

[54] **EXTRUDED CONTACT ELECTRIC HEATER STRIP**

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219/536, 537, 540, 311, 325, 336, 436, 439,
542; 165/171, 53, 183, 185

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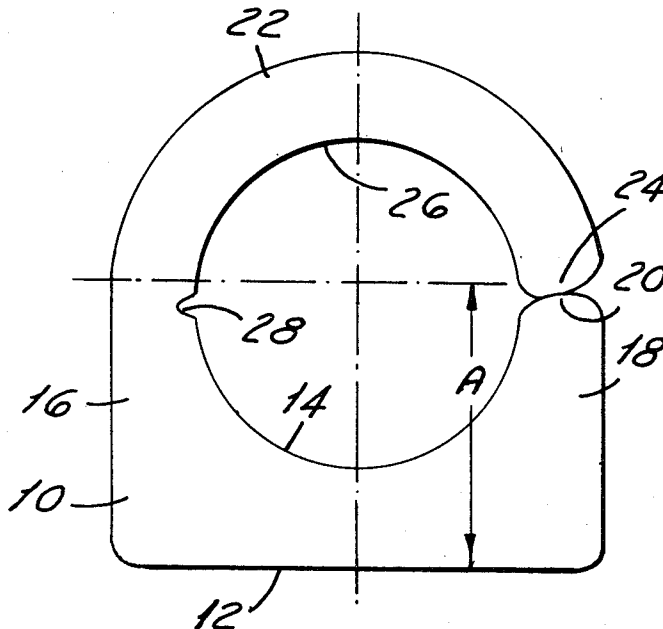
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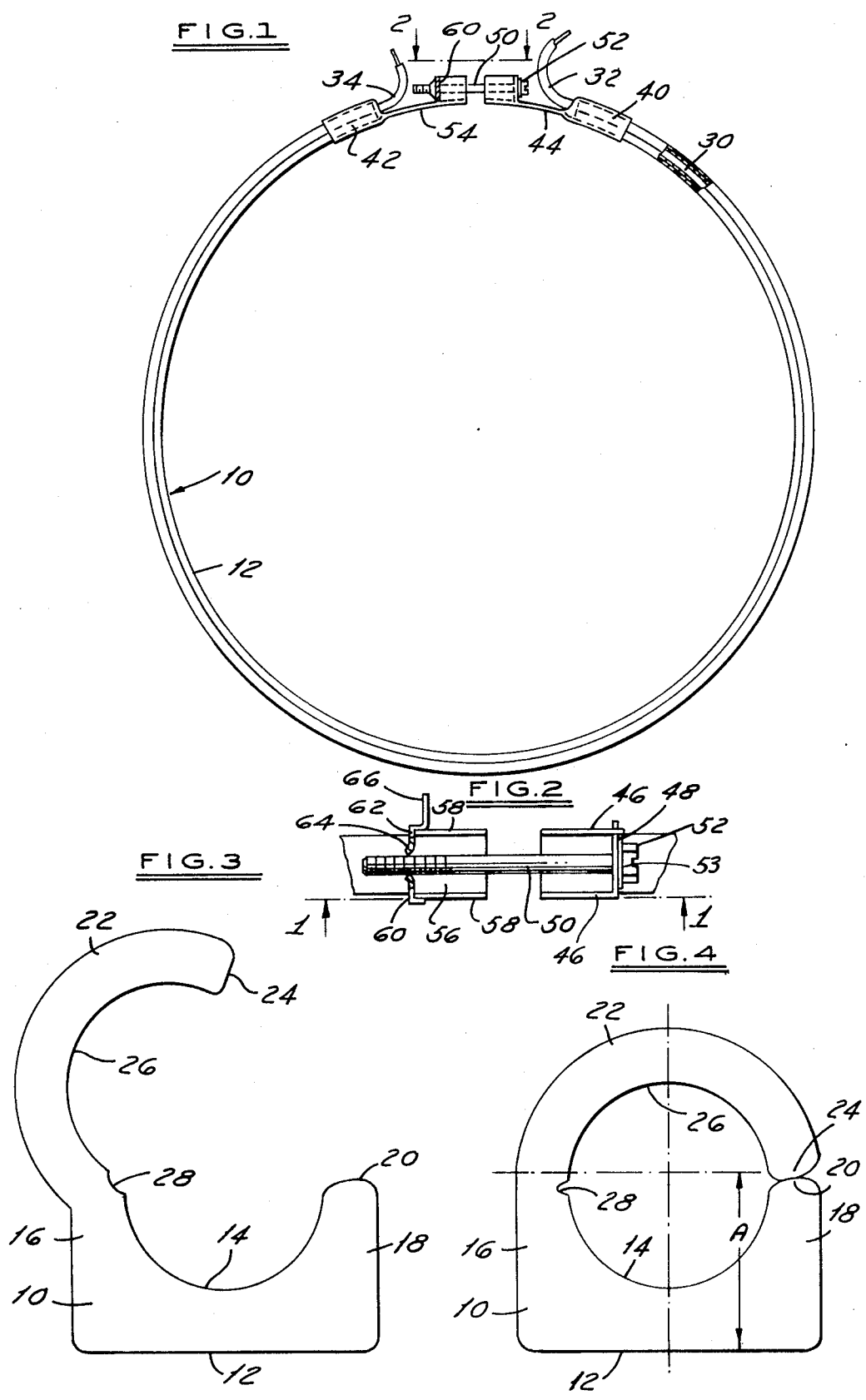
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[57] ABSTRACT

A thermally conductive casing and a method for forming the same for a contact heater resistance element in the form of an open extrusion of thermally conductive, soft metal which, in open form, will receive an elongate resistance element and which is then closed to confine the element and shaped into a configuration which draws the contacting edges of the extrusion into tight engagement to seal in the heating element.

3 Claims, 4 Drawing Figures





EXTRUDED CONTACT ELECTRIC HEATER STRIP

This invention relates to an Extruded Contact Heater Strip and Method for Forming the Same for enclosing an electrical resistance element.

Circular contact heater constructions are known in the art as illustrated in a U.S. patent to Howard K. Graves, U.S. Pat. No. 3,370,156, dated Feb. 20, 1968. These heaters are extensively used for application to the base of a compressor unit to keep the refrigerant and lubricant in said base at a predetermined temperature to prevent deleterious effects caused by frothing and foaming. In other instances, the heaters are used on oil sumps and other places where extreme cold temperatures are to be moderated, for example, in internal combustion engine crankcases and so forth.

One of the problems in forming these strip contact heaters is the sealing of the electrical resistance units which are generally a fine winding of resistance metal around a core covered with an insulation.

It is an object of the present invention to provide a relatively simple container for the resistance elements which has an adequate contact surface for a cylindrical container to be heated and which is self-sealing to the point that the electrical resistance heater is well protected within the casing.

It is a further object of the invention to provide an extruded section which can be readily cut in proper lengths to receive resistance elements and which can then be closed and subsequently formed in a circular configuration to enhance the closing action and insure a tight seal.

Other objects and features of the invention will be apparent in the following description and claims in which the details of the construction are set forth together with the principles of operation in connection with the best mode presently contemplated for practice of the invention.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

FIG. 1, an elevation of a completed unit showing the final configuration partially in section on line 1—1 of FIG. 2.

FIG. 2, a sectional view on line 2—2 of FIG. 1.

FIG. 3, a sectional view of the extrusion used in the practice of the invention.

FIG. 4, a sectional view of the extrusion in closed position.

REFERRING TO THE DRAWINGS

In FIG. 3, an extrusion is shown in cross-section, this being formed of a soft aluminum alloy, that is, in annealed condition. Aluminum alloy 1100 is suitable.

It will be noted that this extrusion shape has a base portion 10 with a bottom surface 12 which is straight in cross-section such that it will be a contact surface for a cylindrical wall after the device is completed. Opposite to the contact surface 12 is a recess 14 semi-circular in shape formed by two sides 16 and 18 rising from the base 10. The side 18 terminates at an edge 20 which is fairly broad and slightly rounded. The side 16 continues in a curved extension portion 22 integrally joined with the side 16 having a free edge 24 and shaped to provide a recess 26.

A small concavity 28 is provided at the juncture of the wall 16 with the extension 22 to facilitate a bending action. The extrusion is made to be finally shaped into

the configuration shown in FIG. 4 where the edges 20 and 24 are brought into contact to merge the two recesses 14 and 26 into an elongate tubular opening.

The steps in the construction of the unit are, first, the extrusion of the section shown in FIG. 3. Secondly, a wound resistance element 30 is laid into the opening 14 after a section of the extrusion has been cut to length. The resistance element 30 preferably has leads 32 and 34 connected to its ends with a suitable sealing between the insulating covers of each. The open extrusion is then rolled or otherwise moved into a closed position as shown in FIG. 4, the soft material facilitating this closure to a relatively tight joint between the edges 20 and 24.

Fastening elements are then attached to each end of the tube as shown in FIG. 1, namely, elements 40 and 42, these having an open ferrule collar which is crimped tightly around the ends of the closed tube to compress the insulation of the lead wires and create a tight seal. Each fastening element has an extension which serves as a part of a tightening clamp assembly. Extension 44 on the crimped section 40 has folded parallel walls 46 and a cross-over fold 48, 90° to parallel walls 46, fold 48 being apertured to receive a screw 50 having a head 52 and carrying a washer 53. On the crimped section 42 is an extension 54 having a base 56 and two side walls 58. The edges of the parallel side walls 58 are angled as shown at 60 to cooperate with a separate lock plate 62 having a threaded opening 64 to receive the threaded end of the tightening bolt 50. A tab 66 is provided on the plate 62 for a grounding connection if this is desired.

As the assembly is viewed in FIG. 1, it will be seen that the tightening of the bolt 50 will cause the lock plate 62 to clamp behind the edges 60 to draw the ends of the heater strip together. After end portions 40 and 42 are applied to the closed extension, the device is formed into a final configuration as shown in FIG. 1, that is, the flat base portion is placed on the inside and the device is formed into a final shape.

It will be noted that the juncture 20-24 is approximately on or a little above the center line of the diameter of the enclosed recess, which center line is substantially parallel to the base 12. The distance from the base is designated at the dimension A in FIG. 4. Thus, when the closed straight extrusion is formed into the final shape shown in FIG. 1, there will be a tendency on the part of the metal near the base to contract and the metal near the outer diameter to stretch. This causes a compression action on the leading edge 24 of the extension 22 so that it is brought into tight engagement with the top side wall 18 of the base. Thus, when the forming is complete, it is almost impossible to detect the joint at this area. The recess in the strip is, therefore, tightly closed and sealed. The assembly is made in lengths which are approximately the circumference of a container to be heated and they may be applied by slipping over the container with a tightening action by reason of the screw clamp shown in FIGS. 1 and 2. This brings the flat surface 12 in tight contact with the walls of the container to be heated and the soft material allows the strip to conform itself closely to the walls to provide an excellent heat transfer from the enclosure resistance element to the embraced container.

We claim:

1. A contact electric heater strip comprising an electrically insulated, elongate resistance heating element

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and an elongate casing tightly enclosing said heating
element, said casing comprising an integral, elongate,
extrusion formed of a highly thermally conductive,
formable metal, said extrusion having in cross-section
a base formed with a flat contact surface on an outside
and a semi-circular, cylindrical recess on an opposed
surface on an inside, said base having side walls extend-
ing upwardly from the base to approximately a diame-
ter of said cylindrical recess which is parallel to said
base, and an integral, semi-circular extension on one of
said walls arching over said recess with a free edge to
contact a top edge of said other side to provide a

closed, elongate, circular recess for containing a heat-
ing element, said closed extrusion being adapted to be
bent around an axis spaced from said base away from
said recess wherein said free edge is drawn tight against
said other side.

2. The contact electric heater strip as defined in
claim 1, wherein the formable metal is of annealed alu-
minum.

3. The contact electric heater strip as defined in
claim 1, wherein the formable metal is of dead soft
metal material.

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