Feb. 3, 1942. C. I. HJELMGREN 2,271,978

ELECTRIC HEATER

Original Filed Oct. 10, 1939

Fig.1.

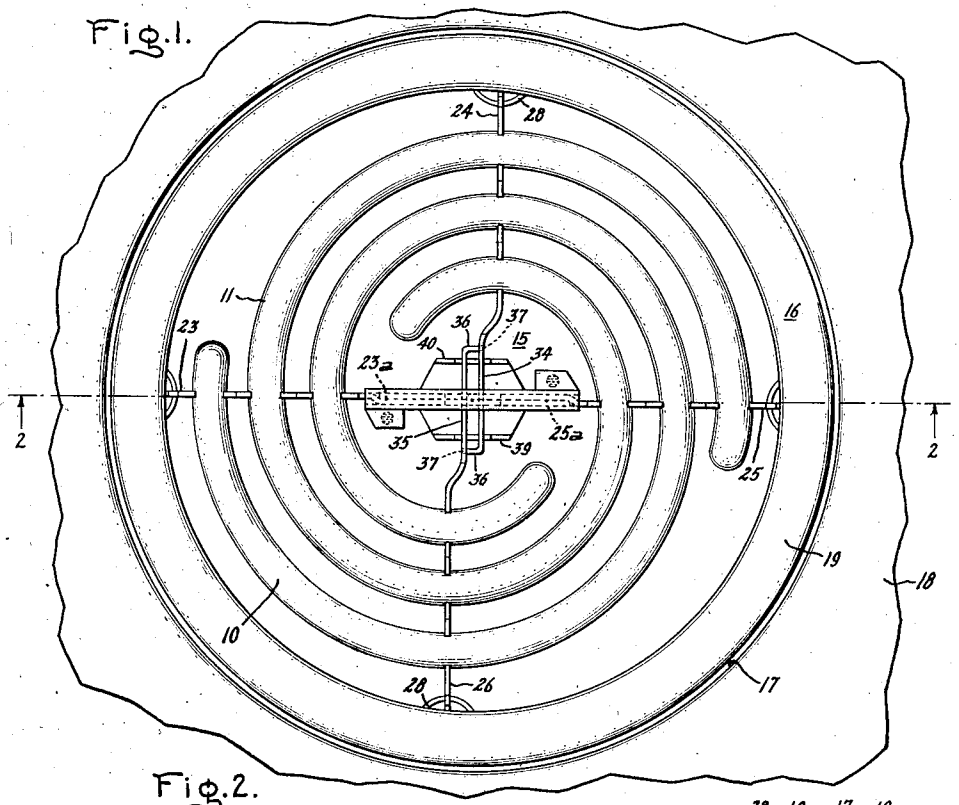


Fig.2.

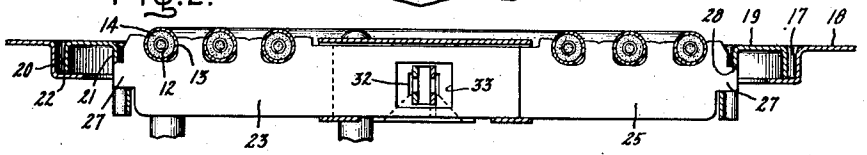


Fig.3.

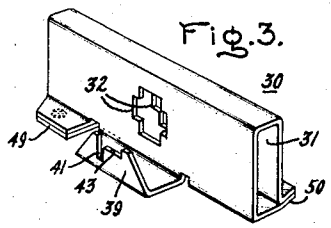


Fig.4.

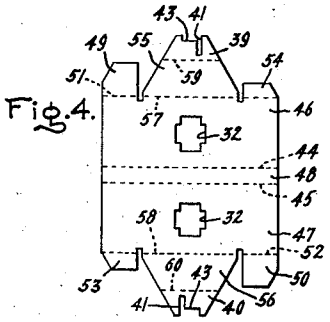


Fig.5.

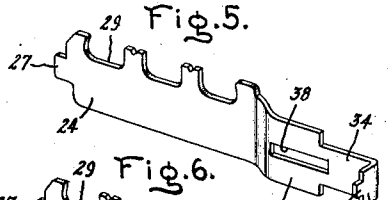
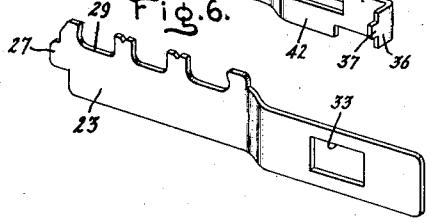


Fig.6.



Inventor:
Charles I. Hjelmgren,
by Harry E. Dunham
His Attorney.

Patented Feb. 3, 1942 2,271,978

UNITED STATES PATENT OFFICE

2,271,978

ELECTRIC HEATER

Charles I. Hjelmgren, Chicago, Ill., assignor to Edison General Electric Appliance Company, Inc., a corporation of New York

Original application October 10, 1939, Serial No. 298,819. Divided and this application September 10, 1941, Serial No. 410,339

5 Claims. (Cl. 219—37)

This invention relates to electric heaters, more particularly to electric heaters of the hotplate type, such as used with electric ranges, and it has for its object the provision of an improved device of this character.

This invention has particular application to electric hotplates having sheath wire heating elements arranged in the form of flat loops or coils. Certain sheath wire heating elements have a resistance conductor housed in a metallic sheath and embedded in and supported in spaced relation with the sheath by a compacted layer of heat conducting, electrically insulating material, such as powdered magnesium oxide. One heating unit of this type is described in the U. S. patent to C. C. Abbott, No. 1,367,341, dated February 1, 1921.

In a particular electric range hotplate employing a sheath wire element of this type, the turns of the element are supported by and rigidly secured to metallic strips formed into a grid-like spider. The ends of the strips are mounted in a supporting ring which functions to hold the spider and the heating element mounted on it in the top opening of the range.

As there is considerable expansion and contraction in the turns of the heating element as its temperature is elevated and reduced, and as they are secured to the spider, strains are set up which may result in buckling of the heating element so that it is no longer flat, or in bending of the outer ends of the holding strips, whereby the outer turns of the element are loosened.

This invention contemplates an improved electric heater wherein the holding strips for the various convolutions of the heating elements, instead of being rigidly fixed to each other, are relatively movable, thereby relieving the strains in the strips and heating elements during expansion and contraction of the elements.

This invention further contemplates an improved connection between the strips which provides for the relative movement between them, and also which has considerable mechanical strength so that the strips will support the turns of the heating element in their normal plane even when heavily loaded by a cooking appliance.

This application is a division of my copending application, Serial No. 298,819, filed October 10, 1939, and assigned to the assignee of this application.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which Fig. 1 is a plan view of an electric hotplate embodying this invention; Fig. 2 is a sectional view taken through the line 2—2 of Fig. 1 and looking in the direction of the arrows; and Figs. 3, 4, 5 and 6 illustrate certain elements used in making the hotplate of Figs. 1 and 2, Figs. 3, 5 and 6 being perspective views of the elements of these figures, and Fig. 4 being a development of the element shown in Fig. 3.

Referring to the drawing, this invention has been shown as applied to an electric range hotplate. This hotplate comprises a pair of spiral heating elements 10 and 11, nested one within the other, and which are of the sheathed type, such as described and claimed in the above-mentioned Abbott Patent No. 1,367,341. Each of these elements comprises a coiled resistance conductor 12 mounted in a metallic sheath 13 and embedded in and supported in spaced relation with reference to the sheath by a highly compacted layer 14 of heat conducting and electrically insulating material; any suitable electrically insulating material may be used, such as powdered magnesium oxide. The oxide may be compacted in any suitable manner as by reducing the sheath, and the sheath may be reduced in any suitable way, as by rolling, swaging or drawing.

The heating elements 10 and 11 are supported upon a suitable spider-like grid 15 which in turn is supported in a supporting member 16 which is adapted to fit within the opening 17 of the top plate 18 of an electric range. The supporting member 16, as shown, is provided with an annular surface 19 from the edges of which two circular walls 20 and 21 depend. The wall 20 rests upon a flange 22 formed in the range top so as to support the hotplate, while the wall 21 functions to support the grid 15. This grid, as shown, is provided with four supporting strips 23, 24, 25 and 26 positioned substantially at right angles to each other and extending radially from the center of the hotplate outwardly to the supporting member. These strips are provided at their outer ends with tongues 27 which are supported in apertures 28 provided in the wall 21 of the supporting member.

The two heating elements 10 and 11 are mounted in indentations 29 formed in the upper edges of the strips, as shown. The upper edges of the opposite side walls of these indentations are peened over so as to rigidly secure the turns of the heating elements to the strips.

The strips 23—26 are secured together at the center by means which provide for relative movement between the strips, and which prevent sagging of the strips at the center of the unit, even

when the unit is heavily loaded. For this purpose, a suitable interlocking member 30 is provided to mechanically interlock the inner ends of the strips together. The member 30 is provided with walls defining an elongated socket 31 into which the inner ends 23a and 24a of the strips 23 and 25 are received. The ends 23a and 25a are received in overlapping relation in the socket 31, as shown in Fig. 1, and preferably they will be slightly offset, as shown in this figure and in Fig. 6, so that the bodies of the strips 23 and 25 will be in substantial alignment.

The side walls of the socket 31 are provided with cross-shaped openings 32 and the inner ends 23a and 25a of the strips 23 and 25 are provided with elongated openings 33 which register with the openings 32 and which preferably are somewhat longer than these openings. The openings 32 in the socket and the openings 33 in the strips 23 and 25 receive the inner ends 34 and 35 of the strips 24 and 26, which, as shown in Figs. 1 and 2, are directed through these openings. The two ends 34 and 35 of the strips 24 and 26 are arranged in overlapped parallel relation, but are spaced somewhat from each other by end sections 36 on the two members arranged at right angles to the ends and directed towards each other, as clearly shown in Fig. 1. These angular extensions 36 terminate in tongues 37 which are received in elongated apertures 38 provided for them in the strips.

The extreme end portions 34 and 35 of the strips 24 and 26 preferably will have a lesser width than the remainder of the strips, as shown in Fig. 5; that is, the portions of the ends of the strips which protrude from the opposite sides of the socket will be reduced in width.

To reenforce and stabilize the inner end sections 34 and 35 of the strips 24 and 25, seats 39 and 40 are provided on opposite sides of the socket 31 in spaced relation with reference to it, as clearly shown in Figs. 1 and 3. These seats each have a relatively deep recess 41 in which the relatively wide inner portion 42 of one of the strips is received before it enters the openings 32 and 33 and with a relatively shallow recess or seat 43 which receives the protruding end section 34 of the other strip.

The socket 31 and the seats 40 and 41 may be formed as separate members secured together in any suitable manner, but I prefer to form them from a single piece of material. They may be made from a single piece of material which is blanked out as shown in Fig. 4. This sheet of material is bent along the lines indicated 44 and 45 to bring the two pieces of material 46 and 47 into substantially parallel relation. The areas of the sections 46 and 47 define the side walls of the socket, while the area 48 of the material between the lines 44 and 45 defines the top wall of the socket. The bottom wall is defined by tabs 49 and 50 which are bent inwardly at right angles to the wall areas 46 and 47 respectively along the lines 51 and 52, and are secured to tabs 53 and 54 respectively which are bent outwardly at right angles to the wall sections 46 and 47. The tabs 49 and 50 are secured to the tabs 53 and 54 in any suitable manner, as by welding. The seats 39 and 40 are defined by bending roughly triangular-shaped pieces 55 and 56 outwardly along dotted lines indicated 57 and 58 so as to lie at right angles to the walls 46 and 47, respectively, as shown in Fig. 4. Then the end sections in which the seats 40 and 41 are included are bent upwardly along the dotted lines 59 and 60 to the positions shown in Fig. 4. Preferably, the openings 32 and the slots 41 and 43 will be formed in the blank shown in Fig. 4 before it is formed into the supporting member 30.

It will be observed that the two strips 23 and 25 can move relatively to each other in the plane of the grid, the openings 33 being sufficiently long to permit substantial relative movement between these members without interfering with the ends of the other two strips 24 and 26 which pass through them. Likewise, the strips 24 and 26 can move longitudinally in the plane of the grid, the elongated openings 38 providing for a substantially longitudinal movement of the tongues 37 which are received in them.

It will be observed that sufficient lengths of the ends of the strips 23 and 25 are received by the supporting member 31 to prevent sagging of these elements at the center. It will also be observed that the strips 24 and 26 can not sag at the center by reason of their supporting seats 39 and 40, and also by reason of the interlocking connections between their ends 37 and their slots 38.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electric heater comprising a sheath wire heating element arranged into a substantially flat coil, a plurality of strips to which the turns of said coil are secured diverging from each other at relatively wide angles, means supporting the outer ends of said strips, and a member interlocking the inner ends of said strips having walls defining an elongated socket portion in which the inner ends of two of said strips are received in free sliding engagement, and said walls having a transverse aperture therethrough in which the inner end of another of said strips is received in free sliding engagement.

2. An electric heating unit comprising a support having a continuous depending wall, a spider-like grid in said support having a plurality of radially positioned strips arranged generally at right angles to each other, the outer ends of said strips being mounted in said wall, a member having walls defining an elongated socket in which a material portion of the lengths of the inner end portions of two of said strips are slidably received to support said inner end portions to provide for relative movement between said two strips, and said member having a plurality of spaced seats arranged transversely of said socket portion and which receive the inner end portions of the remaining strips in free sliding engagement, a heating element having a plurality of turns mounted on said grid, and means securing said turns to said strips.

3. An electric heating unit comprising a support having a continuous depending wall, a spider-like grid in said support having four radially positioned strips arranged generally at right angles to each other, means attaching the outer ends of said strips to said wall, a member having walls defining an elongated socket in which a material portion of the lengths of the inner end portions of two of said strips are received in overlapping relation and so that said lengths

can move freely relative to each other, said walls of said socket and the overlapped portions of said strips having apertures therein in substantial alignment, the inner ends of the other two strips being projected through said apertures for free sliding movement therein, a heating element having a plurality of turns mounted on said grid, and means securing said turns to said strips.

4. An electric heating unit comprising a support having a continuous depending wall, a spider-like grid in said support having four radially positioned strips arranged generally at right angles to each other, means attaching the outer ends of said strips to said wall, a member having walls defining an elongated socket in which a material portion of the lengths of the inner end portions of two of said strips are slidably received in overlapping relation, said walls of said socket and the overlapped portions of said strips having apertures therein in substantial alignment, the inner ends of the other two strips being projected through said apertures in overlapped relation so that they can move freely relative to each other, each of said last-named inner ends having an angular extension directed toward the other strip and received in an elongated aperture provided for it in said other strip, a heating element having a plurality of turns mounted on said grid, and means securing said turns to said strips.

5. An electric heating unit comprising a support having a continuous depending wall, a spider-like grid in said support having four radially positioned strips arranged generally at right angles to each other, means attaching the outer ends of said strips to said wall, a member having walls defining an elongated socket in which a material portion of the lengths of the inner end portions of two of said strips are slidably received in overlapping relation, said walls of said socket and the overlapped portions of said strips having apertures therein in substantial alignment, the inner ends of the other two strips being projected through said apertures in overlapped relation so that they can move freely relative to each other, each of said last-named inner ends having an angular extension directed toward the other strips and received in an elongated aperture provided for it in said other strip, said member also having seats spaced laterally from said socket for receiving said overlapped inner end portions of said two other strips, a heating element having a plurality of turns mounted on said grid, and means securing said turns to said strips.

CHARLES I. HJELMGREN.