Jan. 1, 1946. E. L. WIEGAND 2,392,076

ELECTRIC HEATER

Original Filed Aug. 23, 1941 2 Sheets-Sheet 1

FIG. 1.

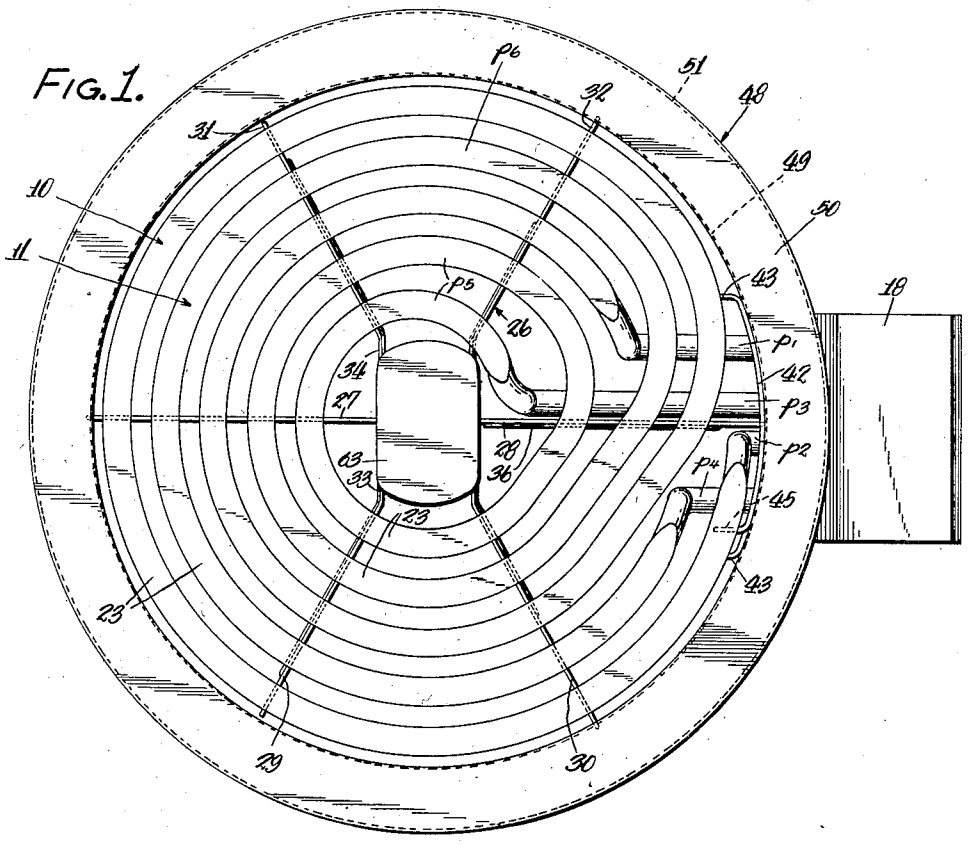
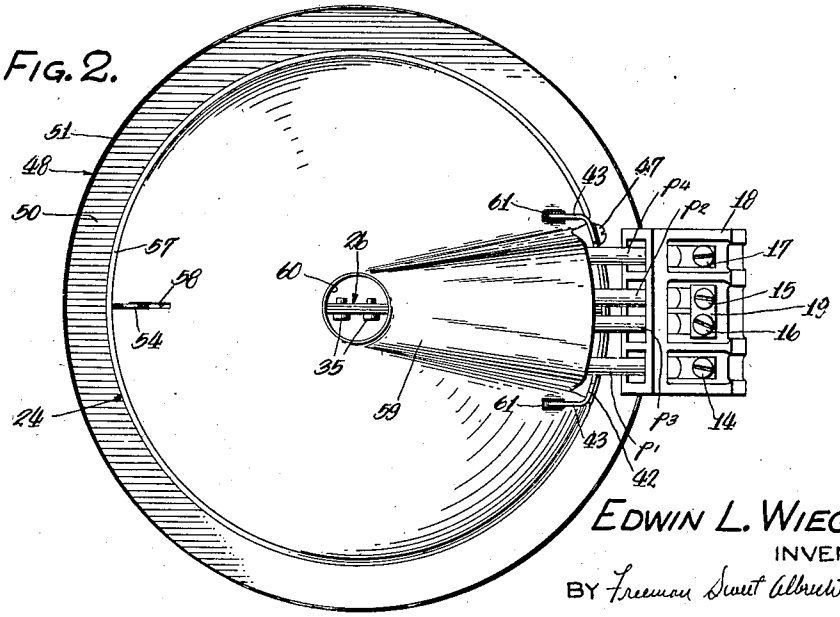


FIG. 2.



EDWIN L. WIEGAND
INVENTOR

BY Freeman Sweet Albright and Williams

ATTORNEYS

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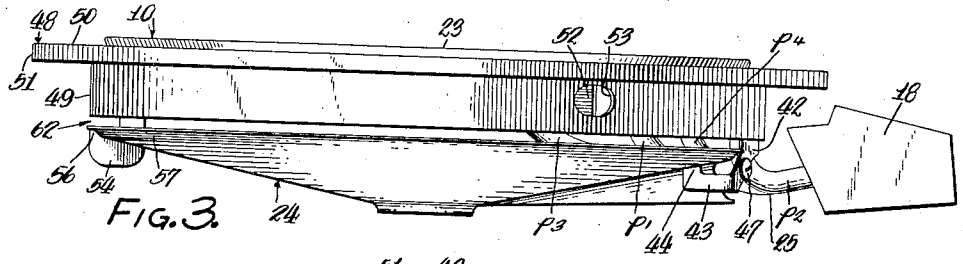


FIG. 3.

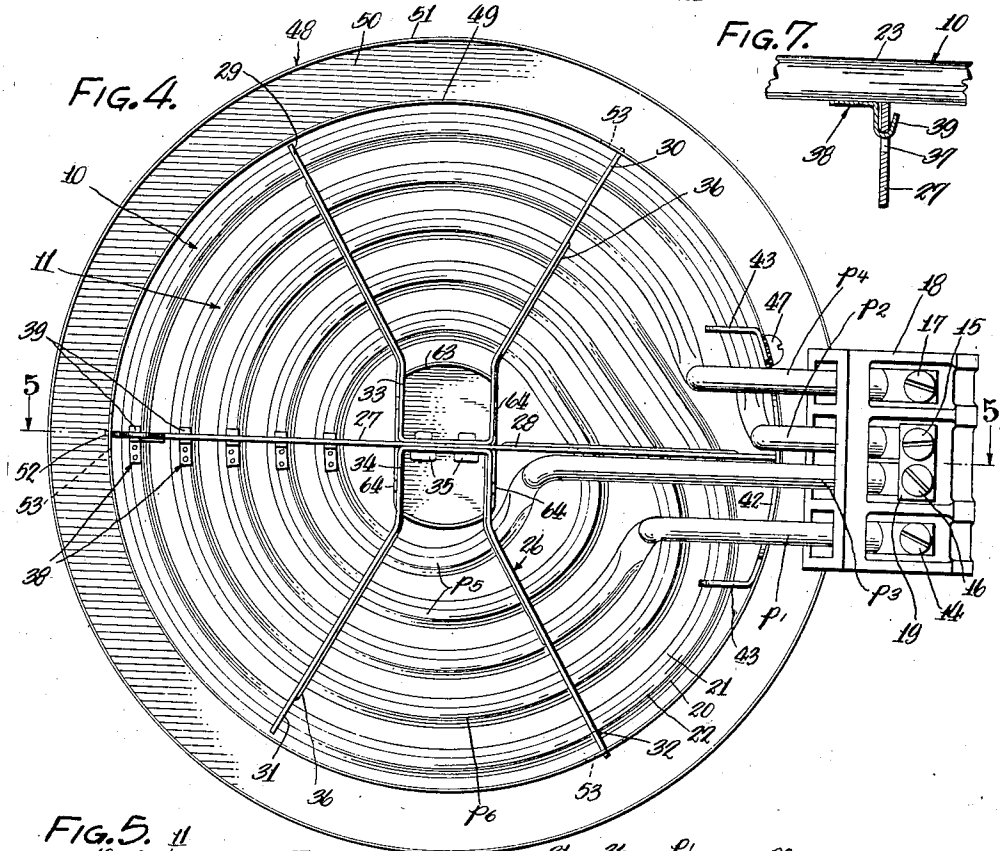


FIG. 4.

FIG. 7.

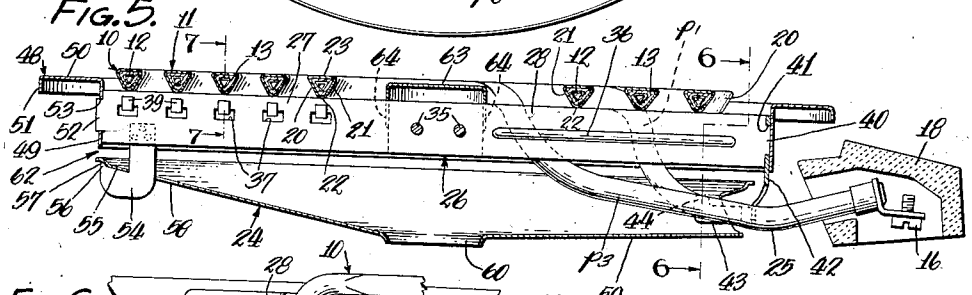


FIG. 5.

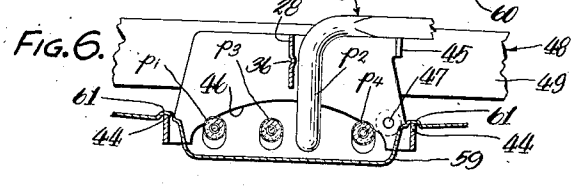


FIG. 6.

EDWIN L. WIEGAND
INVENTOR

BY Freeman Swart Albrecht and Williams

ATTORNEYS

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UNITED STATES PATENT OFFICE

2,392,076

ELECTRIC HEATER

Edwin L. Wiegand, Pittsburgh, Pa., assignor to Edwin L. Wiegand Company, Pittsburgh, Pa., a corporation of Pennsylvania

Original application August 23, 1941, Serial No. 408,073. Divided and this application December 9, 1942, Serial No. 468,383

2 Claims. (Cl. 219—37)

My invention relates to electric heaters, more particularly to electric range units, and the principal object of my invention is to provide new and improved electric heaters of these types.

This application is a division of my copending application Serial Number 408,073, filed August 23, 1941.

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

Figure 1 is a plan view of an electric range unit illustrating an embodiment of the invention,

Figure 2 is a bottom plan view of the embodiment, drawn to a smaller scale,

Figure 3 is a side elevation of the embodiment,

Figure 4 is a bottom plan view, the reflector being omitted to better illustrate certain of the parts,

Figure 5 is a sectional view corresponding generally to the line 5—5 of Figure 4,

Figure 6 is a fragmentary sectional view corresponding generally to the line 6—6 of Figure 5, and

Figure 7 is an enlarged sectional view corresponding generally to the line 7—7 of Figure 5.

The electric heater or range unit embodying my invention may comprise one or more heating elements, in this instance two elements 10 and 11. As herein shown, each element comprises a tubular metal sheath within which is disposed electrical resistance heating means 12, embedded in refractory electrical-insulating heat-conducting material 13. The insulating material 13 may be in the form of suitable granular, comminuted, or powdered refractory material, preferably compacted to a dense hard condition.

Each of the elements 10 and 11 has an active portion which is preferably triangular in cross-section, as best shown in Figure 5, and the active portion of each element is of generally spiral form. Referring particularly to Figures 1 and 4, it will be noted that the element 11 has a central portion wound about itself for one turn, and the remainder of the active portion of the element 11 is then intercalated with the element 10. Therefore, the element 11 has portions disposed side-by-side, and then has portions disposed side-by-side with portions of the element 10. This particular construction makes possible a distribution of heat not attainable with structures of the prior art.

For example, assuming that the elements 10 and 11 are electrically connected to an electrical source of, say 220 volts, in such manner that either one or both may be energized, the elements herein shown are designed to provide 2000 watts when both are simultaneously energized. The element 11 is so designed that when it only is energized, it will provide 1400 watts, and this wattage will be spread out over a considerable area, but with some concentration at the center. The element 10 is so designed that when it only is energized, it will provide 600 watts. Of course, the wattages will be in relation to the voltage used, and in the embodiment it is possible to have other heats. For instance, if 110 volts were used, the elements 10 and 11 herein disclosed are so designed that when both are energized they will provide 500 watts; when the element 11 only is energized it will provide 350 watts; and when the element 10 only is energized, it will provide 150 watts. Also, it will be apparent that it is possible to employ a switch connected to different voltages, as for example 220 volts and 110 volts, and so designed that the elements may be singly or together energized with either voltage.

The element 10 has end portions p_1, p_2, and the element 11 has end portions p_3, p_4. Each of the end portions terminates in a connection terminal, respectively numbered 14, 15, 16, and 17, which may be housed in a suitable insulating block or housing 18. The terminals 15 and 16 are here shown bridged by a bridge plate 19, and the connection terminals may be connected to a source of electricity (not shown) through the means of a proper electrical switch (also not shown).

The end portions p_1, p_2, p_3, p_4 are all of substantially circular or rounded section, to facilitate bending, and preferably only the spiral portions of the elements are of triangular section. The elements such as may be embodied in the range unit herein shown may initially comprise a tubular sheath of substantially circular cross-section into which the resistor and insulating material have been introduced endwise, and may have their active portions side-pressed in suitable dies to a desired triangular cross-section, and the element may be press-forged as set forth in my co-pending application Serial Number 361,997, filed October 21, 1940. Accordingly, the active portion of each heating element 10 or 11 comprises a tubular sheath having two walls 20, 21, the major portions of which are flat and make between them an angle of approximately 60°, these walls merging in a rounded apex 22. The upper wall 23 is substantially entirely flat and makes with the walls 20, 21 angles of 60° respectively. In the embodiment shown, the flat por-

tions of the walls 20, 21 are respectively of less cross-sectional extent than the substantially entirely flat upper wall 23.

As best seen in Figure 5, the upper walls 23 lie in a common plane. Therefore, if an object, such as a cooking vessel, is placed upon the heating means comprising the heating elements 10, 11, the vessel will be in contact with the flat upper walls 23, and therefore is in excellent heat-conducting relation with respect to a relatively large area of the heating means, so as to be heated mainly by conduction. The generally downwardly facing lower walls 20, 21 of each heating element radiate some heat diagonally downwardly in respectively opposite directions, considering any given portion of an element, and this heat is reflected upwardly by a reflector 24 which generally underlies the heating elements 10, 11.

The end portions p_1, p_2, p_3, p_4 extend downwardly from their respective active portions, and then have their respective extremities bent slightly upwardly toward the insulating block 18, thus forming a drip point 25, best shown in Figure 5 with reference to the portion p_3. Preferably all the end portions are brought together at an edge of the range unit, as herein shown, so that external electrical connection thereto is facilitated.

Tracing the various portions of the elements, and starting with the portion p_3 of the element 11, it will be seen that the portion p_3 extends toward the center of the range unit, upwardly to the active portion, and the active portion is wound about itself at the center at least once, as shown at p_5, and then has an intermediate portion p_6 spiralling to the end portion p_4. The element 10 starts with the end portion p_1 extending upwardly to its active portion, and this active portion is intercalated with respect to the active portion of the element 11 except at the central portion p_5, and terminates in the end portion p_2.

The apexes 22 of the heating elements 10 and 11 define the under side of the active portion of the heating means, and this under side is mounted upon a supporting means 26, which may be a grating or grid comprising a plurality of generally radially disposed arms 27 to 32 inclusive. In the embodiment shown, the supporting means 26 comprises a straight sheet-metal member, providing the arms 27, 28. The arms 29, 30 are formed by a sheet-metal member bent so as to form a central generally U-shaped bight 33, and the arms 29, 30 extend from this bight in generally V-shaped relation with respect to each other. Likewise, the arms 31, 32 are formed by a sheet-metal member bent so as to form a central generally U-shaped bight 34, and the arms 31, 32 extend from this bight in generally V-shaped relation with respect to each other. The bights 33, 34 are fastened to opposite sides of the sheet-metal member forming the arms 27, 28, as by means of rivets 35. If desired, all, or certain of the arms may be provided with stiffening ribs, as indicated by the numeral 36.

Means may be provided to hold the heating means comprising the elements 10, 11 in desired assembly with the supporting means 26. In the embodiment shown, this means comprises a plurality of slots 37 formed in the arm 27, each slot generally underlying the section of the respective heating elements traversed by the arm 27, as best seen in Figure 5. A plurality of clips 38 are secured to the apex of each element 10, 11 adjacent the arm 27, as by spot welding, each clip having a tongue 39 extending downwardly generally along a surface of the arm 27, extending through a respective slot 37 and having its extremity bent upwardly, as best seen in Figure 7. Thus, the elements 10, 11 are held against substantial movement toward or away from the supporting means 26. Desirably, the slots are elongated in a radial direction, and in this direction are longer than the width of the clips 38 to allow for relative movement of the elements in a plane defined by the upper margins of the arms 27 through 32, so as to accommodate for expansion and contraction of the heating elements. In this manner, binding, straining, or warping of the parts is prevented.

The extremity of the arm 28 is formed with a projection 40 fitting into an aperture 41 in a bracket 42. The bracket 42 is longitudinally curved, as best seen in Figure 4, and at its lower extremities is provided with fingers 43 extending inwardly of the range unit, and terminating in upwardly directed ledges 44. An upper side margin of the bracket 42 has an angular extension 45 upon which the apex of the element 10, adjacent the end portion p_2, rests, thus supporting this part of the element 10, since it is spaced a substantial distance from the arm 32. The lower margin of the bracket 42 is formed with a curved recess 46 (see Figure 6) to pass the adjacent parts of the end portions p_1, p_2, p_3, p_4, and the adjacent parts of the end portions p_1, p_4 bear against the defining margin of the recess 46 for the purpose of steadying and aiding in the support of the heating elements 10, 11. A ground screw 47 is threaded into a tapped aperture formed in the bracket 42, and is adapted to receive a conductor which may be grounded to a suitable ground, such as a stove frame or the like.

Circumscribing the outer ends of the arms of the supporting means 26 is a ring 48, having a cylindrical portion 49 merging with an annular portion 50 in turn merging with a downwardly extending cylindrical flange 51, adapted to engage a range top (not shown). The arms 27, 30, and 32 are longer than the other arms, and the longer arms are provided with projections 52 forming shoulders with the respective arm, the projections being adapted to engage respectively in apertures 53 formed in the cylindrical portion 49, and the shoulders being adapted to bear against the adjacent inner peripheral surface of the cylindrical portion, so that the ring 48 is adapted to support the supporting means 26. The arm 27, adjacent its extremity, is provided with a downwardly extending hook 54. As here shown, the hook is a separate piece and is spot welded to the arm 27. The hook 54 has an inclined surface 55 terminating in a hook-tip 56.

The reflector 24 is disposed beneath the supporting means 26, and as best shown in Figure 5, is of generally conical form, or to describe it differently, is generally dish-shaped, with the opening of the dish directed toward the supporting means 26. The peripheral margin of the reflector 24 is formed with a downwardly offset curved portion 57, and the reflector, in line with the hook 54, is formed with a slot 58 of a length to pass the hook 54. The reflector 24 has a pocket 59 of generally U-shaped cross-section, as best seen in Figure 6, the bottom wall of the pocket extending radially inwardly, and merging with the reflector wall adjacent a central opening 60 formed in the reflector 24. On either side of the pocket 59, the reflector wall is formed with upwardly pressed areas 61, positioned so that the recess surfaces thus formed are adapted to receive respective ledges 44. The hook 54 and the ledges

44 provide hanger means from which the reflector is adapted to be hung.

The reflector 24 is adapted for assembly and disassembly with respect to the supporting means by movement generally edgewise of the supporting means. For example, to assemble the reflector 24 with the supporting means 26, the reflector 24 is moved in a direction generally parallel to the bottom edges of the arms 27 to 32 so that the pocket 59 moves to cover the adjacent parts of the end portions p_1, p_2, p_3, and p_4, and the reflector is moved a distance sufficient to align the slot 58 with the hook 54, at which time the reflector is lifted slightly to pass the hook through the slot, and the reflector 24 is again moved slightly in the first direction until the recess surfaces formed by the upwardly pressed areas 61 align with respective ledges 44. At this time, the reflector is permitted to hang, with the recess surfaces of the upwardly pressed areas resting on the ledges 44, and the reflector surface adjacent the slot 58 resting on the hook surface 55. The hook-tip 56 bears against the offset margin 57 of the reflector, and the hook surface 55 is inclined, so that either or both prevent unintentional reverse disassembly movement of the reflector. To disassemble the reflector 24 from the supporting means 26, a reversal of the assembly movement is necessary.

As best seen in Figure 5, the peripheral margin of the reflector 24 is spaced from the cylindrical wall 49 of the rim 48, to provide a substantially annular air opening 62 (except at the pocket 59) so that air may enter this space radially inwardly and proceed upwardly through the grating and heating element assembly. The downwardly inclined wall of the reflector 24 provides a drainage surface for any substances spilled on the reflector, and these substances may drain through the central opening 60, which opening also provides an additional air opening.

A central medallion 63, or the like, may be provided to cover a desired amount of the space at the center of the heating means. As here shown, the medallion 63 rests on the upper edges of the arms 27 through 32, adjacent the bight portions 33, 34, and has marginal extensions, forming four legs 64, which are secured to the side surfaces of the bight portions 33, 34 in any suitable manner, as for instance by spot welding.

From 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 also will 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 unit comprising supporting means and first and second electric heating elements mounted on said supporting means, having each of said elements intermediate the terminal portions thereof disposed in generally spiral configuration, with the spirals of the two elements progressing in the same direction, the first element comprising an inner portion extending at least approximately two turns and spiralled on itself, and an outer portion continuing at least approximately one turn, and said second element comprising at least approximately two turns and including an interior portion extending at least approximately one turn and intercalated with said outer portion of said first element.

2. An electric heating unit comprising supporting means and first and second electric heating elements mounted on said supporting means, having each of said elements intermediate the terminal portions thereof disposed in generally spiral configuration, with the spirals of the two elements progressing in the same direction, the first element being of substantially greater heating capacity and comprising an inner portion extending at least approximately two turns and spiralled on itself, and an outer portion continuing at least approximately one turn, and said second element comprising at least approximately two turns and including an interior portion extending at least approximately one turn and intercalated with said outer portion of said first element.

EDWIN L. WIEGAND.