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O. A. COLBY

BRASS MELTING FURNACE

Filed Jan. 12, 1923

Fig. 1.

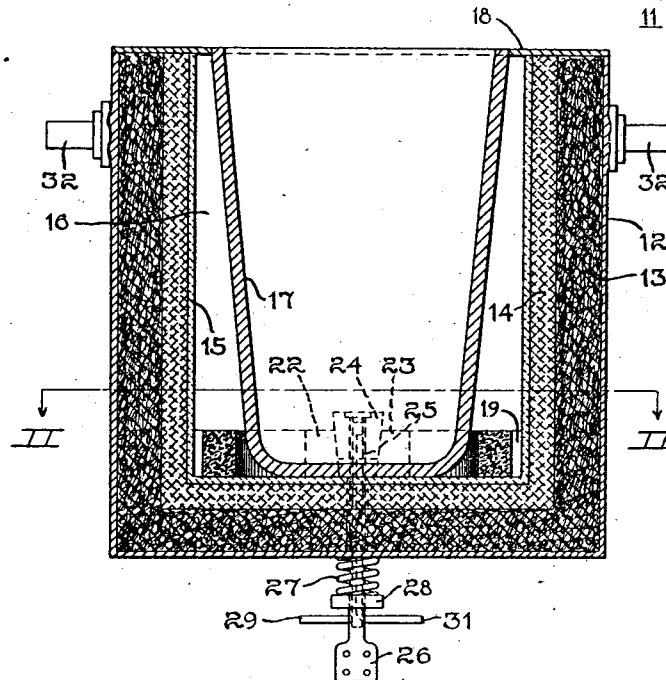


Fig. 2.

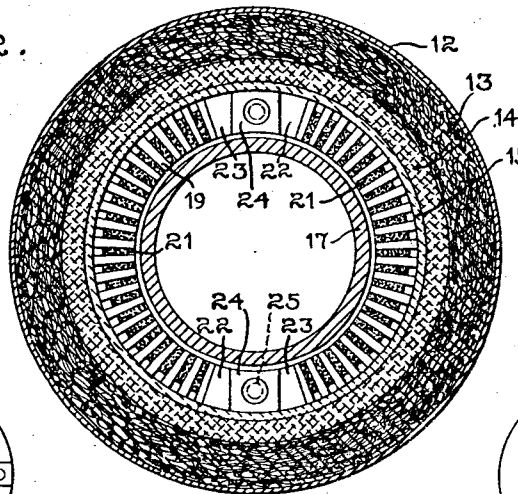


Fig. 3.

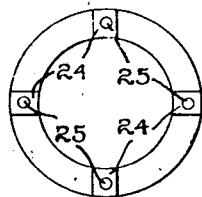
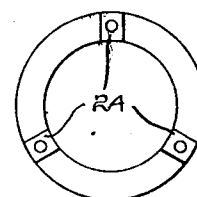


Fig. 4.



WITNESSES:

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BRASS-MELTING FURNACE.

Application filed January 12, 1923. Serial No. 612,204.

To all whom it may concern:

Be it known that I, ORA A. COLBY, a citizen of the United States, and a resident of Irwin, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Brass-Melting Furnaces, of which the following is a specification.

My invention relates to electric furnaces and particularly to electric resistance furnaces.

The object of my invention is to provide a relatively simple, compact and symmetrical refractory heating element for an electric furnace.

In practicing my invention, I provide a plurality of radially extending, relatively thin, flat, refractory resistor plates located in spaced relation in a substantially circular path, with granular electric-conducting material located therebetween. Pairs of oppositely beveled, refractory end blocks located in symmetrically spaced positions divide the plates into groups, the number thereof being in accordance with the number of phases of an alternating current supply circuit electrically connected thereto. Resilient means are provided to press a plurality of refractory terminal members into close operative engagement with the pairs of beveled end blocks to maintain the plates and the granular material in close operative engagement.

The heating element may be located in a suitable electric-insulating and heat-insulating casing adapted to the work to be done in the furnace.

In the single sheet of drawings,

Figure 1 is a view, in vertical section, of an electric furnace comprising the device embodying my invention,

Fig. 2 is a view, in horizontal section thereof, taken on the line II—II of Fig. 1, and

Figs. 3 and 4 are diagrammatic top plan views of heating elements arranged for energization from a two-phase and a three-phase supply circuit respectively.

An electric furnace 11 comprises an outer metallic casing 12 of any suitable or desired contour and dimension, but here shown as substantially circular in contour. An outer layer 13 comprises either a plurality of bricks or blocks or a mass of a suitable heat-insulating refractory material. An

inner layer 14 comprises a lining of a suitable high-temperature resisting refractory material. A third inner lining and muffle 15 may comprise a relatively thin layer of a refractory material which is particularly adapted to withstand the relatively high temperatures encountered in the operation of the furnace. The hereinbefore described layers of refractory material define or surround a chamber 16 which, as it is desired to employ a substantially circular crucible 17 therein, is also made substantially circular in horizontal contour. A cover member 18 of sheet metal may be provided to substantially close the top of the chamber 16 to prevent heat loss therefrom or to prevent objects falling therein.

A heating element, which is supported on the floor of the furnace, comprises a plurality of radially extending, relatively thin, flat, refractory, electric-conducting plates 19 which may consist of graphite, carbon, or other similar material. The plates 19 are located in spaced relation in a substantially circular path, their outer edges being located close to, or operatively engaging, the inner surface of the muffle 15. Relatively small masses 21, of a granular electric conducting material, such as comminuted carbon, are located between the adjacent spaced plates, the mass extending to within a short distance of the outer edge of the plates. The plates 19 and the interposed mass of granular material are divided into a plurality of symmetrically spaced groups by a plurality of pairs of oppositely beveled refractory end blocks 22 and 23 which are located in spaced relation in substantially the same path as are the plates 19.

A plurality of refractory terminal members 24, of wedge shape, are located between and operatively engage the opposing beveled surfaces of the pairs of end blocks 22 and 23, the dimensions of the blocks 24 being such that the blocks are not located in the same horizontal plane as are the plates 19, but extend thereabove in order that they may be moved in a direction at right angles to the plane of the circular path in which the plates 19 are located, to maintain them in close operative engagement with the end blocks 22 and 23, to maintain these in close operative engagement with the adjacent plates 19 and also to maintain the plates 19 and the masses 21 in close operative engagement.

ment with each other during the operation of the furnace.

Each of the members 24 is provided with an opening 25 extending therethrough and a water cooled, electric-circuit terminal member 26 of a suitable material, such as copper, has its upper end located in and extending through the opening 25. A helical spring 27 surrounds the rod 26 over a portion of its length, laterally extending flange portion 28 being provided on the member 26 against which the outer end of the spring 27 may rest. The inner end of the spring 27 rests against an insulating portion of the casing, suitable provision being, of course, necessary to prevent current flowing through the furnace structure from one of the terminal members to the other. As this construction is no part of the present invention, I have not illustrated it in detail. An inlet conduit 29 and an outlet conduit 31 is provided with terminal members 26 to permit of water cooling the same.

If it is desired to operate from a direct current source of supply or from a single phase alternating current source of supply only one pair of refractory terminal blocks 24 and the co-operating pairs of end blocks 22 and 23 will be provided substantially as illustrated in Figs. 1 and 2 of the drawing. The current path is, in this case, from one of the terminal members 26 and then through the two sets of plates and masses of granular material in parallel-circuit relation, to the other and diametrically opposed terminal members. If it is desired to employ a heating element of the above described type, on a two-phase circuit, two pairs of blocks 24 are located 90° apart, substantially as illustrated in Fig. 3 of the drawing, and a current path between adjacent terminals is, therefore, only through one 1/4 of the periphery of a circle. In case it is desired to energize the heating element from a three-phase source of supply, the terminal members 24 will be three in number and located 120° apart, substantially as illustrated in Fig. 4 of the drawing.

If it is desired to employ a heating element of the hereinbefore described type in a brass melting furnace, the construction is such that the crucible 17 may be placed within the furnace chamber 16 and the heating element is placed adjacent to the surrounding bottom of the crucible. Suitable means, such as short shafts 32, may be secured to the metallic casing 12 in order that the entire furnace structure may be tilted in a suitable mechanism (not shown) to permit of emptying the crucible as desired.

While I have illustrated my improved heating element in a furnace particularly adapted to the melting of brass in a crucible, it is not limited thereto and may be located

in a suitable furnace construction, which is adapted to the work to be performed in a chamber constituted by refractory walls.

Various changes in detail and arrangement may be made without departing from the spirit and scope of the invention and such modifications are intended to be covered by the appended claims.

I claim as my invention:

1. An electric resistance furnace comprising a plurality of radially extending, relatively thin, flat, refractory resistor plates, located in a substantially circular path, and a plurality of refractory terminal members, of wedge shape, interposed between certain of said plates and symmetrically spaced circumferentially thereof.

2. An electric resistance furnace comprising a plurality of radially extending, relatively thin, flat, refractory resistor plates, located in spaced relation in a substantially circular path, electric-conducting material connecting adjacent plates, pairs of oppositely beveled spaced end blocks dividing said plates into symmetrical groups, and refractory terminal members, of wedge shape, located between said pairs of end blocks.

3. An electric resistance furnace comprising a plurality of radially extending, relatively thin, flat, refractory resistor plates, located in spaced relation in a substantially circular path, electric-conducting material connecting adjacent plates, pairs of oppositely beveled spaced end blocks dividing said plates into symmetrical groups, refractory terminal members, of wedge shape, located between said pairs of end blocks, and resilient means operatively engaging said terminal members for forcing them laterally of said plates to compress the same.

4. An electric resistance furnace comprising a plurality of radially extending, relatively thin, flat, refractory resistor plates, located in spaced relation in a substantially circular path, granular refractory electric-conducting material located between and connecting adjacent plates, and resiliently actuated means movable in a plane substantially parallel to the flat surfaces of said plates for compressing said granular electric-conducting material between said plates and for conducting current to and from said plates and said granular material.

5. An electric resistance furnace comprising a substantially circular wall of refractory electric-insulating material, a plurality of radially extending, relatively thin, flat carbonaceous plates located in spaced relation in a substantially circular path, granular electric-conducting material located between and connecting adjacent plates, a plurality of pairs of oppositely beveled, spaced carbonaceous end blocks dividing said plates and interposed granular material into symmetrically spaced sets or groups, the num-

ber of said groups being in accordance with the number of phases of a supply circuit to which said sets of plates and granular material is connected, and refractory electric-circuit terminal members, of wedge shape 5 operatively engaging said respective pairs of beveled end blocks.

6. In an electric resistance furnace, in combination, a plurality of radially extending, relatively thin, flat, refractory resistor plates located in spaced relation in a substantially circular path, granular electric-conducting material between said plates, a plurality of pairs of spaced and oppositely 10 beveled refractory end blocks dividing said plates and interposed granular material into a plurality of symmetrical groups, and a plurality of refractory terminal members, of wedge shape, movable in a direction at 15 right angles to the plane of said circular path for operatively engaging said pairs of end blocks and for compressing said granular material and plates.

7. In an electric resistance furnace, in combination, a plurality of radially extending, relatively thin, flat, refractory resistor plates located in spaced relation in a substantially circular path, granular electric-conducting material between said plates, a plurality of pairs of spaced and oppositely 25 beveled refractory end blocks dividing said plates and interposed granular material into a plurality of symmetrical groups, a plurality of refractory terminal members, of wedge shape, operatively engaging said pairs of 30 end blocks, and resilient means for moving said terminal members in a direction at right angles to the plane of said circular path to closely engage said end blocks and to compress said granular material between 35 said plates. 40

In testimony whereof, I have hereunto subscribed my name this second day of January, 1923.

ORA A. COLBY.*