March 16, 1965

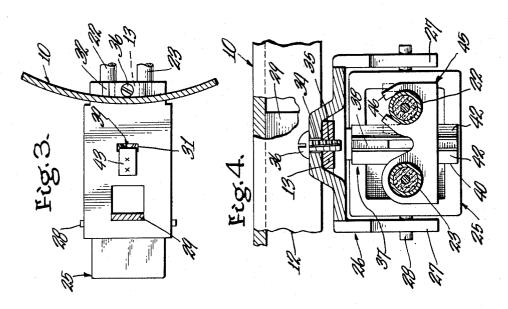
G. E. AMMERMAN RANGE TOP HEATER ASSEMBLY

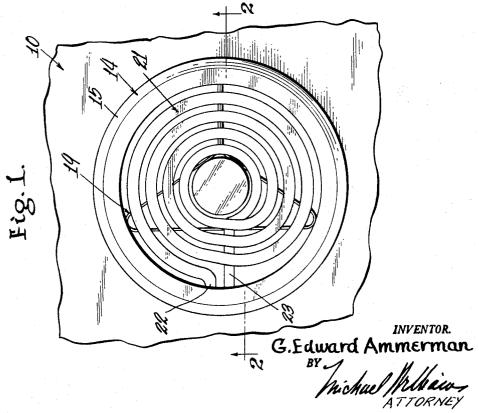
3,174,028

Filed July 20, 1961

t

2 Sheets-Sheet 1





March 16, 1965

G. E. AMMERMAN

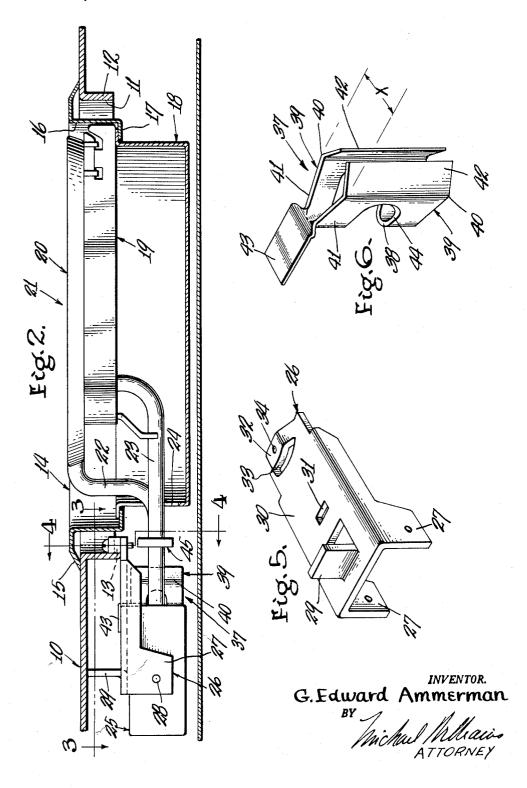
3,174,028

Filed July 20, 1961

Ę

RANGE TOP HEATER ASSEMBLY

2 Sheets-Sheet 2



United States Patent Office

5

3,174,028 Patented Mar. 16, 1965

Pres

3,174,028 RANGE TOP HEATER ASSEMBLY George E. Ammerman, Oakmont, Pa., assignor to Edwin L. Wiegand Company, Pittsburgh, Pa. Filed July 20, 1961, Ser. No. 125,414 12 Claims. (Cl. 219-455)

The present invention relates to electric heating units, more particularly to electric heating units and assemblies of the surface, or range type, and the principal object of 10 the invention is to provide new and improved units and assemblies of the character described.

ŕ

÷,

Present day tubular sheathed electric resistance surface heating units of the so called plug-in type present a problem in grounding the outer sheath of the heating ele-15 ment, to harmlessly drain off any current which may leak to the sheath, in an efficient, low-cost manner. The difficulty arises, of course, because grounding of the element sheath must be effected automatically as the element is assembled with the range in its normal heating 20 position and the ground connection thus made must be automatically broken when the element is shifted from its normal heating position.

Another problem presented by plug-in range surface units is that of simply and effectively connecting to the 25 range top the dielectric terminal block which shields and supports the electrical connections to the element. It is desirable that the block be secured beneath the range top in a simple, low-cost, effective manner with a minimum of assembly time and with minimum modification to the 30 range structure. Further, the block must be readily removable for servicing while any of its mounting screws or the like must be hidden from view when the usual trim ring of the element assembly is installed.

The present invention solves the above-mentioned problems and meets the outlined requirements in a highly efficient, low-cost manner. 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 40 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 fragmentary, top plan view of a range top or the like together with a surface type, electric re-45 sistance, sheathed heating unit,

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

FIGURE 3 is a fragmentary sectional view generally 50 corresponding to the line 3-3 of FIGURE 2,

FIGURE 4 is an enlarged, fragmentary sectional view generally corresponding to the line 4-4 of FIGURE 2,

FIGURE 5 is a reduced size perspective view of a detail, and FIGURE 6 is an enlarged perspective view of another

detail.

With reference to FIGURES 1 and 2, there is illustrated a sheet metal panel 10 which may, for example represent the top of an electric range or the like. Such panel has an aperture 11 formed therein (see FIGURE 2), the aperture, in the present embodiment, being margined by a depending annular skirt 12. For a purpose later to appear and referring also to FIGURE 4, skirt 12 has a structurally integral, horizontally extending tongue 13 projecting radially inwardly of the panel aperture 11.

As best seen in FIGURE 2, a conventional, tubular sheathed electric resistance heater assembly is supported by the panel 10 in the usual manner. As herein illustrated, the heater assembly includes a trim ring 14 with 70 a radially outwardly extending flange 15 which rests upon the upper surface of the panel and a depending tubular

portion 16 having at its lower end a radially inwardly extending flange 17. Removably seated upon the ring flange 17 is a radially outwardly flanged portion of a shallow, reflector-drip pan 18.

Resting upon the flange of the pan 18 is a spider 19 which underlies and, in the present embodiment, is secured to the intermediate, convoluted, heat-generating portion 20 of a metallic tubular sheath, embedded resistance electric heating element 21. The terminal ends 22, 23 of the element 21, which ends conduct electrical energy to the portion 20, are disposed beneath the convoluted portion 20 and project beyond its periphery through an opening 24 in the pan 18 in side-by-side relation for connection into an electrical circuit.

Briefly, the free ends of the element terminal ends 22, 23 are slidable into respective pockets of a dielectric terminal block 25 which is supported by the panel 10 in a manner to be disclosed. Carried within the terminal block pockets are suitable clips which are wired into an electric power circuit and which form a separable electrical connection with the element terminal ends. It is to be understood that the element terminal ends may be readily withdrawn from the terminal block 25, thus auto-

matically breaking the electrical circuit connections thereto, and the element removed from its assembled position seen in FIGURE 2 to provide for ready access to all of the heater assembly parts and to the panel 10 for cleaning or the like. Just as easily, the element terminal ends may be re-inserted in respective pockets of the terminal block 25 at assembly to re-establish the electrical circuit connections.

It is believed that the foregoing brief description of the terminal block 25 and its cooperation with the element 21 is adequate for present purposes; however, for a more detailed description, reference may be had to the application of George Edward Ammerman et al., Serial No. 861,853, filed December 24, 1959, for Range Top Heater Assembly, and assigned to the same assignee as the instant application.

An important feature of the present invention is the manner in which the terminal block 25 is supported and as seen in FIGURES 2 through 5 and with particular reference to the latter, a channel-shaped bracket 26 is provided having enlarged, apertured flanges 27 at one end. Block 25 fits between the channel flanges and is secured in place by means of a pin 28 about which it has limited pivotal movement. For a purpose to appear, an upward-ly projecting strut 29 is lanced out of the web portion 30 of the bracket while a rectangular opening 31 is formed in the web portion adjacent the strut.

At the bracket end opposite the strut 29, a strap 32 is lanced out of the bracket web portion and is formed upwardly to closely receive thereunder the previously mentioned tongue 13 provided by the panel 10. Since an edge 33 of the strap is adapted to abut the annular panel skirt 12, such edge is preferably formed with a matching, arcuate configuration. An oversize aperture 34 is formed in the bracket strap 32 and is aligned with an aperture 35 formed in the tongue 13.

An important feature of the invention is that a selftapping screw 36 freely passes through the oversize strap aperture and is threaded into the panel tongue 13 to serve a dual function: Firstly, the screw 36 removably secures the bracket to the panel 10. Secondly, the screw insures that the bracket is adaquately grounded to the panel for a purpose to appear. In carrying out the aforesaid second function, it is to be noted that in many instances, the panel 10 is enameled after forming and therefore the tongue 13 has all its exposed surfaces covered with a dielectric coating. Such enameled coating could present a problem in securing a good ground connection between the bracket and the panel; however, by

3,174,028

the expedient of bearing against the bare metal of the bracket with the head of the screw 36 and by using the screw itself to cut threads into the tongue aperture 35, an excellent ground will be obtained since the screw will cut through any enamel in the tongue aperture to reach 5bare metal.

Means are provided for grounding the element 21 to the bracket 26 and as best seen in FIGURE 6, comprises a resilient, sheet metal member 37 doubled back on itself to provide a bight portion 33 and legs 39. Each leg 39 $_{10}$ has an intermediate portion 40, which portions are relatively widely spaced to provide diverging leg parts 41 adjacent the bight 38 and converging leg parts 42 at their free ends. For a purpose to appear, the spring X between the leg portions 40 is slightly greater than the 15 spacing between the elemental terminal ends 22, 23. In the present embodiment, in the position of parts shown, the upper end 43 of the member bight portion 38 is flattened and bent at right angles for projecting through the bracket opening 31 to overlie the top of the bracket 20 web 30. End 43 may be welded, riveted, or otherwise secured to the bracket in electrical continuity therewith. Also, for a purpose to appear, member 37 is so located with respect to the terminal block 25 that its bight portion 38 abuts the adjoining face of the terminal block 25 zontally extending apertured sheet-metal panel which is (see FIGURE 2). In the present embodiment, bight portion 38 of the member is notched out at 44 to increase the latter's flexibility.

With the parts in their normal assembled relation as best viewed in FIGURES 2, 3 and 4, legs 39 of the mem- 30 bers 37 are disposed between the element terminal ends 22, 23 with the member portions 40 in frictional engagement with respective terminal ends to insure grounding of the element tubular sheath to the panel 10. As will be understood, the resilient member 37 will not interfere 35 with insertion of the element terminal ends 22, 23 into the terminal block or removal therefrom because of the inclination of respective member leg parts 41,42 which function as cam surfaces. Indeed, the member 37 actually facilitates insertion of the element terminal ends 40 into respective pockets of the terminal block since its surfaces 42 guide respective terminal ends to proper alignment with respective block pockets. Also, the previously mentioned abutment of the member bight portion 38 with the adjoining face of the terminal block supports 45 the member against deflection as the element is inserted into the block. Such deflection could otherwise prove to be a problem because of the cantilever mounting of the member.

Since the member 37 is adapted to be sprung between 50 the element terminal ends 22, 23, means are provided for maintaining such ends in predetermined spaced relation. In the present embodiment, such means comprises a relatively heavy metal strip 45, see FIGURES 2 and 4, extending between respective element terminal ends. One 55 ed, said heating element having a pair of metal-sheathed end of strip 45 is apertured to closely but slidably pass one of the element terminal ends, as herein shown the terminal end 23, while the other end of the strip has spaced ears 46 for receiving therebetween the element terminal end 22.

Prior to assembly, ears 46 of the strip 45 will be disposed in the phantom line position seen in FIGURE 4 wherein they readily pass the element terminal end 22. During assembly, however, when the apertured strip end has been slid over the element terminal end 23 and the $_{65}$ strip properly positioned along the terminal ends with the terminal end 22 disposed between the strip ears 46, the latter will be bent over as shown in full lines in FIGURE 4 to permanently lock the strip to the terminal end 22. It is to be noted that while the strip 45 will 70 zontally extending apertured sheet-metal panel which is retain the element terminal ends in the desired, transversely spaced relation, the apertured end of the strip will freely slide along the element terminal end 23 so as not to interfere with expansion and contraction of the heating element during heating and cooling thereof.

While there has been disclosed a heating element having but two terminal ends, it will be appreciated that the usual double-coil heating element, having four terminal ends in side-by-side relation, could as well be employed by using a terminal block designed to accommodate four element terminal ends rather than two. The terminal block supporting bracket would, of course, have to be modified to accommodate such a larger terminal block. Under such circumstances, the grounding member 37 could probably, though not necessarily, fit between the two center element terminal ends in the same manner as herein disclosed.

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. An electric heating assembly, comprising a horinormally grounded and which has a screw-receiving opening adjacent to its aperture, said panel having its surface coated with enamel and the like and such coating being applied following formation of the panel and thus coating the surface defining the screw receiving opening, a metalsheathed electric resistance heating element having a plane heating surface disposed within the aperture of said panel and supported by the latter in a horizontal position for underlying and supporting a vessel to be heated, said heating element having a terminal end portion disposed beneath said heating surface and projecting laterally thereform, a dielectric block beneath said panel and having terminals connectable to a source of electricity and engageable with contacts on said terminal end portion to place said heating element in circuit with said source, a metal bracket supporting said dielectric body and having an aperture for freely passing the shank of a self-threading screw, the latter being threaded into the screw-receiving opening of said panel and breaking away the coating at the surface of the latter to effect good grounding connection between said screw and said panel, said screw having a head bearing against said bracket to hold and ground the latter to said panel.

2. An electric heating assembly, comprising a horizontally extending apertured sheet-metal panel which is normally grounded, an electric resistance heating element having a plane surface disposed within the aperture of said panel and supported by the latter in a horizontal position for underlying and supporting a vessel to be heatterminal portions disposed in side-by-side spaced relation beneath said heating surface, a terminal block supported from said panel and having terminal members electrically engageable with contacts on said terminal portions for 60 placing said heating element in an electric circuit, and grounding means for said heating element, comprising a sheet-metal stamping supported from and electrically connected to said panel and having a pair of opposed vertically extending wing-like legs which normally are resiliently urged apart a distance greater than the spacing between said element terminal portions but which are movable toward each other for disposition between such portions in direct pressing relation thereagainst.

3. An electric heating assembly, comprising a horinormally grounded, an electric resistance heating element having a plane heating surface disposed within the aperture of said panel and supported by the latter in a horizontal position for underlying and supporting a vessel to 75 be heated, said heating element having a pair of metal-

Č,

sheathed terminal portions disposed in side-by-side relation beneath said heating surface, a terminal block supported from said panel and having terminal members electrically engageable with contacts on said terminal portions for placing said heating element in an electrical circuit, and 5 grounding means for said heating element, comprising a sheet-metal stamping supported from and electrically connected to said panel and having a pair of opposed vertically disposed wing-like legs connected by an integral bight, the legs at said bight being spaced a distance less than the 10spacing between said terminal portions for easy disposition therebetween, and said legs diverging from said bight to a spacing greater than the spacing between said terminal portions, said legs having sliding camming relation with said terminal portions as said bight is moved between 15 the latter so that parts thereof removed from said bight resiliently press against respective terminal portions.

ţ

4. In combination: a horizontally extending, apertured sheet metal panel having an underlying, structurally integral, generally horizontally extending tongue, an electric 20 heating element removably supported by said panel and having a heat-generating portion providing a generally plane, horizontally disposed heating surface is substantial vertical alignment with said panel aperture for underlying and supporting a vessel to be heated and said element having a terminal end portion disposed beneath said heating surface and projecting beyond the latter's periphery for conducting electrical energy to said heat-generating portion, a die-electric body beneath said panel and slidably receiving the free end of said element terminal end portion to removably place said element in an electrical circuit, a bracket underlying said panel and supporting said dielectric body and having a portion overlying said panel tongue to properly position said bracket beneath said panel, said bracket portion having an enlarged aperture 35 therethrough, and a self-threading screw extending freely through said bracket portion aperture and threaded into an aperture formed in said panel tongue to mechanically and electrically secure said bracket and said panel to-40 gether.

5. In combination: a horizontally extending, apertured sheet panel having an underlying, structurally integral, generally horizontally extending tongue which projects radially inwardly of the panel aperture, an electric heating element removably supported by said panel and having a 45 heat-generating portion providing a generally plane, horizontally disposed heating surface in substantial vertical alignment with said panel aperture for underlying and supporting a vessel to be heated and said element having a terminal end portion disposed beneath said heating surface and projecting beyond the latter's periphery of conducting electrical energy to said heat-generating portion, a dielectric body beneath said panel and slidably receiving the free end of said element terminal end portion to removably place said element in an electrical circuit, a bracket 55 underlying said panel and supporting said dielectric body and having an integral, upwardly projecting strap portion overlying said panel tongue, said strap portion having an enlarged aperture, and a self-threading screw extending freely through said strap portion aperture and threaded 60 into an aperture formed in said panel tongue to mechanically and electrically secure said bracket and said panel together.

6. In a range top heating unit assembly including an elongated tubular sheathed electric resistance element configured to provide a convoluted heating surface intermediate the ends thereof and a pair of terminal portions extending outwardly from said convoluted portion in sideby-side relation to terminate in said ends and support means for operatively positioning said resistance element in a range top:

the improvement comprising means for maintaining said terminal portions in a predetermined spaced relation to facilitate plug-in connection of said ends to a source of electric current while permitting necessary 75 including surfaces converging in a direction toward said

thermal expansion and contraction of said element, said means comprising:

- a rigid one-piece metallic member disposed transversely between and mechanically interconnecting said terminal portions in predetermined spaced relation,
- said member being free from other interconnection with said heater unit assembly, whereby said member may be readily attached to said terminal portions and serves solely to maintain a desired spacing therebetween,
- said member having first means substantially surrounding and rigidly secured to said one terminal portion for preventing relative movement therebetween,
- and having second means substantially surrounding and securing said other terminal portion thereto in predetermined spaced relation to said one terminal portion.
- said second means permitting axial and rotative movement of said other terminal portion relative to said member without varying the spaced relation thereof to said one terminal portion.

7. The improvement of claim 6 wherein said first means comprises a portion of said strip having a notch defining a pair of spaced ears between which said one ter-25 minal portion is received, said ears being crimped snugly about said one terminal portion for rigidly securing said member thereto, and said second means comprises another portion of said strip having an aperture for receiving said other terminal portion therethrough thereby to maintain 30 the spaced relation between said terminal portions while permitting said axial and rotative movement of said other terminal portion.

8. The construction of claim 5 wherein said panel aperture is margined by a depending, annular flange from the lower margin of which projects said panel tongue and wherein said bracket has a portion spaced from said strap portion in a direction radially outwardly of said panel aperture and abutting the underside of said panel for stabilizing purposes.

9. A range top heating unit comprising an elongated, metallic, tubular sheathed electric resistance heating element having an intermediate heat-generating portion convoluted to provide a generally plane heating surface removably supported by the range in a generally horizontal position for underlying and supporting a vessel to be heated and having terminal end portions disposed in fixed side-by-side, spaced-apart relation beneath said heating surface and projecting beyond the latter's periphery for conducting electrical energy to said heat-generating element portion, means connecting the free ends of said element terminal end portions in an electrical circuit, and a resilient member supported by and grounded to said range and having opposed portions disposed vertically between said element terminal ends and pressed against the sides of the latter to ground said element.

10. A flange top heating unit comprising an elongated, metallic, tubular sheathed electric resistance heating element having an intermediate heat-generating portion convoluted to provide a generally plane heating surface removable supported by the range in a generally horizontal position for underlying and supporting a vessel to be heated and having terminal end portions disposed in sideby-side, spaced-apart relation beneath said heating surface and projecting beyond the latter's periphery for conducting electrical energy to said heat-generating element portion, a dielectric body supported beneath the range top and slidably receiving the free ends of said element terminal portions to removably place said element in an electrical circuit, and a member supported by an grounded to said range and disposed intermediate said body and the heat-generating portion of said element, said member having opposed portions resiliently urged to a position wherein they are spaced a greater distance than the space between said terminal end portions, said opposed portions heat-generating portion to provide a wedge-like structure having a leading end freely insertable between said terminal end portions during insertion of the latter into said dielectric body and slidably engageable with said terminal end portions in cam relation to move said opposed portions 5 toward each other to a position wherein they are disposed between said terminal end portions and resiliently pressed thereagainst to ground said element to said range.

11. The construction of claim 10 wherein said member has one end secured to said range and wherein said mem- 10 ber abuts said body to limit member deflection as said element terminal ends are forced therepassed.

12. The construction of claim 10 wherein a bracket is mechanically and electrically secured to said range top in underlying relation therewith and supports said dielectric 15 MAX L. LEVY, Examiner.

body, wherein said member is formed of sheet metal and has one end mechanically and electrically secured to said bracket and depends therefrom, and wherein said member abuts said body to limit member deflection as said element terminal ends are forced therepassed.

References Cited by the Examiner UNITED STATES PATENTS

)	2,917,616 2,948,801	12/59 8/60	Price 219-463 Thomson 219-351 Bremer 219-463 Smith et al. 219-451	
	3,002,079	9/61	Smith et al 219-451	

RICHARD M. WOOD, Primary Examiner.

3,174,028