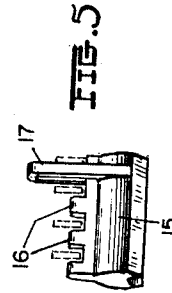
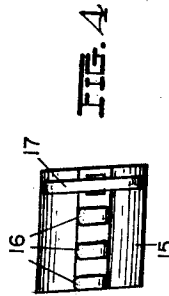
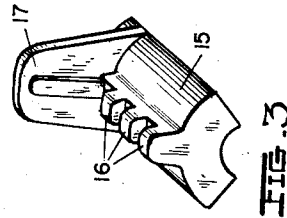
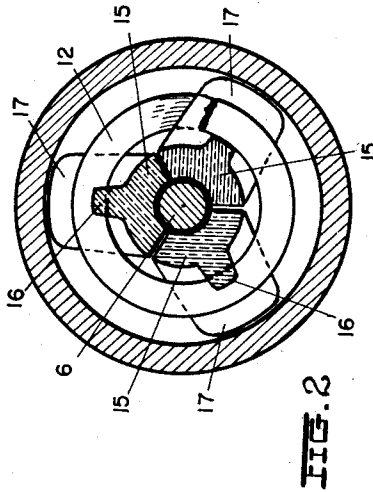
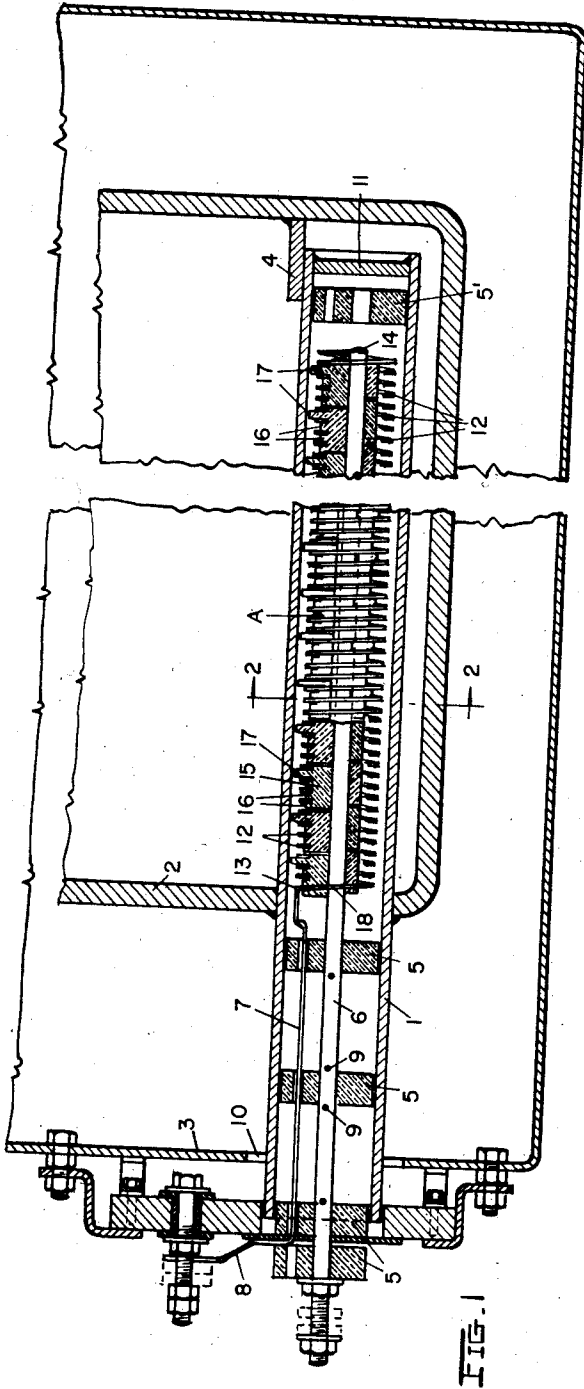


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W. H. WOOD ET AL
CORE FOR IMMERSION HEATERS

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INVENTORS
WILLIAM H. WOOD and
OSCAR C. TRAUTMAN
BY *Oberlin, Limbach & Day*
ATTORNEYS.

UNITED STATES PATENT OFFICE

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CORE FOR IMMERSION HEATERS

William H. Wood, South Euclid, and Oscar C.
Trautman, Parma, Ohio

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5 Claims. (Cl. 201—63)

Our invention relates to improvements in immersion heaters of the type using a heating element of metal which is electrically of high resistance. Conventionally such a heating element is inserted in a tube which is immersed in the material to be heated. Such heaters have proven useful in the heating of lead baths and the like in metallurgical processes. When so used, such a heater may comprise a tube mounted in the bottom of a vessel in which metal is to be heated and a metal heating element inserted in such tube. Conveniently the metal heating element may be of wire in the form of a helix. Particularly, our invention pertains to means supporting and insulating a helical heating element in such a heater.

It is an object of our invention to provide a core which is electrically non-conductive and which may be readily inserted in a helix of wire, wherein it will separate and insulate the individual turns of the helix and support the helix out of contact with the walls of the tube in which the helix is installed.

It is also an object of our invention to provide such a core formed of discrete elements which permit the helix and core to conform to the arc of a curved tube used as the casing for such a heater.

And it is a further object of our invention to provide discrete elements of such a core which may be made at a substantial saving over the cost of making an entire core as an integral body.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the elements hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain structures embodying the invention, such disclosed elements constituting, however, but one of various structural forms in which the principle of the invention may be used.

In said drawing:

Figure 1 is a cross-sectional view of a heating pot showing our invention, partially in elevational view, inserted in the tube of an immersion heater installed for heating metal in such pot.

Figure 2 is a cross-sectional view, partly in elevation of the immersion heater, taken at 2—2 of Figure 1.

Figure 3 is an elevational view of a preferred form of element, or sector, out of which the core of our invention may be assembled.

Figure 4 is a top view of the sector of Figure 3.

Figure 5 is a side view of the sector of Figure 3.

We have secured our objective by forming a core of refractory material, fitted within the helix of the heating element, which core we provide with a plurality of projections, preferably having the form of short circumferential fins. Certain of these projections, or fins, are made with a radial length sufficient to insure that they will project beyond the outside circumference of the helix with which the core is used, and, by contact with the wall of the tube in which the helix is inserted, will maintain the helix centrally of the tube and out of contact therewith. The short fins may be so disposed that they constitute sections of a screw thread about the core. In this fashion, the insertion of the core within the helix is facilitated as it may then be readily screwed to position.

Further it has been found advantageous to divide such a core into a plurality of longitudinal sections, each of which sections is further divided into a plurality of sectors. The advantages gained by such division of the core will readily be perceived from a description of a preferred form of our invention which we use in pots for the melting of lead and the like in the practice of metallurgical processes.

Referring to the drawing, there is shown in Figure 1 in cross-sections an immersion tube 1 mounted across a melting pot 2 by being welded in a hole in the side thereof. The pot 2 is mounted in a casing 3, the space between the walls of the pot and casing being packed with insulation for conservation of heat in the melting pot. The inner end of the tube 1 is closed by a metal plug 11 welded therewithin, and is held in position in the pot 2 by a stop 4 welded on the wall of pot 2. The outer end of tube 1 of the immersion heater projects through an opening 10 in the wall of casing 3, and conventional means are mounted thereabout on said wall for the insulated provision of electrodes from a source supplying a heating current of electricity.

A refractory core, indicated generally by A, is divided into short lengths or sections, each of which is again divided into three sectors 15. Each sector carries three short projections, or fins, 16, and one longer one 17. The end planes of the sectors may each be formed at a slight angle relative to the core axis, and the fins may be formed at a similar angle, thereby simulating broken parts of a screw thread about the core which facilitates insertion of the core into the helix. This is best shown in Fig. 4. Three sectors 15 form a section of the core A and provide an axial passage therethrough. To provide this

passage through the sections of the core A, the apex of each sector 15 is cut away.

In mounting the core in the helix, three sectors 15 are grouped and inserted with a screwing motion, with the fins 16 and 17 between the turns 12 of the helix. Successive groups are inserted until the helix is filled. A metal rod 6 is inserted through the axial passage through the cylindrical core and welded to the inner end of the helix at 14, and a metal strap 7 is welded to the outer end of the helix at 13, the outer free end 8 of strap 7 being bent at an angle for engagement with an electrode. To the free ends of the rod 6 and strap 7, outside the tube 1, electrodes are attached in a conventional manner. For the further conservation of heat, refractory plugs 5 are placed in the tube 1 when the helix and core are assembled therewithin. The rod 6 and strap 7 pass through holes provided in said plugs 5, which plugs are held in position by pins 9 through the rod 6. A plug 5 may be inserted in the tube 1 before installing the helix and core, and will protect the closed welded end of tube 1 from contact with the welded joint 14 of the helix and rod.

It readily appears that the discrete elements, or sectors 15, of which the core A is formed, permit movement therebetween which will permit the core to conform to the arc of the heating element when the helix is inserted in a curved tube. Such a curved tube ordinarily will be mounted with each end extended through and welded to the shell of a melting pot. Both ends of the tube will be open, and connectors from the helix to the electrodes may be welded one to each end of the helix, without the necessity of a rod through the core to provide one such connector.

The sectors 15 are formed of ceramic material and burnt, and the cost of a core formed of such sectors will be much less than the cost of a similar core when formed integrally of the same material.

Other forms may be employed embodying the features of our invention instead of the one here explained, change being made in the form or construction, provided the elements stated by any of the following claims or the equivalent of such stated elements be employed.

We therefore particularly point out and distinctly claim as our invention:

1. A refractory core for a resistance element comprising a number of individual pieces, each precisely alike and constituting a segment of a cylinder, such segment having longitudinal sides that lie in radial planes passing through the same center, the longitudinal sides of one segment abutting the longitudinal sides of another segment and being so arranged that a number of segments form a section of a cylinder, each segment having spaced ribs on its arcuate outer surface, one of said ribs extending radially beyond the other ribs so as to support said segment in a predetermined position with respect to an enclosing member, and all of said ribs extending in planes that are inclined with respect to the axis of said cylinder.

2. A refractory core for a resistance element comprising a number of individual pieces, each

constituting a segment of a cylinder, such segment having longitudinal sides that lie in radial planes passing through the same center, the longitudinal sides of one segment abutting the longitudinal sides of another segment and being so arranged that a number of segments form a section of a cylinder, each segment having spaced ribs on its arcuate outer surface, one of said ribs extending radially beyond the other ribs so as to support said segment in a predetermined position with respect to an enclosing member, and all of said ribs extending in planes that are inclined with respect to the axis of said cylinder, the radially extending ends of each segment lying in planes parallel to the planes in which said ribs extend.

3. In an electrical heater of the submersion type, having a tubular casing within which is a helical heating element, the improvement which comprises an articulated core for supporting said heating element, said core comprising a plurality of sections of cylindrical shape, each section being divided into a plurality of sectors, each sector having spaced ribs on its arcuate outer surface to receive said helical heating element, one of said ribs of each sector extending beyond the others and contacting said tubular casing, said ribs being axially aligned.

4. A refractory core for a resistance element comprising a number of individual pieces, each precisely alike and constituting a segment of a cylinder, such segment having longitudinal sides that lie in radial planes passing through the same center, the longitudinal sides of one segment abutting the longitudinal sides of another segment and being so arranged that a number of segments form a section of a cylinder, each segment having spaced ribs on its arcuate outer surface, one of said ribs extending radially beyond the other ribs so as to support said segment in a predetermined position with respect to an enclosing member, and all of said ribs extending in planes that are inclined with respect to the axis of said cylinder, each section consisting of three segments and said ribs defining a helical thread to receive said resistance element.

5. A refractory core for a resistance element comprising a number of individual pieces, each precisely alike and constituting a segment of a cylinder, such segment having longitudinal sides that lie in radial planes passing through the same center, the longitudinal sides of one segment abutting the longitudinal sides of another segment and being so arranged that a number of segments form a section of a cylinder, each segment having spaced ribs on its arcuate outer surface, one of said ribs extending radially beyond the other ribs so as to support said segment in a predetermined position with respect to an enclosing member, and all of said ribs extending in planes that are inclined with respect to the axis of said cylinder, said ribs being spaced axially along said arcuate outer surface and also being spaced from said radially extending longitudinal sides.

OSCAR C. TRAUTMAN.
WILLIAM H. WOOD.