April 16, 1929. J. C. WOODSON 1,709,645

IMMERSION HEATER

Filed Nov. 30, 1927

Fig. 1.

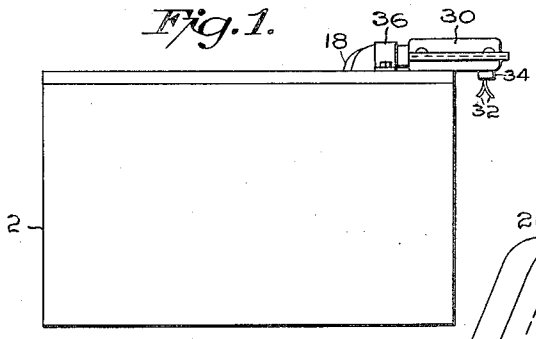
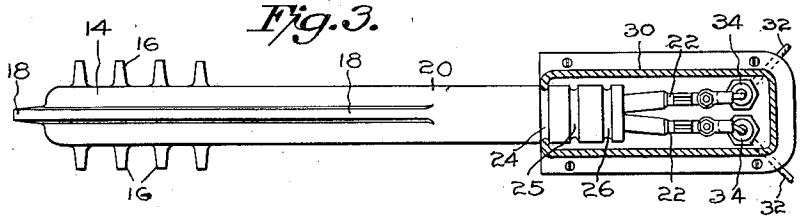



Fig. 2.




Fig. 3.




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# UNITED STATES PATENT OFFICE.

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## IMMERSION HEATER.

Application filed November 30, 1927. Serial No. 236,834.

My invention relates to melting pots and more particularly to an electric heating means therefor.

It is an object of my invention to provide, in conjunction with a melting pot, an electrical-resistance heating unit adapted to be immersed therein, and improved means for effecting the electrical circuit connections for said unit, whereby the connections are protected against injury and contamination incident to operation of the heater.

A further object of my invention is to provide, in an electrical heating unit adapted to be immersed in a melting pot and having an outlet box secured to an extremity thereof, selective means for securing said box to said unit whereby the outlet opening thereof may be positioned beyond the rim of said pot, irrespective of the width of said rim.

In practicing my invention, I provide a heating unit comprising an electric-resistance element and leads therefor cast into a body of metal, and terminals secured to said leads projecting beyond the cast-metal portion. The unit is so proportioned that, when in operative position immersed in a melting pot, the resistance element is adjacent to the bottom of the pot and the cast portion surrounding the leads extends over the rim thereof. I provide, further, a terminal-outlet box secured to the upper extremity of said unit in a plurality of positions, selectively, to position the outlet opening thereof beyond the pot rim, thereby permitting the use of the unit in conjunction with pots having rims of various widths.

In the drawing:

Figure 1 is an assembly, in elevation, of a melting pot and an immersion heater embodying my invention.

Fig. 2 is a view, in vertical section, of the structure shown in Fig. 1, portions of the pot being broken away.

Fig. 3 is a plan view of the heating element shown in Fig. 2, with the outlet box therefor shown in section.

Referring to the drawing, I have shown a melting pot 2 of the usual type wherein a flanged pot or crucible 4, of suitable heat-resistant material, is enclosed by an annular wall 6 of refractory heat-insulating brick and a quantity of mineral wool 8 disposed between the pot and wall.

Since the particular construction of the melting pot constitutes no part of the present invention, further description thereof is not deemed necessary.

Referring more particularly to Figs. 2 and 3, the heating unit comprises a coil 10 and leads 12 of electrical-resistance material covered by a suitable refractory insulation, and a body of metal cast therearound forming a rugged unitary structure. In the present embodiment, I prefer to employ cast iron for the body of the heater but obviously, other metals may be employed if desired.

The portion 14 of the cast-metal body surrounding the coiled resistor 10, is provided with fins 16 and 18 cast integral therewith, to increase the heat-radiating area thereof.

The fin 18 extends along the elongated portion 20 to increase the radiating area and to effect the structural reinforcement thereof.

The elongated portion 20 of the cast body, enclosing the leads 12, is of substantially L-shape to permit the upper extremity thereof to extend above and over the rim of pot 4, and be supported thereby. A boss 21, cast integral with the portion 20, constitutes a bearing point therefor in engagement with the pot rim.

The leads 12 are brought out through the end of the portion 20 and are provided with terminals 22 for making the electrical circuit connections for the heating unit.

Adjacent to the upper extremity of the elongated portion 20, are provided a plurality of spaced annular grooves 24, 25 and 26, coaxial therewith, adapted to cooperate selectively with an opening in an outlet box 30, as hereinafter described.

The outlet box 30 is of the usual construction wherein the box is formed in two halves adapted to be removably secured together in operative relation. A semicircular opening, of a diameter substantially equal to the diameter of the grooves 24, 25 and 26, is formed in the end wall of each half of the box, so that the box may be clamped selectively in engagement with either of the three grooves.

Adjacent to the other end of the box, and preferably in the lower longitudinal face thereof, are formed outlet openings adapted to receive therethrough the leads 32 of the energizing circuit and suitable bushings 34, in a manner well known in the art.

If the heater body is of cast iron, the heater will tend to float, if immersed in a bath of molten lead, because of the difference

in the specific gravities of the two metals. In order to obviate this difficulty, I provide a clamp 36 of substantially U-shape removably secured to the pot rim and surrounding the horizontally extending portion of the extension 20.

In operation, the heater is positioned in the container, or melting pot, with the portion 14 thereof resting upon the bottom of the pot and the upper end of the elongated portion 20 hooked over the pot rim, with the boss 21 resting thereupon. The lower half of the outlet box is then positioned selectively in one of the grooves 24, 25 or 26, depending upon the width of the pot rim, to bring the outlet opening of the box beyond the side wall of the pot. The power leads are then inserted through the outlet openings and electrically connected to the terminals 22. The box is then closed by clamping the upper half thereof to the lower half in operative relation.

By my invention, I have provided an improved means for effecting the electrical connection of an electrical heating element to a suitable energizing circuit, whereby the electrical connections are completely enclosed and protected against contamination incident to operation of the heater, and whereby the terminal connections and circuit leads are removed, as far as practicable, from the operative portion of the heating element.

As above pointed out, the structure of the melting pot is purely illustrative, and, quite obviously, various other applications of an electric heater embodying my invention may be resorted to and be within the scope of the present invention.

On the other hand, while I have shown a heater of the cast-in type, clearly, my invention is also applicable to other types of electrical-resistance heaters, wherein the protection of the electrical connections thereof is desired.

Various modifications may be made in my invention without departing from the spirit and scope thereof and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are set forth in the appended claims.

I claim as my invention:

1. An electrical heating unit comprising an electrical resistor and terminals therefor, a terminal box, and means for securing said box to said unit selectively in a plurality of positions and in operative relation to said terminals.

2. An electric heater comprising an insulated electrical-resistance heating element and a body of cast metal surrounding said element, terminal connections for said element projecting beyond said cast-metal body, a terminal outlet box enclosing said terminals, and means for securing said box to said cast-metal portion selectively in a plurality of positions longitudinally thereof.

3. An immersion heater comprising an electrical resistor, leads therefor, and terminals secured to said leads, a body of metal cast about said resistor and an elongated portion cast integral therewith surrounding said leads, an outlet box and selective means for securing said box to said elongated portion in a plurality of positions longitudinally thereof, whereby said terminals and selected portions of said extension are enclosed thereby.

4. An electrical immersion heater comprising an electrically insulated resistance heating element, terminal leads therefor, and a body of metal cast about said element and leads; terminals secured to said leads beyond said cast metal portion, a terminal outlet box and means for selectively securing said box to said cast metal portion in a plurality of positions and in operative relation to said terminals.

5. In an immersion heater for a melting pot comprising an electrical resistor, leads therefor extending above the rim of said pot, terminals secured to the ends of said leads, and a body of metal cast about said resistor and leads; means for making electrical connections to said resistor comprising an outlet box enclosing said terminals and means for selectively securing said box to said body portion in a plurality of positions longitudinally thereof to position an outlet opening thereof beyond the rim of said pot.

In testimony whereof, I have hereunto subscribed my name this 19 day of November 1927.

JAMES C. WOODSON.