J. H. REID.

COMBINED ELECTRIC ARC OR RESISTANCE AND INDUCTION FURNACE.

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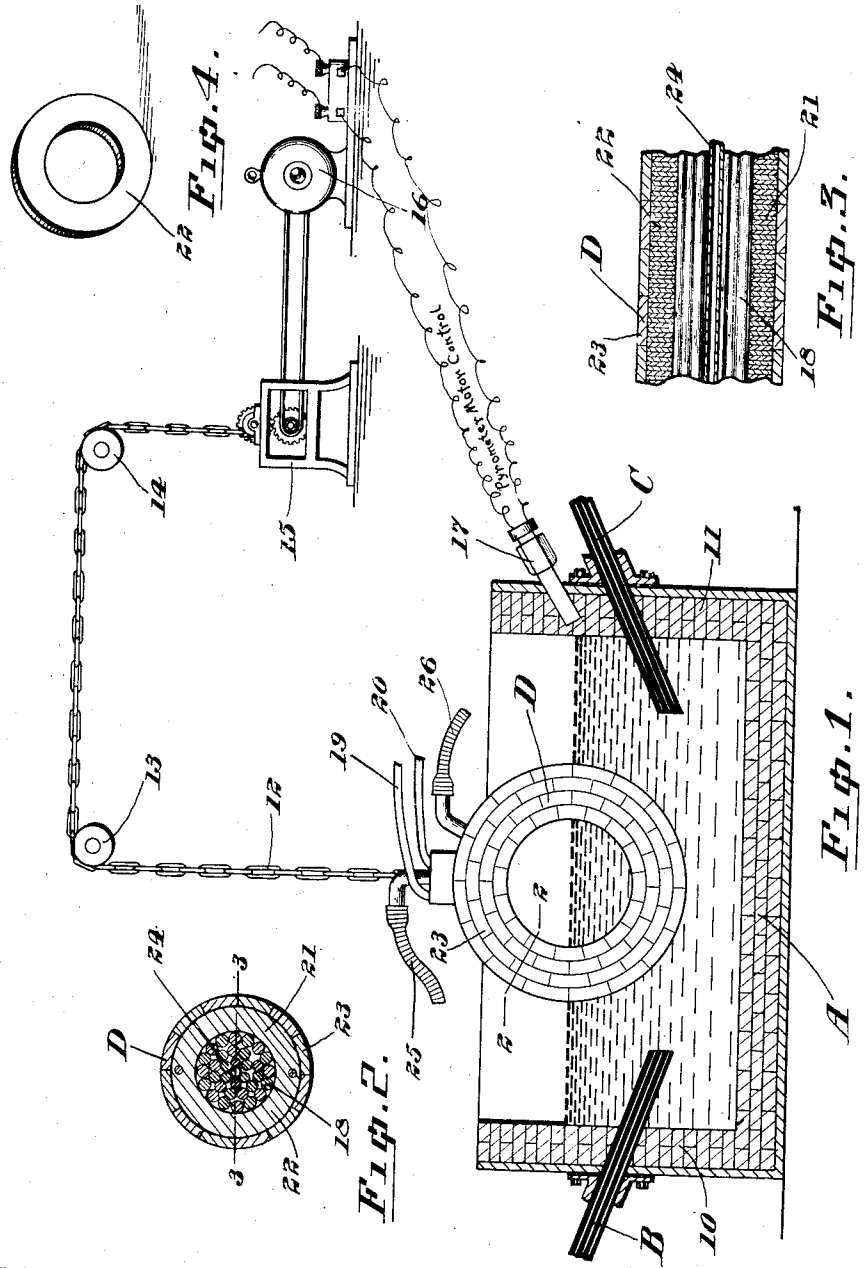
956,544. Patented May 3, 1910.



WITNESSES,

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UNITED STATES PATENT OFFICE.

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COMBINED ELECTRIC ARC OR RESISTANCE AND INDUCTION FURNACE.

956,544. Specification of Letters Patent. Patented May 3, 1910.

Application filed February 3, 1909. Serial No. 475,908.

To all whom it may concern:

Be it known that I, JAMES HENRY REID, of Newark, in the State of New Jersey, United States of America, have invented certain new and useful Improvements in Combined Electric Arc or Resistance and Induction Furnaces, of which the following is a specification.

My invention relates to improvements in combined electric arc or resistance and induction furnaces, and the objects of my invention are to afford better regulation and distribution of heat in an electric furnace, to enable the heating to be accomplished by induction and resistance, and to provide a simple and effective method of regulating the induction heat; and it consists essentially of the construction hereinafter described in detail in the accompanying specifications and drawings.

In the drawings, Figure 1 is a vertical section through my improved furnace. Fig. 2 is a transverse section of the induction coil on the line 2—2, Fig. 1. Fig. 3 is a sectional detail on the line 3—3, Fig. 2. Fig. 4 is a perspective view of one of the laminated plates surrounding the induction coil.

In the drawings, like letters of reference indicate corresponding parts in each figure.

Referring to the drawings, A represents the furnace or treating tank having suitable walls 10 and 11, through which electrodes B and C of any usual or desirable type extend, the said electrodes being adapted to either heat the charge through the resistance of the mass itself, or by arcs produced at the extremities of the electrodes.

To provide for heating the charge by induction, in addition to the resistance or arcs, an annular induction heating coil D is provided, being preferably suspended over the top of the furnace, whereby it may be raised and lowered to regulate the amount of heat produced, as hereinafter described.

In the embodiment illustrated, the induction heating coil is supported by a chain 12 extending over pulleys 13 and 14 of a suitable winch 15 operated by an electric motor 16.

In practice it may be desired to raise and lower the induction coil automatically to maintain the furnace at a given temperature and in this case, the motor will be controlled by suitable apparatus now well known in the art, the said apparatus being controlled by a pyrometer 17 in the walls of the furnace, whereby when the heat becomes excessive, the induction heating coil will be raised, and when the temperature falls the induction heating coil will be lowered. In this way, the amount of heat produced by induction may be regulated, because it will be apparent that the amount of this heat will depend on the depth to which the induction heating coil is inserted in the charge within the furnace.

The induction heating coil itself is composed of a central, annular, current-conducting coil 18, the terminals 19 and 20 of which lead from the coil to a suitable source of power not shown. This current-conducting coil is surrounded by an annulus 21 formed by rings 22 of soft laminated iron and these, in turn, are surrounded by a cover 23 of refractory material such as fire brick.

To cool the interior of the coil and prevent burning out of the conductor, a water-circulating coil 24 may be provided centrally within the coil 18, the said coil 24 having terminals 25 and 26 thereof leading externally to the coil and being placed in communication with a suitable source of water supply.

It will thus be seen that by the present invention, use may be made in a single furnace, of heat produced both by induction and resistance. Further, the heat produced by induction may be automatically regulated through the lowering and raising of the induction heating coil controlled by the pyrometer as already explained.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention, within the scope of the appended claims, could be made, without departing from the spirit or scope thereof, it is intended that all matter contained in these specifications and drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:—

1. An electric furnace having electrodes for heating the same, and means wholly within the furnace for producing heat by induction.

2. An electric furnace having electrodes and means for passing a current through the same from an external source of power

and means independent of the current passing through the electrodes for inducing a heating current between them.

3. An electric furnace having a suspended induction heating coil adapted to be lowered into the charge.

4. An electric furnace having a suspended induction heating coil adapted to be lowered into the charge, and means for circulating a cooling medium around the interior of the induction heating coil.

5. An electric furnace having a suspended annular induction heating coil adapted to be lowered into the charge.

6. An electric furnace having an induction heating coil and means for introducing and withdrawing the same from the furnace.

7. An electric furnace having suitable side walls, electrodes extending through the same, an induction heating coil and means for lowering the same centrally into the furnace.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES HENRY REID.

Witnesses:
RUSSEL S. SMART,
WM. A. WYMAN.