Oct. 21, 1941. E. L. WIEGAND ET AL 2,260,108

ELECTRIC HEATER

Filed Oct. 27, 1938 2 Sheets-Sheet 1

Fig. 1

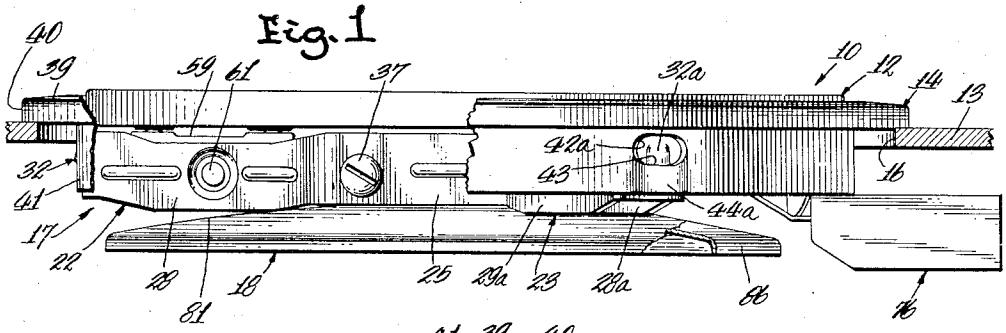

Fig. 2

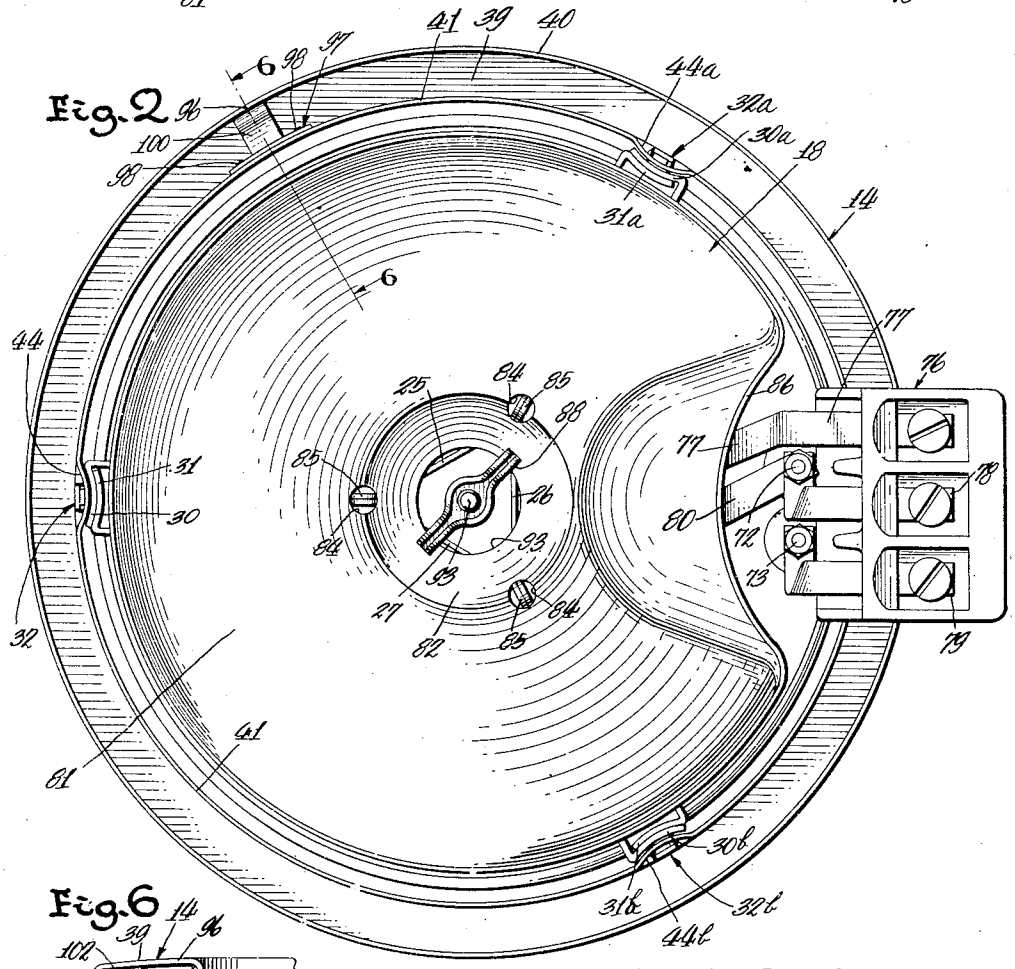

Fig. 6

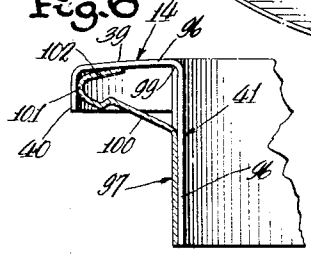

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Fig. 3

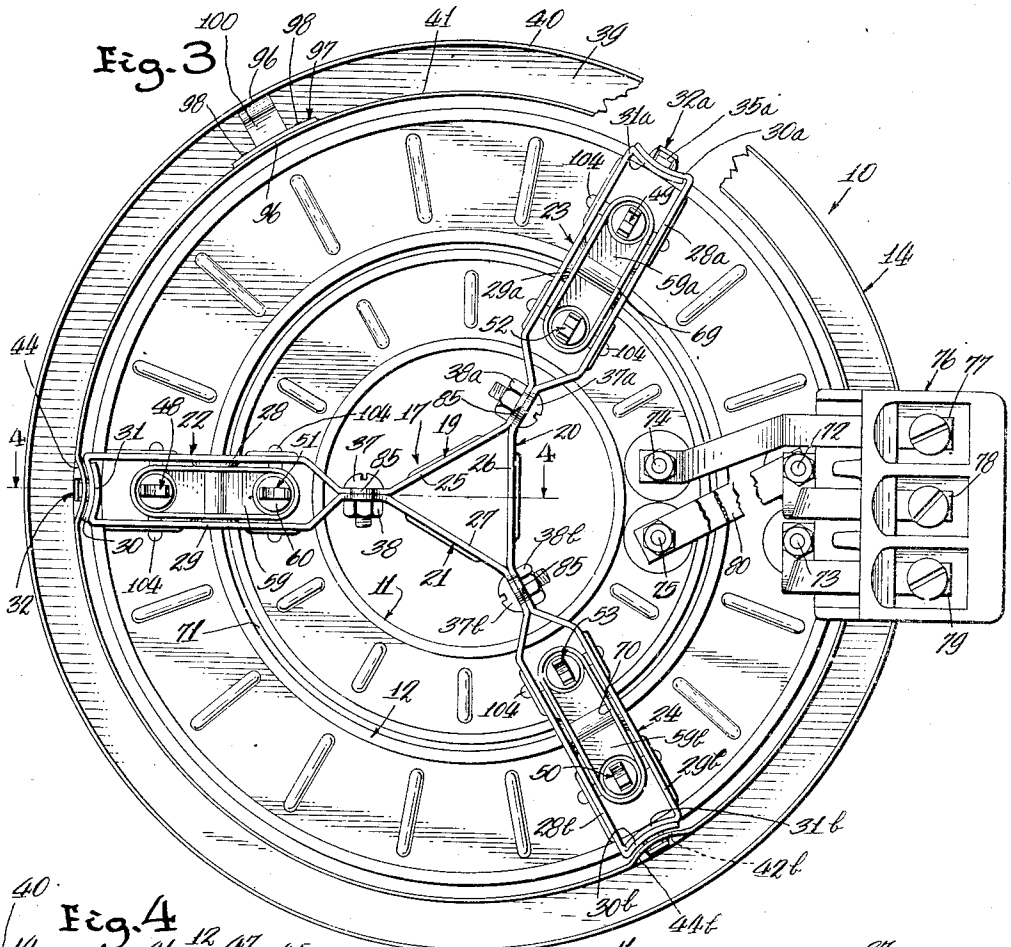


Fig. 4

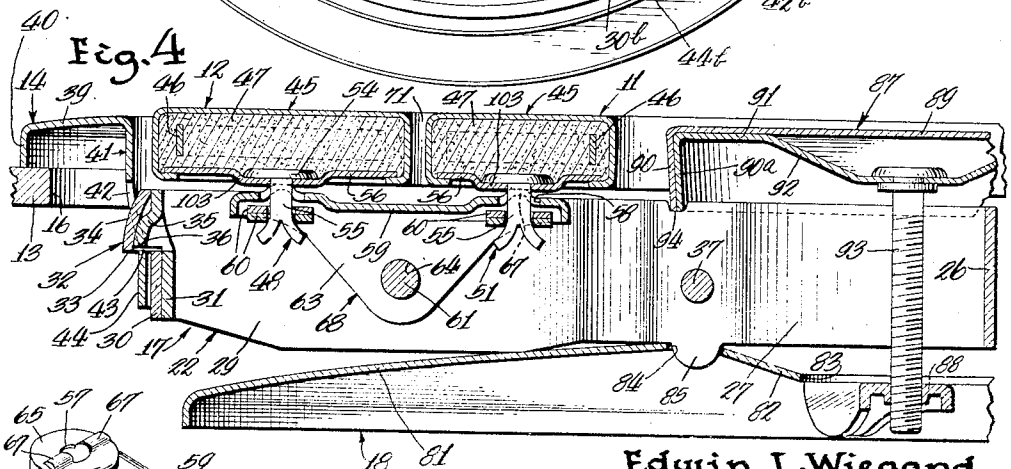
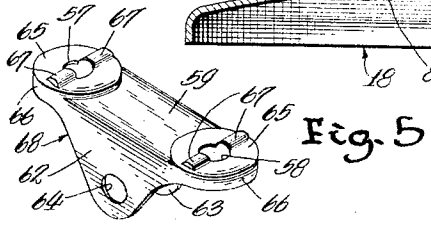


Fig. 5



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UNITED STATES PATENT OFFICE

2,260,108

ELECTRIC HEATER

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Application October 27, 1938, Serial No. 237,238

19 Claims. (Cl. 219—37)

Our invention relates to electric heaters in general, and more particularly to supporting means for one or more electrical heating elements. Electric heaters embodying our invention are particularly adapted for use in electric ranges. The principal object of our invention is to provide new and improved electric heaters of these types.

In the drawings accompanying this specification, and forming a part of this application, we have shown, for purposes of illustration one form which our invention may assume, and in these drawings:

Figure 1 is a side elevation of an electric range unit embodying our invention, certain portions being partly broken away for the sake of clearness,

Figure 2 is a bottom view of the range unit shown in Figure 1,

Figure 3 is a bottom view of the range unit shown in Figure 1, but with the reflector and the means for connecting it to the range unit omitted, and a part of a member broken away for the sake of clearness,

Figure 4 is a fragmentary sectional view, on an enlarged scale, taken on the line 4—4 of Figure 3, looking in the direction of the arrows,

Figure 5 is a perspective view of a detail, and

Figure 6 is a fragmentary sectional view, on an enlarged scale, taken on the line 6—6 of Figure 2, looking in the direction of the arrows.

The range unit 10 comprises one or more electrical heating elements (here shown as two in number) 11, 12. The heating elements 11, 12 are in this instance of ring form, constructed and arranged so that they are concentric. The heating elements 11, 12 are here shown as supported from a stove top 13 by a supporting means which, in this instance, includes a support ring 14 resting on the stove top 13 having an aperture 16, and a supporting frame or spider 17 which is here shown as supported by the support ring 14. The spider 17 serves as a support for the heating elements 11, 12 as will hereinafter more fully appear. The range unit 10 also includes a reflector 18 disposed beneath and supported by the spider 17.

Referring more particularly to Figure 3, the spider 17 may be fabricated from any desired number of identical sheet metal stampings, depending upon the number of arms desired, and is here shown as fabricated from three sheet metal stampings 19, 20, 21, resulting in three arms 22, 23, 24, the arms extending radially outwardly from a central portion which, in this case, comprises three parts 25, 26, 27, forming a triangle.

The arms 22, 23, 24 of the spider may all be identical, as here shown, and a description of one of them will serve for all. Referring to the arm 22, through which the section 4—4 is taken, this arm comprises two circumferentially spaced plates 28, 29, the radially outer end portions 30, 31 of which are bent toward each other to overlap each other. The end portions 30, 31 are here shown as concave radially inwardly. The radially outer-most end portion, 30, has a portion 32 thereof (desirably of less circumferential width than the circumferential width of the end portion 30) struck outwardly (see also Figure 4), so that the cut margin 33 of the struck-out portion 32 will form a shoulder, and the outer surface 34 of the struck-out portion will form a cam surface. The radially inner end portion 31 has a part thereof, 35, struck radially outwardly so as to fit into the recess inside of the struck-out portion 32, thereby firmly holding together the end portions 30, 31. The struck-out portion 35, as most clearly seen in Figure 4, has its lower margin, 36, stopping short of the shoulder formed by the lower margin, 33, of the struck-out portion 32.

At their radially inner ends the spaced plates 28, 29 are bent inwardly toward each other at an angle so that the lateral surfaces contact at the junction between the spaced plates of the arm 22 and the parts 25, 27 of the triangular central portion. At this junction the two stampings are fastened together by means of a bolt and nut, 37, 38.

Referring to the spider 17 as a whole, it will be noted that one stamping, 19, constitutes a side 25 of the central triangular portion and also the plates 28, 29a of the arms 22, 23 respectively; whereas the stampings 20, 21 constitute the other two plates 28a, 29 of the arms 23, 22, respectively, and also constitute the plates 29b, 28b of the arm 24, and the other two sides 26, 27 of the triangular central portion. The radially inner ends of the plates 28a, 29a and 28b, 29b, of the arms 23, 24 are respectively also fastened together by bolts and nuts 37a, 38a, and 37b, 38b. It will be apparent that the stampings may quickly and uniformly be assembled to form the spider 17. By making the spider of sheet metal stampings an additional advantage is secured over the use of the usual cast iron support, in that the spider may be readily made of chrome iron high temperature metal, or other high temperature metal.

The support ring 14 is here shown as comprising an annular generally horizontal portion 39, slanting downwardly and outwardly slightly, and at its outer periphery has a downwardly extend-

ing cylindrical flange 40, the lower margin of which is adapted to rest on the stove top 13. The inner periphery of the annular portion 39 has a downwardly extending generally cylindrical longer flange 41. The junction portions between the annular portion 39 and the flanges 40, 41 respectively are desirably rounded. The flange 41 is provided with three apertures 42, 42a, 42b, on the lower margins 43 of which the shoulders 33 provided by the struck-out portions 32, 32a, 32b are adapted to rest, the construction and arrangement being such that when the spider 17 and support ring 14 are assembled, the upper surfaces of the heating elements 11, 12 are desirably somewhat above the top of the annular portion 39 of the support ring 14.

The cylindrical surface defined by the inner periphery of the flange 41 proper of the support ring 14 is somewhat larger than the circle defined by the radially outermost parts of the end portions 30 of the arms 22, 23, 24, and is slightly smaller than the circle defined by the radially outermost ends of the struck-out portions 32, 32a, 32b. Portions 44, 44a, 44b of the flange 41, just below the lower margins of the apertures 42, 42a, 42b, are bent radially inwardly so that they are approximately complementary to the outer surfaces of the inwardly curved end portions 30, 30a, 30b. Thus the margins 43 of the apertures 42, 42a, 42b, on which the shoulders 33 of the struck-out portions 32, 32a, 32b are seated, are a desired distance radially within the outer ends of the struck-out portions, so that the spider 17 is securely seated and held against downward displacement with respect to the support ring 14, while at the same time the spider and the support ring are easily assembled and disassembled as will be further explained hereinafter.

The heating elements 11, 12 may be of any desired form; they are here shown as each comprising a metallic sheath 45 within which is disposed any desired form of resistor 46, here shown as of the strip type. The resistor 46 may be embedded in refractory electrical-insulating heat-conducting material 47, and this material may be in the form of suitable granular, comminuted, or powdered refractory material, preferably compacted to a dense hard condition. The heating element 12 is here shown as provided with three equally circumferentially spaced studs or rivets 48, 49, 50, and the heating element 11 is shown as similarly provided with three studs or rivets 51, 52, 53, radially alined with the rivets respectively of the element 12. Each of the rivets has a head, 54, within the sheath of the respective heating element, the shanks 55 of the rivets projecting downwardly, as viewed in Figure 4, through openings in bottom portions 56 of the respective sheaths. The rivet heads 54 may be disposed in recesses formed by bosses 103 and these bosses may be strengthened by embossed ridges 104 (see Figure 3). The shanks 55 of the rivets 48, 51 extend downwardly through apertures 57, 58 in a sheet metal web 59 which extends transversely of the space between the plates 28, 29 of the arm 22. The rivets 49, 52 and 50, 53, are associated in like manner with webs 59a and 59b respectively similarly associated with the arms 23, 24. The heating elements may be held assembled with the webs 59, 59a, 59b in any desired manner. To this end, the ends of the shanks 55 of the rivets are here shown as bifurcated longitudinally, the ends of the furcations being spread apart, and, in this instance, two washers 60 are disposed on each shank, between the under surface of the respective web (59, 59a, or 59b) and the bent furcations of the rivet shanks.

If it be desired that the heating elements be movable relatively to each other and to the spider, the webs 59, 59a, 59b may be made movable relatively to the plates of the respective arms 22, 23, 24, and to this end the web 59 is here shown as forming a part of what may be termed a saddle, 68, swingable about a headed pivot pin 61 the shank of which extends transversely between the plates 28, 29. The pivot pin 61 may extend through apertures in the plates 28, 29 and have its shank end riveted over to keep the pin assembled with the plates. The axis of the pivot pin 61 is desirably so disposed that it is horizontal and approximately tangent to the general cylinder defined by a space 71 left between the heating elements 11, 12. The saddle 68 is here shown as including a pair of spaced flanges 62, 63 extending downwardly from opposite lateral margins of the web 59, the flanges being provided with apertures 64 through which the pivot pin 61 is freely disposed. The ends of the web 59 are here shown as in the form of generally cylindrical bosses 65. The outer end peripheries of the bosses 65 extend downwardly to form semi-cylindrical flanges 66 merging with the flanges 62, 63. The tops of the bosses 65 are here shown as each provided with a pair of small embossings or ridges 67, the ridges of each pair extending radially in opposite directions from the aperture 58 in the respective boss, and transversely to the longitudinal axis of the web 59. In the particular embodiment illustrated, the under surfaces of the sheath portions 56, adjacent the rivets 48, 51, rest respectively on these ridges, 67, as may be clearly seen in Figure 4. Where it is desired that the heating elements be movable, the apertures 57, 58 are desirably somewhat elongated in the direction of the axis of the web, and the topmost ones of the washers 60 are spaced a desired amount from the under surface of the bosses 65. It will be understood that saddles 69, 70, associated with arms 23, 24 respectively, are constructed and arranged identical with the saddle 68. Each saddle may be conveniently made from a single sheet metal stamping.

The resistor 46 within the element 12 is suitably connected to a pair of terminal studs 72, 73, and the resistor 46 of the element 11 is suitably connected to a pair of terminal studs 74, 75, all of these studs being desirably so located that they are disposed circumferentially between two of the spider arms when the elements are assembled with the spider.

A suitable insulating conductor terminal connection block 76 may be provided, the block having separate chambers in which are disposed conductors 77, 78, 79. The conductor 77 is connected to the terminal stud 74; the conductor 78 is connected to the terminal stud 72; and the conductor 79 is connected to the terminal stud 73. The terminal stud 72 of the heating element 12 is connected to the terminal stud 75 of the heating element 11, by means of a conductor 80. In view of the fact that, in the particular embodiment shown, the heating elements 11, 12 are movable with respect to some fixed point, the conductors 77, 80 are desirably made flexible, and one way in which this may be done is to make these conductors or laminated form, the laminations being of desired thinness and number to secure the desired flexibility and conducting capacity. In Figure 3 one of the conductors, 80, is broken away to show its laminated construction.

The range unit 10 is desirably provided with

the reflector 18 and this is here shown as having a principal portion 81 of generally conical form, the upper surface extending downwardly from the center of the reflector. The central portion of the reflector has a slightly downwardly dished portion 82 provided with an aperture 83. At the junction between the portions 81, 82 are here shown three apertures 84 (see Figures 2 and 4), into which extend rounded projections 85 formed integrally on the sheet metal stampings 19, 20, 21 forming the spider 17. These projections, 85, are here shown as provided at the junction between the central triangular portion 25, 26, 27 and the arms 22, 23, 24 of the spider. The reflector 18 may, if desired or necessary, be provided with a recess 86 so that the reflector will not interfere with the block 76 or the conductors 77, 80. The projections 85, in cooperation with the apertures 84, serve to locate the reflector 18 and hold it from circumferential movement, and the reflector is here shown as held in position against the spider 17, by means of a bolt 87 and wing nut 88. The bolt is here shown as comprising a sheet metal head including a cup 89, the top of which is below the level of the upper surfaces of the heating elements 11, 12, and including also a cup 91 nested in the cup 89. Flanges 90 and 90a of the cups 89 and 91 are here shown as tapering downwardly and inwardly slightly so that the cups are firmly held together. The cup 91 has its central portion 92 dished downwardly and is here shown as having centrally fastened thereto in any suitable manner a stud having a threaded shank 93 cooperating with the wing nut 88. The lower margins of the flanges 90, 90a are adapted to engage in notches 94 which may be formed, in the stamping process, in the upper margins of the sheet metal parts 19, 20, 21 forming the spider 17. In tightening up the wing nut 88, the upper surface of the nut engages the portion 82 of the reflector, adjacent the margin of the aperture 83 which is almost as large as the wing nut, the aperture 83 providing a free opening at the center of the reflector.

The support ring 14 may be made from a single originally rectilinear, strip of sheet metal and accordingly is here shown as split at the abutting end margins 96 (see Figures 3 and 6). In order to hold together the abutting ends of the ring 14, a sheet metal member 97 may be spot welded at a plurality of places 98 to the outer surface of the flange 41, at opposite sides of the abutting end margins 96 of that flange. The sheet metal member 97 is here shown as of the same length as the flange 41, so that the upper end margin 99 of the member abuts the under side of the annular portion 39. The member 97 is provided with an elongated struck-out finger 100 having its end bent to form a loop-like part, the bight 101 of which bears outwardly against the inside surface of the flange 40, and the free leg 102 of which bears against the under side of the portion 39, thereby holding the margins 96, constituting the split in the flange 40 and portion 39, in alinement.

It will be evident that the supporting means comprising the sheet metal spider while not limited to such use is particularly adapted for embodiment in range units in which the heating elements are movably mounted. The usual practice in electric ranges is to have the uppermost surfaces of the heating element or elements define a fixed single plane. Such construction of course will give maximum propinquity between the heating surfaces and the surface of the part to be heated, provided the surface of the part to be heated is also a plane. Cooking vessels, however, irrespective of their original form, ordinarily do not satisfy that condition, some having the bottom thereof bulged outwardly and some bulged inwardly. In fact, some cooking vessels are originally made with the bottom slightly recessed in the central region. It will be evident that if the heating elements are movably mounted, as hereinbefore described, that the upper surfaces of the heating elements will be adjusted to and adapt themselves to the surfaces of various types and forms of vessels placed thereon. For example, in case a vessel which has the central portion of the bottom thereof slightly recessed upwardly, is placed upon a range unit such as herein disclosed, the portion of the bottom of the vessel which surrounds the central recessed portion of the bottom will push downwardly on the upper surface of the element 12, thereby causing the saddles 68, 69, 70 to swing about their pivots and push the element 11 upwardly into contact with the central recessed portion of the bottom of the vessel. On the other hand if the central portion of the vessel is bulged downwardly somewhat, the element 11 will be pushed downwardly, thereby causing the saddles to swing and push the element 12 upwardly into contact with the outer part of the bottom of the vessel. It will be evident that the described construction and arrangement permits such swinging of the saddles with respect to the heating elements. The downward movement of a heating element is limited by engagement of the under side of the element with the top of an arm of the spider 17. The maximum relative movement of the heating elements is of course double the movement of one element in the illustrated embodiment. The aforesaid relative movement need be only slight to take care of substantially all usual conditions.

From the foregoing it will be apparent that the saddles 68, 69, 70 serves to equalize the forces acting against the upper surfaces of the heating elements 11, 12. Accordingly, it will be further apparent that equalization will take place even though the forces acting on either of the elements are not uniformly circumferentially distributed. For example, the forces may be such as to move the element 12 downwardly at one place and to move it upwardly at another place, the unit 11 being correspondingly moved in respectively opposite directions at those places. This would occur if the bottom of the vessel is not bulged outwardly, or inwardly, uniformly.

If it is desired to disassemble the support ring 14 from the remainder of the range unit 10, the entire range unit may be lifted out of the stove, and then the left hand portion of the support ring, as viewed in Figure 4, may be moved downwardly, relatively to the end of the arm 22, so that the upper margin of the aperture 42 will ride onto the cam surface 34, thereby drawing the support ring slightly to the left. Further relative movement in the same direction entirely disengages the left hand side of the support ring 14 from the struck-out portion 32. During such relative movement the support ring 14 pivots about the struck-out portions 32a, 32b, and when the top of the support ring is below the level of the reflector 18, the support ring may be entirely removed from the spider 17, by movement of the support ring, in its tilted position, in a general direction toward the right (as viewed in Figure 4) in respect to the remainder of the range unit.

If it is desired to reassemble the support ring 14 with the remainder of the range unit, the apertures 42a, 42b of the support ring are first engaged over the struck-out portions 32a, 32b, with the support ring in such tilted position that the side of the support ring opposite the chord defined by the struck-out portions 32a, 32b is below the reflector 18; and then the free portion of the support ring is moved upwardly until the radially inner curved margin of the portion 39 engages the lower margin of the struck-out portion 32, whereupon a slight pressure will cause that curved margin to ride upwardly over the lower margin of the struck-out portion 32 while drawing the support ring slightly to the left. Further movement in the same direction will cause the support ring 14 to snap into the position shown in Figure 4.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiment of our invention provides a new and improved electric heater, and accordingly, accomplishes the principal object of our invention. On the other hand, it also will be obvious to those skilled in the art that the illustrated embodiment of our invention may be variously changed and modified, or features thereof, singly or collectively, embodied in other combinations than those illustrated, without department from the spirit of our invention, or sacrificing all of the advantages thereof, and that accordingly, the disclosure herein is illustrative only, and our invention is not limited thereto.

We claim:

1. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a plurality of substantially identical sheet metal stampings forming a plurality of arms each arm including spaced sheet metal parts defining planes transverse to said general plane, said supporting means comprising also a portion disposed transversely of said spaced parts; means mounting said portion for swinging movement in a plane transverse to said general plane; and means whereby said portion supports said heating element.

2. An electric heater, comprising: supporting means constructed and arranged to support electrical heating elements; ring means disposed about said supporting means and constructed and arranged to support said supporting means; said ring means being split transversely and including an annular portion having two spaced concentric generally cylindrical flanges; means, including a member welded to the outer peripheral surface of the inner of said flanges, constructed and arranged to hold the margins of the split in said flange in alinement; and means, forming a part of said member, constructed and arranged to hold the margins of the split in the outer of said flanges in alinement.

3. An electric heater, comprising: an electrical heating element, and sheet metal supporting means for said heating element, said supporting means comprising a plurality of sheet metal stampings constructed and arranged to form a central plural sided sheet metal portion and a plurality of sheet metal arms extending outwardly from the said plural sided central portion, and means fastening said stampings to each other to form a unitary supporting means.

4. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a plural sided central portion and a plurality of arms extending generally radially from said central portion, said central portion and said arms comprising a plurality of sheet metal stampings in number the same as the number of said arms, each arm including sheet metal parts defining planes transverse to said general plane, and each stamping forming a side of said central portion and also two of said parts of different arms; and means whereby said supporting means supports said heating element.

5. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a triangular central portion and three arms extending generally radially from the apexes of said central portion, said central portion and said arms comprising three sheet metal stampings, each arm including sheet metal parts defining planes transverse to said general plane, and each stamping forming a side of said central portion and two of said parts of different arms; and means whereby said supporting means supports said heating element.

6. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means including spaced sheet metal parts defining planes transverse to said general plane, said supporting means including also a sheet metal portion connected to at least one of said spaced parts and extending transversely thereof; and means mechanically connecting said portion and said heating element.

7. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a plurality of circumferentially spaced arms each including spaced sheet metal parts defining planes transverse to said general plane, said supporting means comprising also a plurality of portions disposed transversely of the spaced parts of said arms respectively; and means so mounting said portions on said arms respectively that said portions are adapted to support said heating element.

8. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a plurality of circumferentially spaced arms each including spaced sheet metal parts defining planes transverse to said general plane, said supporting means comprising also a plurality of portions disposed transversely of the spaced parts of said arms respectively; means so mounting said portions on said arms respectively that said portions are adapted to support said heating element; and means mechanically connecting said portions and said heating element.

9. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means disposed at one side of said heating element and engageable by said heating element, said supporting means including spaced sheet metal parts defining planes transverse to said general plane, and including also a member disposed transversely of said spaced parts; and fulcrum means, disposed between and carried by said spaced parts, so mounting said member for swinging movement in a plane transverse to said general plane that said member and said heating element are engageable with each other.

10. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means including spaced sheet metal parts defining planes transverse to said general plane, said supporting means in-

cluding also a sheet metal portion having an aperture and connected to at least one of said spaced parts and extending transversely thereof; and means, including a stud carried by said heating element and extending through said aperture, constructed and arranged mechanically to connect said heating element and said portion.

11. An electrical heater, comprising: an electrical heating element, sheet metal supporting means for said heating element, said supporting means including a plurality of sheet metal arms extending in a generally radial direction, each arm having at its radial outer end a portion bent so as to extend in a generally circumferential direction, and a shoulder struck radially outward from said portion; and ring means disposed about the radially outer ends of said arms, said ring means having apertures in which said shoulders are respectively engageable.

12. An electric heater, comprising: a plurality of electrical heating elements defining a general plane; sheet metal supporting means disposed at one side of said heating elements and engageable by said heating elements, said supporting means including a plurality of arms each arm including spaced sheet metal parts defining planes transverse to said general plane, and including also members disposed transversely of the spaced parts of respective said arms; and a plurality of fulcrum means disposed between and carried by the spaced parts of the respective arms, each fulcrum means so mounting one of said portions intermediate its ends for swinging movement in a plane transverse to said general plane that certain of said heating elements are engageable with a given one of said portions at respective opposite sides of the axis of swinging movement.

13. An electric heater, comprising: a plurality of electrical heating elements defining a general plane; sheet metal supporting means disposed at one side of said heating elements and engageable by said heating elements, said supporting means comprising a plurality of substantially identical sheet metal stampings forming a plurality of arms each arm including spaced sheet metal parts defining planes transverse to said general plane, and including also members disposed transversely of the spaced parts of respective said arms; and a plurality of fulcrum means disposed between and carried by the spaced parts of the respective arms, each fulcrum means so mounting one of said portions intermediate its ends for swinging movement in a plane transverse to said general plane that certain of said heating elements are engageable with a given one of said portions at respective opposite sides of the axis of swinging movement.

14. An electric heater, comprising: supporting means constructed and arranged to support electrical heating elements; ring means disposed about said supporting means and constructed and arranged to support said supporting means; said supporting means having a plurality of peripherally disposed circumferentially spaced projections providing downwardly facing shoulders; said ring means including a generally cylindrical portion having a plurality of circumferentially spaced apertures, corresponding lower margins of said apertures being engaged by said shoulders respectively; said ring means and said supporting means being relatively so constructed and arranged that when they are assembled a first of said apertures has its lower margin disposed further radially inwardly of the end of the cooperating one of said projections than the upper margin of said first aperture and that said ring means and said supporting means may be disassembled by first tilting said ring means downwardly relatively to said supporting means, locally at said cooperating projection, disengaging said ring means and said supporting means at said cooperating projection, and then disengaging said ring means from said supporting means at the other said projections.

15. An electric heater, comprising: supporting means constructed and arranged to support electrical heating elements; ring means disposed about said supporting means and constructed and arranged to support said supporting means; said supporting means having a plurality of peripherally disposed circumferentially spaced projections providing downwardly facing shoulders; said ring means including a generally cylindrical portion having a plurality of circumferentially spaced apertures, corresponding lower margins of said apertures being engaged by said shoulders respectively; said ring means and said supporting means being relatively so constructed and arranged that when they are assembled a first of said apertures has its lower margin disposed further radially inwardly of the end of the cooperating one of said projections than the upper margin of said first aperture and that said ring means and said supporting means may be assembled by first bringing certain of said projections and apertures into registry while said ring means is tilted downwardly with respect to said supporting means at said cooperating projection, and then tilting said ring means upwardly at said cooperating projection into the general plane of said supporting means to bring said cooperating projection into registry with said first aperture.

16. An electric heater, comprising: supporting means constructed and arranged to support electrical heating elements; ring means disposed about said supporting means and constructed and arranged to support said supporting means; said supporting means having a plurality of peripherally disposed circumferentially spaced downwardly facing shoulders; said ring means including a generally cylindrical portion having a plurality of circumferentially spaced apertures, corresponding lower margins of said apertures being engaged by said shoulders respectively; at least one of said shoulders being formed by a projection having a cam surface inclining upwardly radially inwardly from the end of said projection and being engageable by an upper margin of the cooperating one of said apertures; and the lower margin of said cooperating aperture being bent inwardly out of the general locus of said cylindrical portion so that said lower margin is disposed further radially inwardly of the end of said projection than said upper margin.

17. An electric heater, comprising: a plurality of electrical heating elements defining a general plane; sheet metal supporting means comprising a plurality of substantially identical sheet metal stampings forming a plurality of arms each arm including spaced sheet metal parts defining planes transverse to said general plane, said supporting means comprising also a member disposed transversely of said spaced parts; and means so mounting said member for swinging movement in a plane transverse to said general plane that said member is engageable by adjacent ones of said heating elements at opposite

sides of the axis of swinging movement of said member.

18. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a plural sided central portion and a plurality of arms extending generally radially from said central portion, said central portion and said arms comprising a plurality of sheet metal stampings in number the same as the number of said arms, each arm including sheet metal parts defining planes transverse of said general plane, and each stamping forming a side of said central portion and also two of said parts of different arms; and means holding said heating elements assembled with said supporting means.

19. An electric heater, comprising: an electrical heating element defining a general plane; sheet metal supporting means comprising a triangular central portion and three arms extending generally radially from the apexes of said central portion, said central portion and said arms comprising three sheet metal stampings, each arm including sheet metal parts defining planes transverse to said general plane, and each stamping forming a side of said central portion and two of said parts of different arms; and means holding said heating element assembled with said supporting means.

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