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J. H. GAETJE ET AL

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ELECTRICAL HEATING DEVICE

Filed May 14, 1929

Fig. 1.

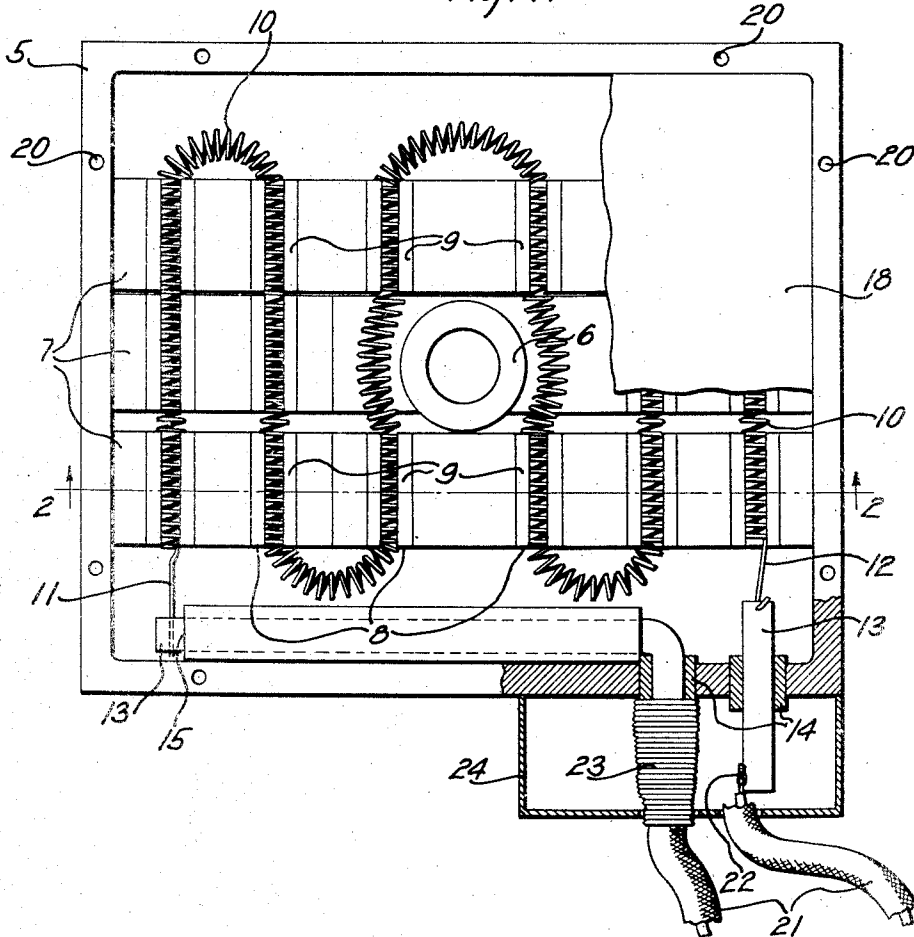
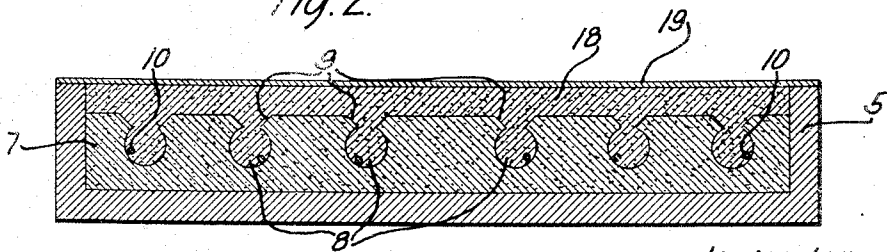


Fig. 2.



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UNITED STATES PATENT OFFICE

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ELECTRICAL HEATING DEVICE

Application filed May 14, 1929. Serial No. 362,910.

This invention relates to electrical heating devices, and more particularly to electrical heating devices for heating and melting metal and metallic alloys and maintaining them in the molten state.

In the heating and melting of lead alloy in an extruding press for sheathing telephone cable with a lead covering it is desirable that the entire lead containing portion of the press be maintained at a uniform temperature, and the preferable way of producing this uniform temperature is to attach individual heating units to various external portions of the press, especially to those portions which are somewhat removed from the main body thereof.

An object of this invention is to provide an efficient and economical heating device shaped to accurately fit a body to be heated.

In accordance with this object one embodiment of the invention consists of a resistance element which is embedded within a plastic, quick-setting refractory cement incased within a metal box and positioned therein by means of highly refractory insulating bridges. Ample size terminal rods to withstand a high degree of heat extend through a wall of the box and are brazed to the resistance element on the inside. An external compartment filled with the plastic cement protects the connections of the terminal rods with their leads.

A clear understanding of the invention will be had from the following description of one specific embodiment thereof when taken in connection with the accompanying drawing, wherein

Fig. 1 is a plan and partly sectional view of the heating device with its cover and most of the embedding cement removed; and

Fig. 2 is a sectional view of the same device including the cover, which is taken on the line 2—2 of Fig. 1.

Referring now to the drawing in which like numerals designate similar parts in the two figures, the numeral 5 denotes a heavily constructed metallic box which may be constructed or shaped into any desired form according to the surface to which it is applied and which is capable of withstanding the temperature

provided in this invention for fusing metal, which box is preferably composed of aluminum bronze for this purpose. The walls and bottom of the box are comparatively thick to provide a large mass of metal and the external surface of the bottom is machined or planed for making a continuous intimate contact with the surface of the metal container or other body against which the bottom is applied, thereby avoiding air pockets or spaces and insuring an efficient conduction of heat through the bottom into the wall of the metal container. A heavy, hollow cylindrical boss 6 integral with the bottom of box 5 extends upwardly therefrom to the top of the box for receiving a bolt (not shown) or other suitable means for fastening the box to the body to be heated. Although only one boss is shown and the box 5 happens to be rectangular in this case, it will be understood that the box may take various shapes, depending upon the shape of the body to which it is applied, and the number of such bosses may also vary.

Inside of the box 5 are placed a plurality of suitably spaced, highly refractory insulating bridges, or supports 7, for the purpose of positioning a heating or resistance element therein. The bridges 7 are composed of a suitable refractory material, preferably fired lavite, which is a very compact, homogeneous insulating mineral. A plurality of corresponding, transverse apertures 8 extend through the bridges 7 at spaced intervals, and downwardly sloping slots 9 are provided to lead into the apertures 8 for a purpose which will presently appear.

A heating element in coil form 10 consisting of any suitable resistance metal for maintaining a relatively high temperature, such as nickel-chromium wire, is threaded longitudinally through the apertures 8 of the lavite bridges 7 before the bridges are placed inside the box, thus forming one continuous serpentine-shaped heating element extending from a terminal 11 to a terminal 12. The resistance coil 10 and its bridges 7 are placed in the box 5 and the terminals 11 and 12 are connected to terminal rods 13 of a relatively large cross-section, preferably by brazing. The terminal rods 13 being of

large cross-section conduct heat away from these connections and thus provide connections which will successfully withstand the heat. The terminal rods 13 extend through
 5 a wall of the box 5 and are insulated therefrom by bushings 14, and a tubular porcelain insulator 15 surrounds the longer terminal rod 13 to prevent it from contacting with the box and the coil.

10 Over and around the positioning bridges 7 is deposited a plastic, quick-acting, refractory cement 18, preferably alundum cement, for embedding or enveloping the entire coil 10 and securing the bridges 7 in fixed position in the box. The alundum cement 18 is
 15 forced down into each of the transverse apertures 8 of the bridges 7 by way of the sloping slots 9 for the purpose of surrounding each turn of the coil 10 and insulating the turns of the coil from each other, and also to prevent any air spaces appearing adjacent the coil. Thus the cement 18 not only incases the portions of the coil which are unsupported by the bridges, but embeds the coil portions dis-
 20 posed within the bridges as well. The entire unfilled space of the box 5 up to the top level thereof is filled with this cement, and care is taken to see that the coil is insulated from the boss 6. A sheet metal cover 19 retained by screws threaded into apertures 20
 30 protects the upper surface of the cement from external interference and secures it within the box.

The external ends of the terminal rods 13
 35 have asbestos covered leads 21 soldered thereto, as shown at 22, and surrounding these soldered connections are wound asbestos cords 23 for protecting the soldered connections against the heat. A metallic shield
 40 or housing 24 suitably secured to the box 5 and filled with the alundum cement 18 also surrounds and protects these external connections and prevents the terminal rods 13 from becoming short circuited by overflowing or
 45 leaking molten metal from the container being heated.

This completes the description of this readily constructed heating device which may be easily made in various forms or shapes
 50 for fitting divers parts of metal fusing apparatus or lead sheathing presses. The fused lavite bridges serve to position a heating element in any shape of box, while the alundum cement seals and embeds the heating element
 55 in that position, and the heat is efficiently conducted through the lavite bridges and the machined bottom of the box into the wall of the metal container or other body being heated. The alundum cement may be used with-
 60 out the lavite bridges and provides for mounting of the heating element adjacent various shapes of depressions or cavities external of the metal container, but it is preferable to use the lavite bridges for positioning the ele-
 65 ment. It is, therefore, to be understood that

the heating device herein disclosed is economical to construct and subject to a variety of readily constructed shapes.

It will be understood, of course, that the invention is not to be limited to the specific structure herein disclosed and illustrated, but it is to be limited only by the scope of the appended claims.

What is claimed is:

1. In an electrical heating device, a casing, 75
 a resistance element, means whereby said resistance element may be disposed in zigzag arrangement in said casing and held in place, said means comprising a plurality of bridges
 80 having aligned recesses therein through which said resistance element may be threaded and held in place by the walls thereof, a refractory material disposed in said casing and in said recesses for surrounding and embedding said resistance element and said
 85 bridges, a cover for said casing, and a tubular extension integral with the casing extending through the refractory material to the cover.

2. In an electrical heating device, a casing, 90
 a resistance element, means whereby said resistance element may be disposed in zigzag arrangement in said casing and held in place, said means comprising a plurality of bridges
 95 having aligned recesses therein through which said resistance element may be threaded and held in place by the walls thereof, a refractory material disposed in said casing and in said recesses for surrounding and embedding said resistance element and said
 100 bridges, and a cylindrical boss extending through said casing and spaced from said resistance element whereby said casing may be secured in a receptable.

In witness whereof, we hereunto subscribe 105
 our names this 30th day of April, A. D. 1929.

JOHN HERMAN GAETJE.
 ARTHUR EDWIN SANTSCHI.

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