April 18, 1950 L. L. JOHNSON 2,504,840

TILTING INDUCTION FURNACE

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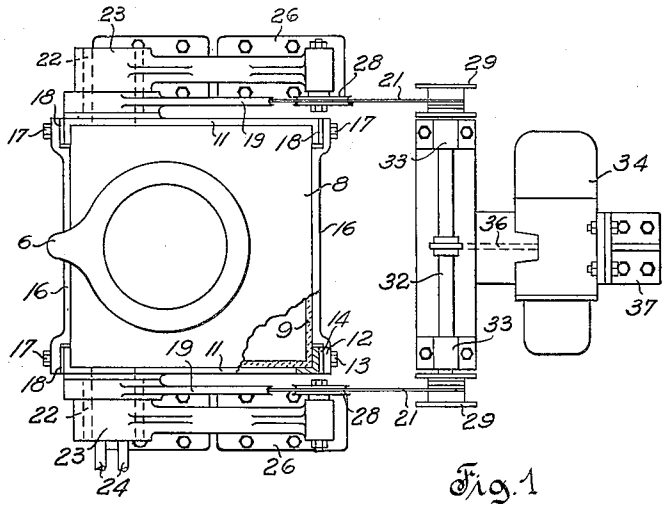


Fig. 1

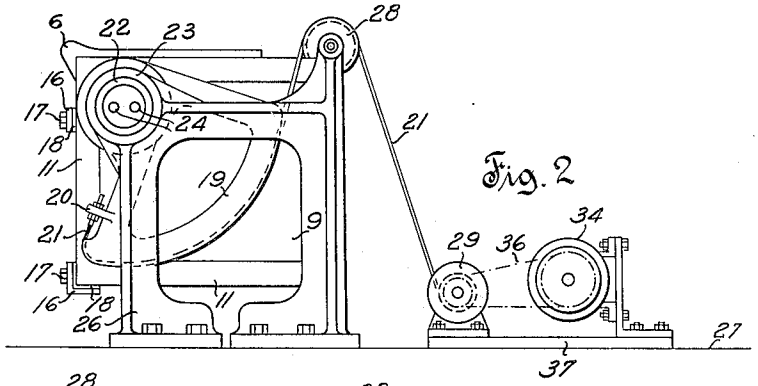


Fig. 2

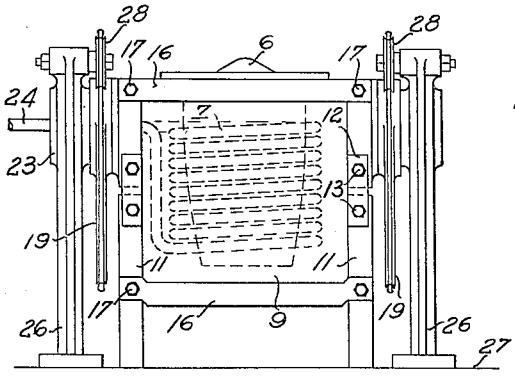


Fig. 3

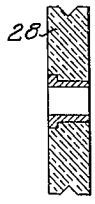


Fig. 4

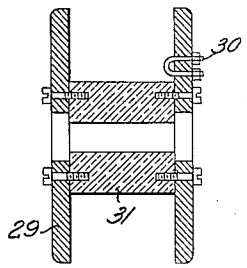


Fig. 5

Inventor
Lawren L. Johnson

by Didier Journeaux
Attorney

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TILTING INDUCTION FURNACE

Lauren L. Johnson, La Grange, Ill., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis., a corporation of Delaware

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1 Claim. (Cl. 13—27)

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This invention relates in general to improvements in electric heating devices and more particularly to a tiltable inductor coil casing arrangement for preventing the flow of stray currents which tend to be induced in different members of the casing.

In electric heating devices comprising an inductor coil, and particularly in so-called coreless induction furnaces, the magnetic field produced by the flow of current through the inductor extends into a space which is relatively large compared to the size of the inductor. This field tends to induce currents in metallic objects located in such space, and such currents result in electrical losses and in overheating or even destruction of the objects in which they are induced. It is therefore desirable to so shape and dispose the metallic objects that must be located near the inductor that they form open circuits for the currents which tend to be induced therein from the inductor.

In particular, the framework of the inductor casing may advantageously consist of a pair of open rectangular side frames joined by cross members connected therewith in insulated relation. When the inductor is tiltably supported on bearings, the bearing pedestals may likewise consist of open metallic frames. When the inductor is to be tilted by means of a hoist and a pair of metallic cables, the cables should be so connected to the inductor casing, the bearing pedestals and the hoist as to form an open circuit for current that tends to be induced therein.

It is therefore an object of the present invention to provide an improved heating device casing defining open circuits for currents which tend to be induced therein.

Another object of the present invention is to provide an improved suitable heating device in which bearing pedestals form open circuits for currents that tend to be induced therein.

Another object of the present invention is to provide an improved heating device in which a plurality of tilting cables are arranged to form an open circuit for current which tends to be induced therein.

Objects and advantages other than those above set forth will be apparent from a consideration of the following description when read in connection with the accompanying drawing, in which:

Fig. 1 is a plan view, partly in cross section, of a tiltable induction melting furnace and of the associated hoist embodying the different features of the present invention;

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Fig. 2 is a view in side elevation of the furnace and hoist illustrated in Fig. 1;

Fig. 3 is a rear view of the furnace illustrated in Fig. 1;

Fig 4 is a view in axial cross section through one of the cable supporting sheaves of the embodiment illustrated in Fig. 1; and

Fig. 5 is a view in axial cross section through one of the winding reels of the embodiment illustrated in Fig. 1.

Referring more particularly to the drawing by characters of reference, numeral 6 designates a crucible for receiving a charge of metal to be melted by induction by means of an inductor coil 7 connected to a suitable source of periodic current (not shown). Inductor 7 is disposed and supported in a casing 8 which preferably consists of a parallelepipedous metallic framework associated with rectangular sheets 9 of refractory electrical insulation such as asbestos board.

The casing framework consists of a pair of side frames 11 preferably made of non-magnetic metal or alloy. The four side elements of each frame comprise entire front, top and bottom elements and a rear element which is divided into two portions separated by a gap. The two portions of the rear element are joined in insulated relation by means of a strap 12 fastened thereto by means of insulated bolts 13 and insulated therefrom by suitable insulating material such as a piece of mica plate 14. Frames 11 are joined in insulated relation by a plurality of cross bars 16 fastened thereto by means of insulated bolts 17 with interposition of suitable insulating material such as pieces of mica plate 18.

It will be apparent that the above described arrangement of the casing framework insures that the different framework elements form open circuits for currents that tend to be induced therein from the inductor. The flow of such currents from one framework element to another is thus completely prevented. While currents may be caused to flow locally at some points of the webs of the framework elements, such currents are of small magnitude, and the losses caused thereby can be reduced to a relatively negligible value by making the framework elements of high conductivity material such as bronze.

On each side frame 11 there is bolted a grooved sector 19 provided with a lug 20 for anchoring a metallic cable 21 serving to tilt the casing when metal is to be poured from crucible 6. On each sector there is bolted a hollow trunnion 22 adapted to rotate in a bearing 23. At least one

of trunnions 22 may conveniently be made hollow to form a passage through which the leads 24 of inductor 7 may be brought out of casing 8.

Each bearing 23 is supported by a pedestal 26 which may be cast integral therewith. Each pedestal consists of an open metal frame forming an open circuit for current tending to be induced therein from inductor 7. The gap in the pedestal frame is preferably located in the bottom element thereof and the sections of the latter element are joined together in insulated relation by bolting the pedestal to an insulating foundation 27.

Cables 21 are guided and supported on pedestals 26 by means of sheaves 28 made at least partly of insulating material such as fabric reinforced synthetic resin. Each cable is attached to a winding reel 29 by any suitable means such as a U bolt 30. Each reel 29 comprises at least a hub portion 31 of insulating material such as fabric reinforced synthetic resin. The two reels are keyed on a shaft 32 supported on bearings 33 and driven by an electric hoist 34 through a chain drive 36. Bearings 33 and hoist 34 are bolted to a suitable base 37.

It will be apparent that with the above described arrangement the circuit formed by the framework of casing 8, cables 21 and shaft 32 is opened by insulation plates 18 separating the side frames from the cross bars and by insulating hubs 31. Furthermore, the circuit formed by each cable 21, the associated sector 19, the adjacent bearing 23 and pedestal 26 is opened by the insulating web of the associated sheave 28. Currents that tend to be induced in the different portions of cables 21 are thus entirely prevented from flowing through the cables and the elements associated therewith.

Although but one embodiment of the present invention has been illustrated and described it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claim.

It is claimed and desired to secure by Letters Patent:

An electric heating device comprising an inductor coil, a tiltably mounted casing for said coil comprising a pair of metal side frames provided with metal trunnions, metallic bearings for said trunnions, a pair of metal pedestals supporting said bearings, a hoist and a pair of metallic cables for tilting said casing and said coil, means for severally fastening said cables to said side frames, means for fastening said side frames together in insulated relation, and means for transmitting tilting efforts from said hoist to said casing and said coil through said cables and for causing said cables to form an open circuit for current tending to be induced therein from said coil comprising insulating sheaves supporting said cables on said pedestals and insulating reels driven by said hoist.

LAUREN L. JOHNSON.

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