Nov. 24, 1925. 1,562,825

G. EVREYNOFF

ELECTRIC FURNACE

Filed Nov. 11, 1924

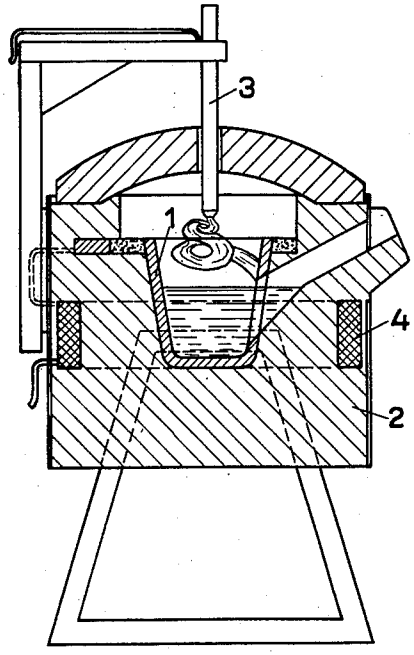


FIG. 1

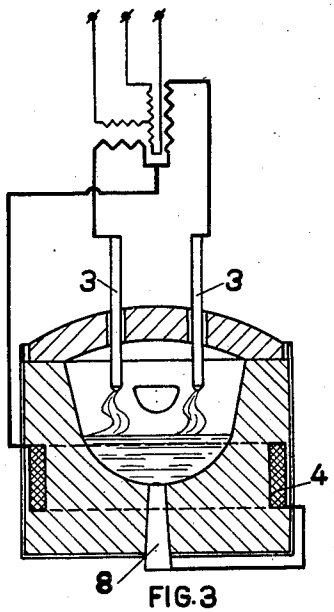


FIG. 3

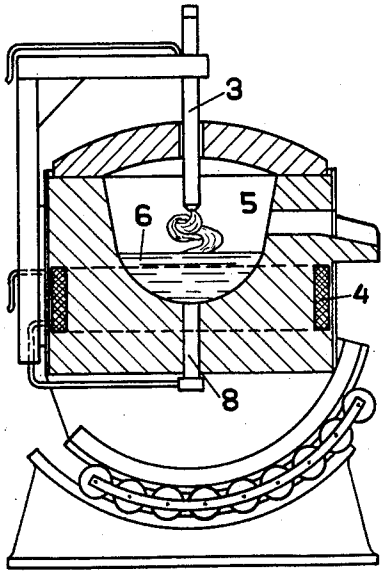


FIG. 2

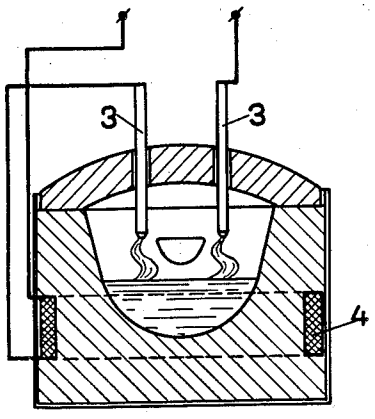


FIG. 4

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UNITED STATES PATENT OFFICE.

GEORG EVREYNOFF, OF EKATERINOSLAV, RUSSIA.

ELECTRIC FURNACE.

Application filed November 11, 1924. Serial No. 749,216.

To all whom it may concern:

Be it known that I, GEORG EVREYNOFF, a citizen of the Russian Republic, and a resident of Ekaterinoslav, Russia, have invented certain new and useful Improvements in Electric Furnaces, of which the following is a specification.

My invention relates to electric furnaces; more especially it relates to electric furnaces of the kind, in which the arc is caused to rotate under the action of a magnetic field produced by an exciting coil. The stability of the arc is ensured, firstly, by the use of a solid electrode consisting of carbon or graphite, so that the crater remains immovable, and secondly, by the arc having the shape of a rotating conical helical line.

Owing to the rotation and the stability of the arc it is rendered possible to make use of an arc of particular length and particular volume, and owing hereto it is also possible to attain, firstly, high working tension of the furnace, secondly, uniform heating thereof, thirdly, better heating of the metal, and fourthly, greater efficiency. By reason of the action of the magnetic field produced by the exciting coil also the metal commences to rotate and continues so and is, therefore, stirred up thoroughly.

The improved electric furnace is intended for the production, remelting, and refining of metals, and its greater efficiency in comparison to known electric furnaces intended for these purposes is due to the rotatory motion of the arc under the action of the magnetic field produced by the exciting current, as stated. The furnace is illustrated diagrammatically and by way of example in the accompanying drawing in which Figure 1 is a vertical section through an electric furnace constructed according to this invention; Figure 2 is a similar illustration showing a modification; and Figures 3 and 4 show two other modifications which are all fully described hereinafter.

Referring to Fig. 1, this furnace consists of a conductive crucible 1 of graphite, carbon, or the like; the crucible is arranged in a refractory body 2, and forms one of the electrodes between which the arc is formed, the other electrode being formed by a centrally movable carbon-rod 3, the arc burning, thus, between this carbon rod and the crucible-wall. The arc-forming end of the electrode 3 is very small in proportion to the diameter of the crucible; it may, in fact, be pointed, the arc assuming in either case the shape of a conical helical line, as shown.

4 denotes a coil which produces a vertical magnetic field, under the action of which the arc is caused to rotate above the surface of the metal and to assume the shape of a conical helical line. The coil 4 is arranged co-axially with the movable carbon-electrode, and may be arranged either entirely outside the body 2 or in an outer groove thereof. In either case the coil may be connected up with the arc in parallel or in series, but if alternating current is used, the coil is connected up always in series.

This furnace can be employed as a substitute for a crucible furnace of the kind intended for the remelting of various metals, especially easily oxidizable metals which are volatile in the arc, as zinc, tin, bronze, aluminium, and the like.

The constructional form of the furnace shown in Fig. 2 is devised to form a melting chamber 5 which may be lined with a refractory material, such as dolomite, magnesite, dinas, or the like. The arc is formed between the metal 6 to be treated and the carbon-electrode 3, and rotates upon the surface of the metal under the action of the exciting coil 4.

The current is supplied in this case by means of a bottom-electrode 8.

Instead of one electrode 3 two such electrodes may be provided, as in Fig. 3, but the bottom-electrode (8) may be dispensed with, and the two upper electrodes connected up to the coil 4 in the manner shown in Fig. 4. These furnaces (Figs. 2, 3 and 4) may be used for the remelting of steel and for the production of special kinds of steel.

I claim:

An electric furnace, comprising, in combination, a receptacle adapted to receive the metal to be treated and to be filled therewith up to a predetermined height; a carbon-

electrode, the arc-forming end of which is very small in proportion to the diameter of the space containing said metal and which is arranged in such a height relatively to the surface of the metal present in said receptacle that its end is located above said surface; a coil so arranged as to produce a magnetic field by which the arc can be caused to assume the shape of a helical line, and to rotate, and means for supplying current to said coil and said electrode.

In testimony whereof I affix my signature.

PROF. GEORG EVREYNOFF.