

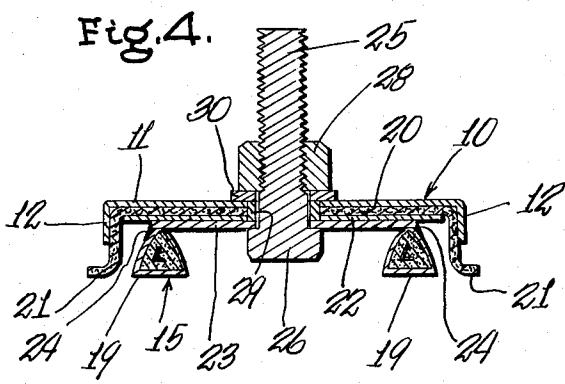
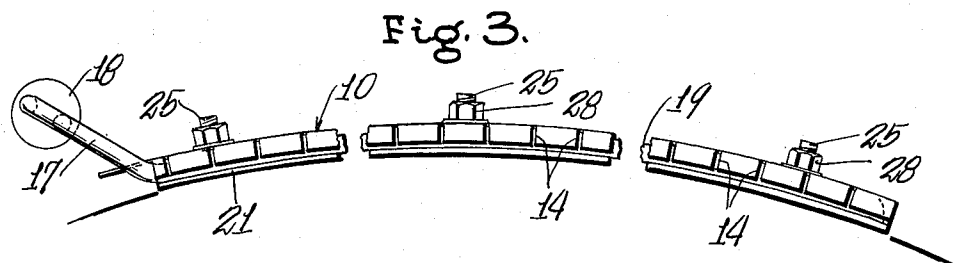
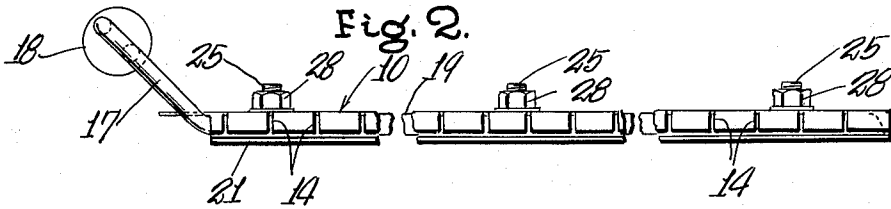
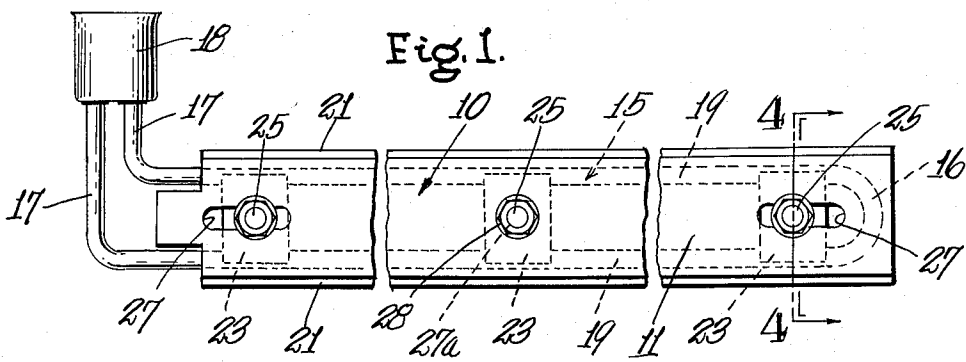
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ELECTRIC HEATING APPARATUS

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ELECTRIC HEATING APPARATUS

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Our invention relates to electric heating apparatus and the principal object of our invention is to produce new and improved apparatus of this character.

The heating apparatus of our invention is particularly suited for preheating plates for welding, and the invention makes it possible to conform to heating apparatus to the shape of the plate, whether the latter be substantially flat or curved. Our invention also includes means for directing substantially all of the heat toward the plate surface and means for generally confining the heat to the plate surface.

In the drawing accompanying this specification and forming a part of this application, there is shown, for purpose of illustration, an embodiment which our invention may assume, and in this drawing:

FIGURE 1 is a broken top plan view of heating apparatus embodying our invention,

FIGURE 2 is a broken side elevational view of the apparatus shown in FIGURE 1,

FIGURE 3 is a view similar to FIGURE 2 but showing the apparatus bent to conform to a curved surface, and

FIGURE 4 is an enlarged sectional view corresponding generally to the line 4—4 of FIGURE 1.

The embodiment of the invention herein disclosed comprises an elongated housing 10, preferably of sheet-metal and trough-shaped to provide, in this instance, a generally flat bottom wall 11 and relatively short side walls 12. The side walls have a plurality of transverse slits or slots 14 spaced along the longitudinal extent of the housing whereby the latter may be bent along the bottom wall to various shapes which may deviate from rectilinear formation.

An elongated, sheathed electric heating element 15 is positioned longitudinally of and within the housing 10 and in the presently disclosed embodiment the heating element is of the hair-pin type with its bight portion 16 at one end of the housing and its terminal portions 17, 17 extending from the opposite end of the housing and connected to a terminal member 18. The terminal member 18 is shown as being of the socket type for receiving a plug connector (not shown) which is connected to a suitable source of electric current.

The legs 19, 19 of the heating element 15 lie along the bottom wall 11 and are spaced inwardly of the interior surface of respective side walls, as best seen in FIGURE 4. The legs 19, 19 of the heating element may be bent between the bight portion 16 and terminal portions 17, 17, and this is customary with hair-pin type elements of usual construction.

The housing 10 is preferably lined interiorly with heat insulating means and in the presently disclosed embodiment such means is in the form of asbestos sheeting 20 which extends substantially the full length of the housing and lies along the inner surface of the bottom and sides of the housing. As best seen in FIGURE 4, the longitudinal edges 21 of the sheeting extend beyond the terminal edges of the housing side walls 12 to form deformable extensions thereof. The sheeting 20 preferably has a wire or other stiffening means woven therein so that the extensions will yieldably retain the shape to which they are formed.

A reflector 22 is disposed between the housing bottom wall 11 and the heater legs 19, 19 to direct heat from the

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heater toward the open side of the housing. The reflector may be in the form of a metal plate, as shown, or the inner surface of the sheeting may have a reflective coating thereon.

Means are provided for connecting the housing and heating element and for holding the latter in position within the former, the connecting means permitting simultaneous longitudinal flexing of the housing and the element legs. In the present embodiment, a plurality of spaced plates 23 span the legs 19, 19 and are welded thereto, as shown at 24. Each plate has a central opening to pass the shank 25 of a bolt having a head 26 bearing against the plate.

The bottom wall 11 of the housing 10 is provided with openings 27, three being disclosed in the drawing. As seen in FIGURE 1, the center opening 27a is round and closely receives the bolt shank 25, whereas the end openings 27 are elongated in direction of the length of the housing. At the center opening 27a, a nut 28 is drawn tightly down on the bolt shank 25 to firmly clamp the head of the bolt against the respective plate 23 and draw tightly together the plate, reflector 22, sheeting 20 and housing bottom wall 11 so that no relative movement of parts is permitted. At the end openings 27, a hard spacer sleeve 29 is disposed between plate 23 and a washer 30 underlying the nut 28 so that the parts cannot be tightly clamped together whereby to accommodate for relative movement between the housing and heater caused by bending or by differential expansion and contraction.

The heater may be bent to generally conform to a curved surface, as seen in FIGURE 3, with the open side of the housing directed toward the surface. The edges 21 of the sheeting 20 may be molded to compensate for variations in spacing between the surface to be heated and the terminal edges of the housing side walls 12, thus to confine the heat emanating from the heating element to the surface to be heated.

In view of the foregoing, it will be apparent to those skilled in the art that we have accomplished at least the principal object of our invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

We claim:

1. Electric heating apparatus comprising an elongated housing which is trough-shaped in cross-section to provide one closed and one open side, said housing having spaced side walls margining the open side of said housing, a tubular sheathed electric resistance heating element secured to said housing and disposed between the spaced side walls thereof and said element extending beyond said housing side walls in a direction outwardly of the open housing side for engagement with a surface to be heated, and flexible, heat-resistant material carried by said housing and projecting beyond said housing side walls in a direction outwardly of said open housing side an amount substantially equal to the corresponding amount of projection of said heating element for reducing heat loss from the interior of said housing through the space between said housing side walls and the surface to be heated.

2. Electric heating apparatus comprising an elongated housing which is trough-shaped in cross-section to provide one closed and one open side, said housing having spaced side walls margining the open side of said housing, a tubular sheathed electric resistance heating element secured to said housing and disposed between the spaced side walls thereof and said element extending beyond said housing

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side walls in a direction outwardly of the open housing side for engagement with a surface to be heated, and flexible, heat-resistant material interposed between said element and said housing and projecting beyond said housing side walls in a direction outwardly of said open housing side an amount substantially equal to the corresponding amount of projection of said heating element for reducing heat loss from the interior of said housing through the space between said housing side walls and the surface to be heated.

3. The construction of claim 2 wherein the side walls of said housing are slotted to provide the latter with sufficient flexibility to generally conform to surfaces which are not flat.

4. The construction of claim 3 wherein heat-reflective means is interposed between said element and said flexible, heat-resistant material to concentrate heat on the surface to be heated.

5. The construction of claim 4 wherein said element is of hair-pin shape providing a pair of legs in side-by-side relation joined at one end by an integral bight portion, wherein means extends across and connects respec-

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tive legs together, wherein a plurality of fastening members are spaced longitudinally along said housing, wherein each fastening member extends through aligned apertures in said means connecting said element legs together, said reflective means, said heat-resistant material and said housing for removably securing together the parts aforesaid, and wherein certain of said apertures are elongated longitudinally of said housing to provide for relative longitudinal movement of the parts aforesaid during flexure of the assembly and differential expansion and contraction thereof during heating cooling cycles.

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