M. FOSSATI.

ELECTRIC FURNACE FOR HEATING, ANNEALING, AND MELTING METALLIC MATERIAL.

APPLICATION FILED MAR. 6, 1919.

1,322,416. Patented Nov. 18, 1919.

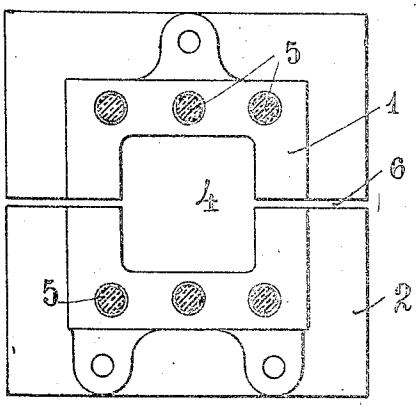


Fig.1

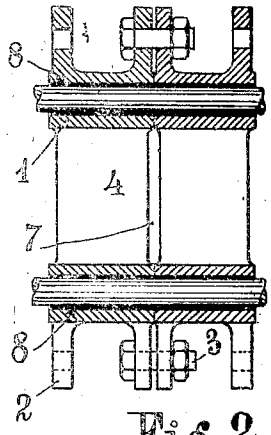


Fig.2

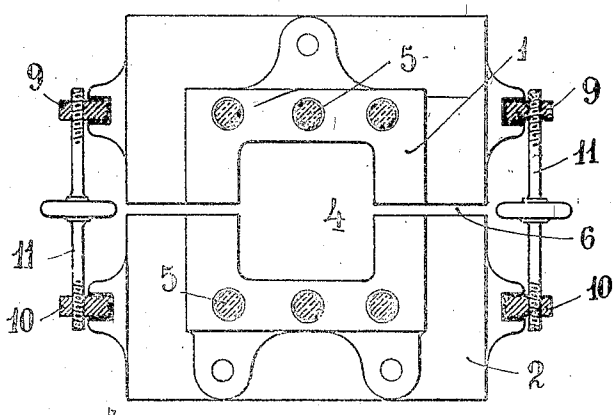


Fig.4

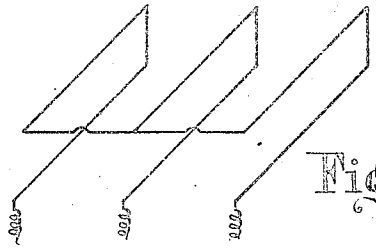


Fig.3

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ELECTRIC FURNACE FOR HEATING, ANNEALING, AND MELTING METALLIC MATERIAL.

1,322,416. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed March 6, 1919. Serial No. 280,884.

To all whom it may concern:

Be it known that I, MARIO FOSSATI, subject of the King of Italy, and resident of Turin, Italy, have invented certain new and useful Improvements in Electric Furnaces for Heating, Annealing, and Melting Metallic Materials, of which the following is a specification.

This invention relates to an induction and resistance electric furnace consisting of a plurality of like sections, this furnace being designed for heating, annealing and melting metals and materials of any kind.

The accompanying drawing shows by way of example a construction of the furnace according to this invention; Figure 1 is a front view of one of the sections forming the furnace; Fig. 2 is the central section of a portion of the furnace; Fig. 3 is a perspective diagram showing the conductor connections, and Fig. 4 shows an arrangement for adjusting the insulating spaces or gaps between the furnace section elements.

As shown on the drawing, the furnace comprises a number of sections 1 having an internal hollow space and provided with flanges 2 which are assembled by means of bolts 3 or the like, said sections being arranged side by side with their hollow spaces located in alinement with each other so as to form the furnace chamber 4.

Sections 1 are made of magnetic material and are provided with holes in which are inserted conductors 5 having high ohmic resistance, said conductors being electrically insulated from sections 1 by means of insulating sleeves 8. Conductors 5 are in the form of bars arranged longitudinally, that is to say, parallel to the furnace axis, and connected so as to form one or more complete turns.

The construction illustrated on the drawing comprises six conductors, which form three separate turns as shown by Fig. 3, each of said conductors being connected by one end with one of the feeding wires of a three-phase circuit, while the three opposite ends are connected together.

The arrangement and connections of conductors may be different from that illustrated on the drawing to suit circumstances, and the character of feeding current used; in any case, as the conductors form complete turns, by feeding them with an alternating monophase or polyphase current, heat is developed owing to ohmic resistance of said conductors and further an induced magnetic flux is obtained in the body of sections 1, this flux giving rise to induced currents which circulate into the same and thence give rise to heat.

The circuits must be arranged so that the combination of fluxes may be such as to neutralize at each time the mutual induction of conductors while permitting the utilization of currents induced in the magnetic circuit by current flowing through said conductors.

Such a result may be obtained by the arrangement of circuits described in connection with Fig. 3 of the drawing, but the same may also be obtained by other suitable arrangements.

Each section of the furnace may consist of two elements arranged close together but not in contact, as shown by Fig. 1, so as to leave a space or gap 6 between the facing surfaces of said section elements, said gaps being either left open or filled with a layer of refractory material; further, if desired, said gaps may have an adjustable thickness.

Fig. 4 shows an arrangement for adjusting the thickness of the air gaps. In said arrangement the upper elements of sections 1 are connected together by bars 9 insulated therefrom and the lower elements of the same sections are connected together by bars 10; appropriate devices such as screws 11 are used to adjust the air space or gap between the opposed surfaces of said section elements.

The several sections 1 are mounted side by side at such a distance from each other as to leave a suitable space or gap 7 between them, this gap being open to air or filled with insulating material, as above described; any suitable adjustable or non-adjustable arrangement may be used to hold said sections and elements thereof spaced apart from each other.

The furnace according to this invention is not subject to deformations caused by heat developed therein and the power factor of the same may be varied by adjusting the thickness of the air or insulating spaces or gaps interrupting the induced circuit, and thence the reluctance of the magnetic circuits.

What I claim as my invention and desire to secure by United States Letters Patent is:

1. An electric furnace for heating, annealing and melting metallic materials of any kind, comprising a chamber having walls made of magnetic material and conductors inserted into said walls and insulated electrically therefrom, an electric current being fed to said conductors to give rise to heat development by resistance of said conductors and by induction into said walls.

2. An electric furnace for heating, annealing and melting metallic materials of any kind comprising a plurality of sections made of magnetic material providing a chamber, each of said sections forming a separate electrically and magnetically closed circuit and conductors passing through said sections and insulated therefrom, an electric current being fed to said conductors to give rise to heat development by resistance of said conductors and by induction into said sections.

3. An electric furnace for heating, annealing and melting metallic materials of any kind, comprising a plurality of sections made of magnetic material having an opening and arranged side by side to provide a chamber, each of said sections forming an electrically and magnetically closed circuit and insulating spaces being left therebetween, and conductors passing through said sections and insulated therefrom, an electric current being fed to said conductors to give rise to heat development by resistance of said conductors and by induction into said sections.

4. An electric furnace for heating, annealing and melting metallic materials of any kind, comprising a plurality of separate sections made of magnetic material each of the same consisting of portions providing a chamber and having adjacent surfaces between which insulating spaces are left, and conductors passing through said section portions and insulated therefrom, an electric current being fed to said conductors to give rise to heat development by resistance of said conductors and by induction into said sections.

5. An electric furnace for heating, annealing and melting metallic materials of any kind, comprising a plurality of separate sections made of magnetic material each of the same consisting of portions providing a chamber and having adjacent surfaces between which insulating spaces are left, means for varying the thickness of said insulating spaces, and conductors passing through said section portions and insulated therefrom to give rise to heat development by resistance of said conductors and by induction into said sections.

Signed at Turin, Italy, this 7th day of February A. D. 1919.

MARIO FOSSATI.