain constructions, be secured directly to the range. In such event, the trim ring could be eliminated entirely and its place taken by suitably forming the range top panel adjacent the openings therein to perform certain of the functions performed by the present, separable trim ring.

In view of the foregoing it will be apparent to those skilled in the art that we have accomplished at least, the principal object of our 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 our invention is not limited thereto.

We claim:

1. A range top heating unit comprising support means adapted to be supported by the range, a pair of elongated sheathed electric heating elements supported by said support means and said elements having respective convoluted intermediate heat-generating portions cooperable to receive a vessel to be heated, said elements further having terminal end portions extending in side-by-side relation from respective ends of their heat generating portions for conducting electric current to the latter and each terminal end portion having a structurally integral, transversely extending abutment spaced from its free end, and means removably connecting said abutments together to limit relative movement thereof and consequent relative movement of said terminal end portions while selectively providing for ready separation of said elements from each other to facilitate individual element replacement.

2. A range top heating unit comprising support means adapted to be supported by the range, a pair of elongated sheathed electric heating elements supported by said support means and said elements having respective convoluted intermediate heat-generating portions cooperable to receive a vessel to be heated and said elements further having terminal end portions extending in side-by-side relation from respective ends of their heat generating portions for conducting electric current to the latter, an apertured abutment carried by each terminal end portion in spaced relation with its free end and with respective apertures in alignment, and means extending through said aligned apertures and connecting said abutments together to limit relative movement thereof and consequent relative movement of said terminal end portions, said means being readily removable from said apertures to provide for separation of said elements from each other to facilitate individual element replacement.

3. A range top heating unit comprising an elongated sheathed electric heating element adapted to be supported by the range and having an intermediate heat-generating portion for receiving a vessel to be heated and also having terminal end portions extending in side-by-side relation from respective ends of said heat generating portion for conducting electric current to the latter, each terminal end portion providing an aperture whose axis extends transversely of respective end portions and said apertures being disposed in generally axial alignment with each other and in spaced relation with the free ends of respective terminal end portions, and means extending through said apertures and connecting said terminal end portions together, said means being somewhat smaller in transverse size than said apertures to provide for limited relative movement of said terminal end portions.

4. A range top heating unit comprising a pair of elongated sheathed electric heating elements adapted to be sup-

ported by the range and said elements having respective intermediate heat-generating portions cooperable to receive a vessel to be heated, said elements further having terminal end portions extending in side-by-side relation from respective ends of their heat generating portions for conducting electric current to the latter, each terminal end portion providing an aperture whose axis extends transversely of respective end portions and said apertures being disposed in generally axial alignment with each other and in spaced relation with the free ends of respective terminal end portions, and means extending through said apertures and connecting said terminal end portions together, said means being somewhat smaller in transverse size than said apertures to provide for limited relative movement of said terminal end portions and said means being readily removable from said apertures to provide for separation of said elements from each other to facilitate individual element replacement.

5. A range top heating unit comprising a pair of elongated sheathed electric heating elements adapted to be supported by the range and said elements having respective intermediate heat-generating portions cooperable to receive a vessel to be heated, said elements further having terminal end portions extending in side-by-side relation from respective ends of their heat generating portions for conducting electric current to the latter, a radially extending flange carried by each terminal end portion in spaced relation with its free end and each flange having a tubular portion underlying and extending transversely of its respective terminal end portion and said tubular portions being disposed in axial alignment with each other, and means extending through said aligned tubular flange portions and connecting said flanges together to limit relative movement thereof and consequent relative movement of said terminal end portions, said means being readily removable from said tubular flange portions to provide for separation of said elements from each other to facilitate individual element replacement.

6. A range top heating unit comprising a heating element adapted to be supported by the range top and having a heat-generating portion normally positioned to underlie a vessel to be heated and further having a terminal portion extending therefrom which conducts electrical energy to the latter, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said terminal portion, and electrical contact means connectable to a source of electrical energy and disposed within said terminal block cavity and removably engaging the free end of said terminal portion for electrically connecting the latter with said source, said contact means comprising a first member engageable with said terminal portion and of high electrical conductivity to minimize arcing therebetween and a second member of spring-like material for resiliently urging said first member into engagement with said terminal portion.

7. A range top heating unit comprising a heating element adapted to be supported by the range top and having a heat-generating portion normally positioned to underlie a vessel to be heated and further having a terminal portion extending therefrom which conducts electrical energy to the latter, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said terminal portion, and elongated electrical contact means connectable to a source of electrical energy and having a first portion secured to said block and a second portion spaced from said first portion and disposed within said terminal block cavity for engagement with the free ends of said terminal portion for electrically connecting the latter with said source, said contact means comprising a first member engageable with said terminal portion and of high electrical conductivity to minimize arcing therebetween and a second member of spring-like material for resiliently urging said first member into engagement with said terminal portion.

8. A range top heating unit comprising a heating element adapted to be supported by the range top in both a predetermined vessel supporting first position and in a predetermined second position spaced from said first, said element having a heat-generating portion for underlying a vessel to be heated and having a terminal portion extending from said heat generating portion for conducting electrical energy to the latter, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said terminal portion and having an abutment adjacent said cavity, and a member shiftably supported within said cavity and connectable to a source of electrical energy and engageable with the free end of said terminal portion for electrically connecting the latter with said source, in one position said member resiliently engaging said abutment and providing a predetermined, fixedly positioned stop for yieldably maintaining said element in said predetermined second position and said member being urged from said position by said element terminal portion upon movement of said element to said predetermined first position.

9. A range top heating unit comprising a heating element adapted to be supported by the range top and having a heat-generating portion normally positioned to underlie a vessel to be heated and further having a terminal portion extending therefrom which conducts electrical energy to the latter, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said terminal portion and having a slot adjacent said cavity, electrical contact means connectable to a source of electrical energy and having one portion disposed within said slot for properly locating said contact means with respect to said terminal block and another portion disposed within said terminal block cavity for engagement with the free ends of said terminal portion for electrically connecting the latter with said source, and means in part provided by said contact means and in part provided by said terminal block and resiliently interengaging to yieldably retain said contact means within its slot.

10. A range top heating unit comprising a heating element adapted to be supported by the range top and having a heat-generating portion normally positioned to underlie a vessel to be heated and further having a terminal portion extending therefrom which conducts electrical energy to the latter, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said terminal portion, said block further having a slot adjacent said cavity and an abutment adjacent said slot, electrical contact means connectable to a source of electrical energy and having one portion disposed within said slot for properly locating said contact means with respect to said terminal block and another portion disposed within said terminal block cavity for engagement with the free end of said terminal portion for electrically connecting the latter with said source, and resilient means provided by said contact means and yieldably engaged with said terminal block abutment to removably retain said contact means within said slot.

11. A range top heating unit comprising a heating element adapted to be supported by the range top and having a heat-generating portion normally positioned to underlie a vessel to be heated and further having a terminal portion extending therefrom which conducts electrical energy to the latter, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said terminal portion, said block further having a slot adjacent said cavity and an abutment adjacent one end of said slot, electrical contact means connectable to a source of electrical energy and having one portion extending into said slot from said one end thereof and seated therewithin to properly locate said contact means with respect to said terminal block and said contact means having another portion disposed within said terminal block cavity for engagement with the free end

of said terminal portion for electrically connecting the latter with said source, and resilient means provided by said contact means and yieldably engaged with said terminal block abutment following disposition of said one contact means portion within said slot to removably retain said contact means within the latter.

12. A range top heating unit comprising a tubular sheathed electric heating element adapted to be supported by the range top having a heat-generating portion for underlying a vessel to be heated and having an elongated terminal portion extending from said heat generating portion, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said element terminal portion and within which the latter is shiftable in a generally arcuate path toward and away from a predetermined position, a terminal conductor pin extending from the free end of said element terminal portion for conducting electrical energy to said heat-generating element portion and providing a curved electrical contact surface which is flat widthwise and extends generally parallel with the axis about which the free end of said element terminal portion is arcuately movable, and electrical contact means connectable to a source of electrical energy and carried by said terminal block within the latter's cavity for extension transversely of said element terminal portion and having line contact with the adjoining flatwise extending portion of said contact surface aforesaid when said element terminal portion is disposed in said predetermined position for establishing a low-resistance electrical connection between said heating element and said source.

13. A range top heating unit comprising a tubular sheathed electric heating element having a first portion providing a generally plane heat-generating surface adapted to be normally supported in a generally horizontal position by the range top for underlying a vessel to be heated and having an elongated terminal portion extending from said first portion, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said element terminal portion and within which the latter is shiftable in a generally arcuate path about a generally horizontal axis as said first element portion is shifted toward and away from its normal position, a terminal conductor pin extending from the free end of said element terminal portion for conducting electrical energy to said first element portion and providing a curved electrical contact surface extending flatwise transversely of said element terminal portion and curved parallel to the latter, and an elongated electrical contact member carried by said terminal block and shiftably disposed within the latter's cavity for extension transversely of said element terminal portion, said member yieldably opposing the arcuate movement aforesaid of said element terminal portion as said first element portion is shifted to its normal position and said member having line contact engagement with the adjoining flatwise extending portion of said contact surface when said first element portion is disposed in its normal position for establishing a low-resistance electrical connection between said first element portion and said source.

14. A range top heating unit comprising a tubular sheathed electric heating element having a first portion providing a generally plane heat-generating surface adapted to be normally supported in a generally horizontal position by the range top for underlying a vessel to be heated and having an elongated terminal portion extending from said first portion, a terminal block adapted to be supported by the range top and having an internal cavity for receiving the free end of said element terminal portion and within which the latter is shiftable in a generally arcuate path about a generally horizontal axis as said first element portion is shifted toward and away from its normal position, a terminal conductor pin extending from the free end of said element terminal portion for conducting electrical energy to said first ele-

ment portion and providing an arcuate electrical contact surface which is curved only in a single direction about a rectilinear axis, said surface being elongated in the direction of said rectilinear axis and the latter extending generally parallel with said horizontal axis, and a flexible elongated electrical contact strip carried by said terminal block and shiftably disposed within the latter's cavity for extension transversely of said element terminal portion, said contact strip yieldably opposing the arcuate movement aforesaid of said element terminal portion as said first element portion is shifted to its normal position and said contact strip having line contact engagement with said contact surface when said first element portion is disposed in its normal position for establishing a low-resistance electrical connection between said first element portion and said source.

15. A range top heating unit comprising a tubular sheathed electric heating element adapted to be supported by the range top, said element having a heat-generating portion shiftable toward and away from a predetermined, generally horizontal position for underlying and supporting a vessel to be heated and having a terminal portion extending from said heat-generating portion for conducting electrical energy to the latter, a bracket supported by the range top and having an upwardly facing, inclined cam surface contiguous with a generally vertical surface, an electrical contact member connectable to a source of electrical energy and supported by the range top, said member being resiliently engaged with the free end of said element terminal portion when said element is in said predetermined position for establishing an electrical connection between said element and said source, and an abutment carried by said element terminal portion spaced from its free end and slidably engaging said cam surface to guide said element during movement thereof toward said predetermined position and said abutment engaging behind said vertical surface when said element is in said position to retain the latter thereat in engagement with said contact member.

16. A range top heating unit comprising a tubular sheathed electric heating element adapted to be supported by the range top and having a heat-generating portion shiftable in an arcuate path toward and away from a predetermined position for underlying and supporting a vessel to be heated, said element also having a terminal portion extending from said heat-generating portion for conducting electrical energy to the latter and said terminal portion having a looped end providing a curved contact surface, a terminal block adapted to be supported by the range top and having an internal cavity for receiving said looped end terminal portion as said element is shifted to said predetermined position, and electrical contact means connectable to a source of electrical energy and carried by said terminal block within the latter's cavity and slidably engaging said contact surface of said looped end terminal portion when said element is disposed in said predetermined position for establishing a low-resistance electrical connection between said element and said source.

17. The construction of claim 16 wherein a terminal conductor pin extends from the free end of said element terminal portion for conducting electrical energy to a resistor conductor within said heat-generating element portion and wherein the free end of said terminal pin terminates in a strip of electrically conductive material formed to a loop configuration and having a bight portion providing said curved contact surface and having leg portions mechanically and electrically secured to said pin.

18. An electric heating assembly, comprising sheathed heating means having a plurality of terminal portions adapted to be disposed in predetermined horizontally aligned side-by-side relation but capable of moving to and from such relation, each terminal portion having a transversely extending member, all of the latter being turned in the same direction, and means for tying to-

gether said members to hold said terminal portions in said predetermined horizontally aligned side-by-side relation.

19. An electric heating assembly, comprising sheathed heating means having a plurality of terminal portions adapted to be disposed in predetermined horizontally aligned side-by-side relation but capable of moving to and from such relation, a radially extending flange rigidly secured to each terminal portion, each flange having a looped part the axis of which is normal to and vertically spaced from the axis of the respective terminal portion, all the looped parts being turned in the same direction and movable with the respective flange and terminal portion so that the openings of said looped parts may be axially aligned, and a metal strip extending through the aligned openings of said looped parts and tying together the latter in end-to-end abutting relation by having its opposite ends headed over the opposite free ends of said looped parts.

20. The construction according to claim 19 wherein said strip is of a width slightly less than the opening of said looped parts whereby said terminal portions may be moved a limited amount vertically relative to each other.

21. The construction according to claim 20 wherein said strip is twisted about its longitudinal axis to a helical formation.

22. An electric heating assembly comprising a sheathed electric heating element having a terminal portion the extremity of which has a contact member, a stationary terminal block having a cavity for receiving said terminal portion, and electrical contact means connectable to a source of energy and disposed within said block cavity and engaging said contact member, said contact means comprising a first portion abutting said contact member and of high electrical conductivity to minimize arcing therebetween, and a second portion of spring-like material for resiliently urging said first member into engagement with said contact member.

23. The construction according to claim 22 wherein the first and second portions of said electrical contact means are formed as leaf springs, with the second portion backing up the first portion.

24. The construction according to claim 22 wherein said terminal block has an opening with a smaller entranceway to form a shoulder therebetween, and wherein said electrical contact means has an end portion with an umbrella-type catch, said end portion being projectable through said smaller entranceway and said catch being compressed during said projection and thereafter expanding into said block opening and engaging against said shoulder to prevent withdrawal of the end portion of said electrical contact means.

25. An electric heating assembly for a range top, comprising sheathed electric heating means having a plurality of terminal portions adapted to be disposed in predetermined horizontally aligned side-by-side relation but capable of moving to and from such relation, a radially extending flange rigidly secured to each terminal portion, each flange having a looped part the axis of which is normal to and vertically spaced from the axis of the respective terminal portion, all the looped parts being turned in the same direction and movable with the respective flange and terminal portion so that the openings of said looped parts may be axially aligned, a metal strip extending through the aligned openings of said looped parts and tying together the latter in end-to-end abutting relation by having its opposite ends headed over the opposite free ends of said looped parts, said strip being of a width slightly less than the openings of said looped parts whereby said terminal portions may move a limited amount vertically relative to each other, a bracket supported by the range top and having an upwardly facing inclined part providing a cam surface and a vertical part extending downwardly from said inclined part, an electrical contact member for each of said terminal portions,

said contact members being resiliently biased in the same direction as the inclination of said inclined part, the foregoing construction providing that said looped parts may be slid downwardly along said cam surface and be engaged behind said vertical part, said contact members engaging said terminal portions and pressing thereagainst to press said looped parts against said upright part.

26. The construction according to claim 25 wherein a terminal block is connected to said bracket and carries said contact members, said terminal block having an opening to pass said terminal portions, an upper margin of said opening providing a fulcrum about which said

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terminal portions are pivoted to shift said looped parts along said cam surface and to position behind said vertical part.

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