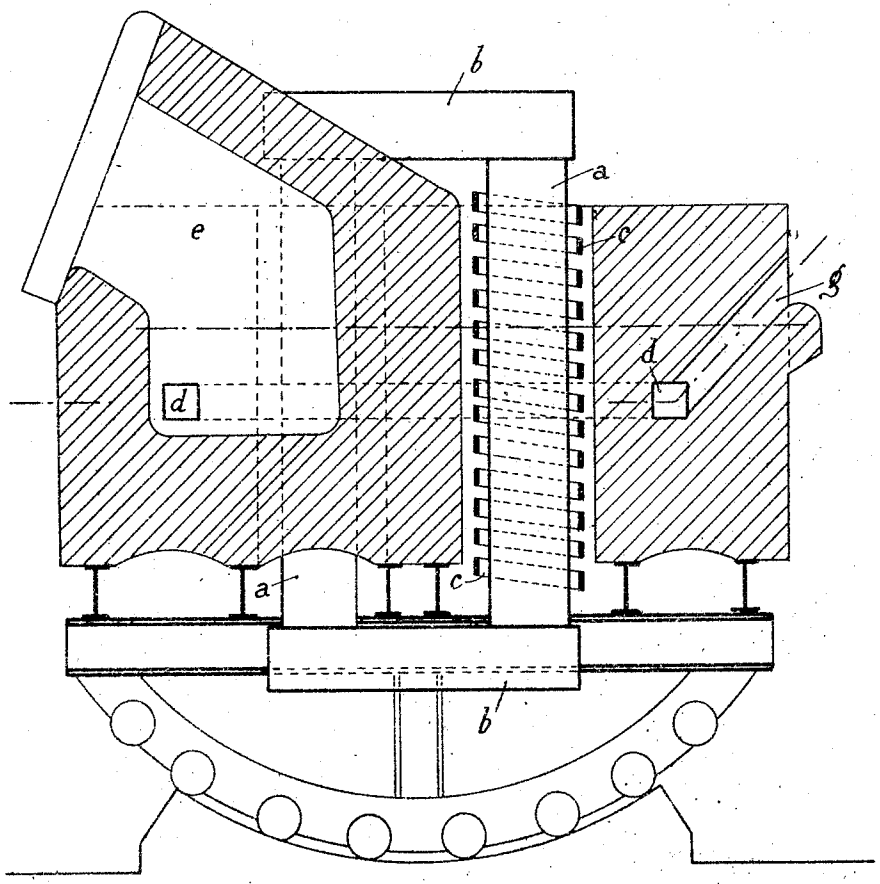
Nov. 10, 1925. 1,561,408

R. L. CHARTIER

INDUCTION ELECTRIC FURNACE

Filed Aug. 21, 1923 2 Sheets-Sheet 1

Fig. 1



INVENTOR

René Louis Chartier

BY

Mauro, Cameron, Lewis & Parker

ATTORNEYS

Nov. 10, 1925.

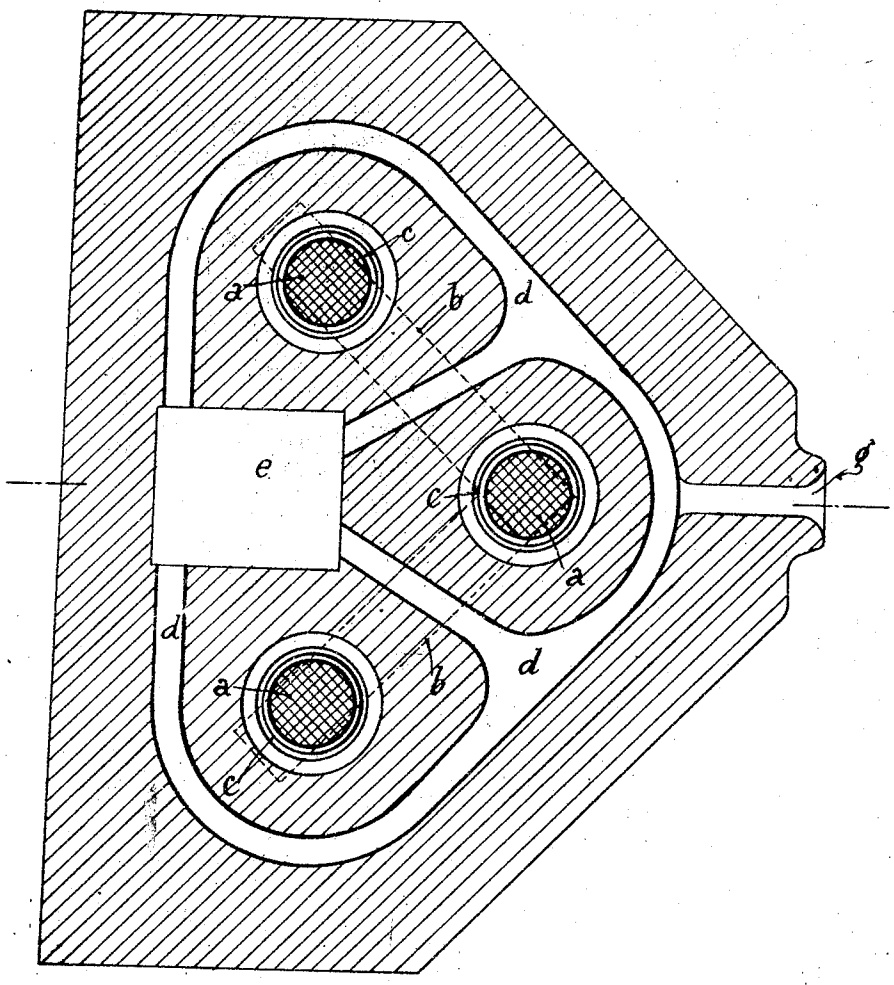
1,561,408

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INDUCTION ELECTRIC FURNACE

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Fig. 2.



INVENTOR

Rene Louis Chartier

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Mauro, Cameron, Lewis & Kerkam

ATTORNEYS.

Patented Nov. 10, 1925. 1,561,408

UNITED STATES PATENT OFFICE.

RENÉ LOUIS CHARTIER, OF PARIS, FRANCE, ASSIGNOR TO COMPAGNIE FRANCAISE DES METAUX, OF PARIS, FRANCE.

INDUCTION ELECTRIC FURNACE.

Application filed August 21, 1923. Serial No. 658,616.

To all whom it may concern:

Be it known that I, RENÉ LOUIS CHARTIER, a citizen of France, and a resident of Paris, France, have invented new and useful Improvements in Induction Electric Furnaces, which is fully set forth in the following specification.

The present invention relates to a three phase induction electric furnace, capable of being used for melting volatile or non-volatile alloys or metals, principally in the case of a mere melting or of super-refining not requiring any metallurgic treatment through too complicated chemical reactions. This furnace is particularly adapted to be used for melting brass waste, and for similar operations.

This furnace has been so devised as to be operable when connected directly to a circuit of three phase currents having the usual frequencies and with an acceptable factor of power. Its main feature, which forms the object of the present application, consists in the arrangement of three secondary channels or ducts which are common or mingled over a great length in the internal parts of the circuit so as to reduce to the minimum their area, that is to say the losses of heat, whence a high thermic yield, while securing the convenient circulation of the metal so as to convey the energy to the working chamber, to facilitate the decantation of the slags and to avoid oxidation.

The invention will be readily understood by reference to the accompanying drawings, illustrating one embodiment of the present invention, and wherein:

Figs. 1 and 2 are, respectively, a vertical and a horizontal section of the furnace forming the object of the invention.

The furnace essentially comprises a refractory shell which is preferably formed of brickwork, and provided with a plurality of openings through which extends a magnetic carcass formed of three vertical cores *a* connected together at their upper and lower part through two heads *b*.

Around the cores are coiled primary windings *c* which, for the low and middle tensions, may be uninsulated. These primary windings can be put in circuit either simultaneously or separately, for instance in order to moderate or stop the rotating field and consequently the movement of the metal, while carrying on to heat one or two of the secondary circuits, those which are close to the working chamber for example.

Around the cores are arranged at a suitable level the channels or ducts *d* in which the metal circulates, and which form with their external branches a curvilinear triangular figure which facilitates the movement of the bath in the direction resulting from the rotating field.

The internal branches, as shown in the accompanying drawings, are common to two contiguous circuits, which allows to reduce to the minimum the total length of the channels, whence a high thermic yield. The internal branches are connected with the external ones so as to avoid the sharp angles and to induce in this way a movement of circulation for the metal.

The external branches of the two circuits and the two branches common to the three circuits open at the lower part of a loading and working chamber *e* in which skimming also takes place.

The tapping takes place at the opposite end of this chamber, at *g*.

The level of the molten metal in the working chamber *e* is normally above the channels or ducts *d* which latter are completely filled with metal. This arrangement reduces the oxidation of the metal to a minimum and also avoids any likelihood of the slags which float on the top of the molten metal in chamber *e* from being carried along through the channels *d* since the light slags come to the surface of the molten bath. Preferably the upper end of working chamber *e* is normally closed by a suitable door.

The whole of the furnace which is conveniently heat-insulated and armoured is erected upon a flooring which may, in its turn, be mounted on cradles provided with rollers allowing the tilting, or the furnace may be pivoted about an axis placed for example near its center of gravity so as to insure the balance (or, near the tap-hole if it is desired to facilitate the direct tapping into ingot-moulds.)

An electro-mechanic or other device, which has not been shewn but which is currently used in apparatuses of this kind, may be employed for tilting the furnace.

The normal running of the furnace is a

continuous one, thereby giving the maximum of regularity in the composition, as only a fraction of the total amount of molten metal is allowed to run every time, and giving also a maximum output and a constant value of the absorbed power.

It must be understood that detail alterations may be made in the invention without departing from the scope thereof.

What I claim is:

1. In a three-phase induction electric furnace comprising closed channels filled with molten metal which act as the secondary wires of induction transformers, and in which the channels form a circuit around each core of a primary, an arrangement wherein the portions of these circuits which are at the interior of the furnace are common to two contiguous circuits and have the same section as the portions of the circuits which are turned near the exterior of the furnace.

2. In a three-phase induction electric furnace comprising closed channels filled with molten metal which act as the secondary wires of the induction transformers, and a common and excentered working chamber from which start and to which lead the secondary channels, and in which the channels form a circuit around each core of the primary, an arrangement wherein the portions of the circuits which are adjacent the interior of the furnace are common to two contiguous circuits and have the same section as the portions of the circuits which are turned near the exterior of the furnace.

3. A three phase induction electric furnace comprising a block of brickwork, three primary wires of transformers inside the said block, closed channels which are adapted to be filled with molten metal and everyone of which surrounds a primary wire of the transformer, an excentered working chamber from which start and to which lead the closed channels, the said channels forming a circuit around each core of the primary, the portions of these circuits adjacent the interior of the furnace being common to two contiguous circuits and having the same section as the portions turned near the exterior of the furnace.

4. A three-phase induction electric furnace comprising a refractory shell having formed therein a melting chamber, a plurality of closed channels terminating in the lower portion of said chamber, and a tapping duct communicating with said channels diametrically opposite to said chamber, and a plurality of primary coils extending through said shell, the metal in said channels forming secondary circuits for said coils, each of the two inner portions of the circuits so formed being common to two of said primary coils.

In testimony whereof I have signed this specification.

RENÉ LOUIS CHARTIER.