April 14, 1925. 1,533,224

O. A. COLBY

ELECTRIC RESISTANCE FURNACE

Filed March 10, 1922

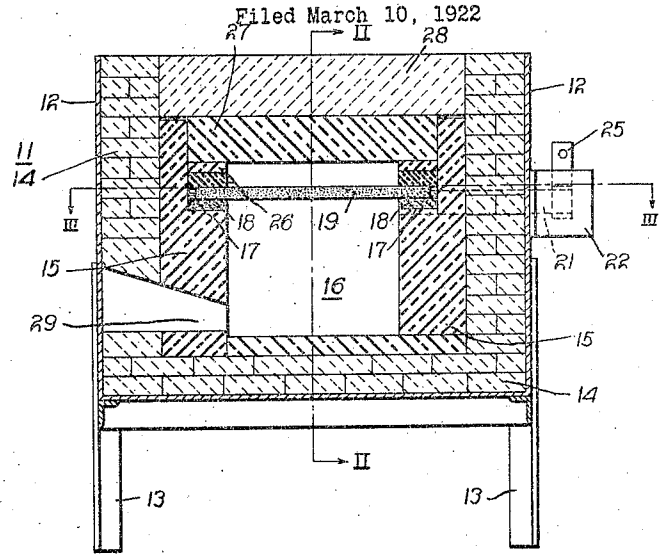


Fig. 1.

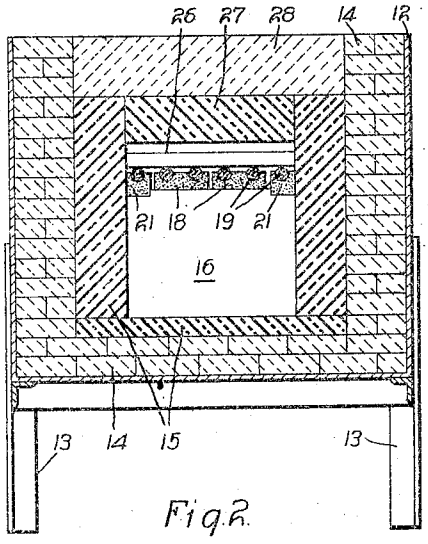


Fig 2.

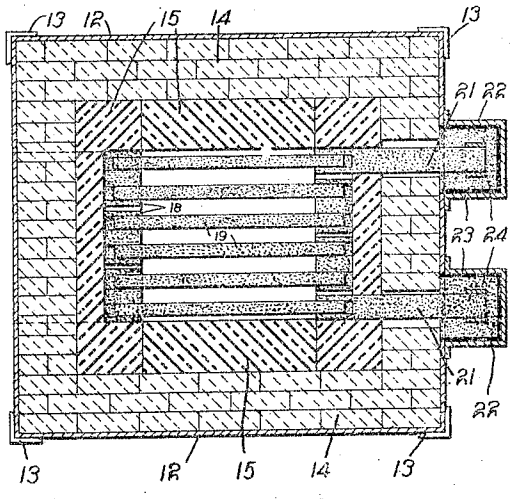


Fig 3.

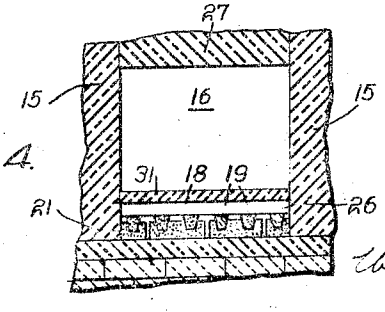


Fig 4.

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UNITED STATES PATENT OFFICE.

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ELECTRIC RESISTANCE FURNACE.

Application filed March 10, 1922. Serial No. 542,609.

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 Electric Resistance Furnaces, of which the following is a specification.

My invention relates to electric furnaces and particularly to electric-resistance furnaces and it has for one of its objects to provide a relatively simple and inexpensive refractory heating element for an electric-resistance furnace which may be easily and quickly assembled and disassembled.

Another object of my invention is to provide a furnace structure which shall cooperate with a heating element of the above indicated character to maintain the parts thereof in close operative engagement during the operation of the furnace.

In practising my invention, I provide a plurality of refractory walls surrounding a furnace chamber, two oppositely disposed walls having a ledge or shoulder portions on which are located a plurality of refractory conducting blocks, each provided with two grooves in its upper face. A plurality of elongated refractory resistor members extend between the shoulder portions with their ends resting in the grooves in the respective conducting blocks. The roof portion of the furnace is so arranged as to rest upon the ends of the resistor members to press them into close operative engagement with the conducting blocks.

In the single sheet of drawings,

Figure 1 is a view, in vertical longitudinal cross-section, of an electric furnace embodying my invention;

Fig. 2 is a view, in vertical lateral cross-section, taken on the line II—II of Fig. 1;

Fig. 3 is a view, in horizontal cross-section, taken on the line III—III of Fig. 1, and

Fig. 4 is a fragmentary view, in vertical lateral cross-section, of a modification of the device embodying my invention.

An electric-resistance furnace, designated by the numeral 11, comprises an outer metallic framework or skeleton 12, provided with a plurality of supporting members 13, suitably secured thereto. An outer lining 14 comprises a plurality of bricks or blocks of any suitable refractory heat-insulating material. An inner lining 15 comprises a plurality of bricks or blocks of a suitable high-temperature-resisting refractory material, constituting the floor and side walls of a furnace chamber 16, the bricks or blocks constituting the two linings being so shaped and disposed as to enclose a furnace chamber of any suitable or desired contour and dimensions. The end walls are illustrated in Fig. 1 of the drawing as comprising only a single brick for the entire wall, as may be possible in a small furnace, each provided with a projecting ledge or shoulder portion 17 to provide a support for a heating element or resistor to be hereinafter described.

A plurality of refractory conducting blocks 18, substantially rectangular in contour, are located upon the ledges 17 and each is provided with two substantially semi-cylindrical grooves in its upper surface. A plurality of refractory resistor members 19, of rod form, extend longitudinally across the top of the furnace chamber, with their ends resting in the grooves in the refractory conducting blocks 18. The conducting blocks 18 are disposed in staggered relation to each other on the ledges of the two end walls to the effect that all of the refractory resistor members 19 may be connected in series-circuit relation. The outer ends of the outer resistor members 19 are respectively located in a relatively narrow and elongated refractory conducting member 21 which extends through the walls of the furnace and a short distance therebeyond.

The outer ends of each of the members 21 may be located in an open-top box 22 suitably secured against an outer wall of the furnace structure, which box is provided with an insulating lining 23 of any suitable material, such as asbestos. The box may be filled with a mass 24 of a granular heat-insulating and protecting material, such as coke dust, to such height as to substantially cover the members 21. A metallic terminal member 25 may be provided for each of the members 21, at the outer end thereof, to permit of connecting them to suitable supply-circuit conductors (not shown).

In order to provide means for pressing the ends of the resistor members 19 into close operative engagement with the conducting blocks 18 and the terminal blocks 21, a rela-

tively thin, flat, elongated bar 26 of a suitable refractory electrical non-conducting material is placed above the ends of the refractory resistor members 18, a plurality of superposed bars being employed if necessary. A brick or block 27 of a suitable high-temperature-resisting electrical non-conducting refractory material has its ends resting upon the bars 26 to constitute also a roof for the chamber 16. A slab or block 28 of a suitable heat-insulating refractory material rests upon the block 27, the thickness of which is such as to prevent the lower surface of the block 28 from operatively engaging the tops of the bricks or blocks constituting the inner lining 15, to permit the weight of the bricks or blocks 27 and 28 to be supported by the outer ends of the refractory resistor members 19 to press them into close operative engagement with the supporting members 18. As a furnace of the above indicated character is to be employed for heat treating various metallic articles placed in the furnace chamber 16, an opening 29 is provided in the front wall of the furnace.

Fig. 4 illustrates a modified form of furnace structure and of the refractory resistor rods. The rods 19 are here illustrated as substantially trapezoidal in lateral cross-section, the grooves in the upper surface of the members 18 and 21 being of corresponding cross-section. The rods 19 are located below the furnace chamber 16, a refractory plate 31 of any suitable electrical non-conducting material constituting the floor of the furnace chamber and being supported by the bars 26. The weight of the plate 31 and of the bars 26 serves to press the rods 19 into close operative engagement with the conducting blocks 18 and the terminal blocks 21.

While any suitable or desired refractory resisting material may be employed, I have found that suitably prepared carbon rods or bars operate very well in a furnace of the above indicated character.

The device embodying my invention thus provides a relatively simple furnace structure in which is incorporated a refractory resistor member comprising a plurality of small-area elongated resistance rods and relatively simple means for assembling and disassembling them. My construction further permits of building up the outer lining of the furnace and the floor and inner side wall lining and then placing the heating element in its proper operative position therein, the roof or the floor of the furnace chamber operating, at the same time, to insure close operative engagement of the refractory resistor members with the conducting supporting members.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof and I desire that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

I claim as my invention:

1. In an electric-resistance furnace, in combination, a plurality of walls surrounding a furnace chamber, a plurality of parallel-extending elongated refractory resistor members having their ends operatively engaging certain of said walls to be supported thereby, and a plurality of refractory conducting blocks, each operatively engaging the adjacent ends of two of said resistor members.

2. In an electric-resistance furnace, in combination, a plurality of refractory walls surrounding a furnace chamber, a plurality of elongated refractory resistor members located in spaced-apart parallel relation, and a plurality of refractory conducting blocks, each extending laterally of said resistor members and operatively supporting the ends of two adjacent resistor members and maintained in close operative engagement therewith by a superposed portion of said furnace structure.

3. In an electric-resistance furnace, in combination, a plurality of refractory walls surrounding a furnace chamber, two oppositely disposed walls provided with integral shoulder portions, a plurality of refractory conducting blocks located in spaced-apart relation on each of said ledges and each block having two parallel extending grooves in its upper surface, a plurality of elongated refractory resistor members located in parallel spaced-apart relation, with their ends located in the grooves in said conducting blocks, and superposed means for maintaining said resistor members in close operative engagement with said conducting blocks.

4. In an electric-resistance furnace, in combination, a plurality of refractory walls surrounding a furnace chamber, a plurality of elongated refractory resistor members located in spaced-apart parallel relation, and a plurality of refractory conducting blocks, each extending laterally of said resistor members and operatively supporting the ends of two adjacent resistor members and maintained in close operative engagement therewith by a superposed portion of said furnace structure, said conducting blocks being located in staggered relation at opposite ends of said resistor members.

5. In an electric-resistance furnace, in combination, a plurality of refractory walls surrounding a furnace chamber, two oppositely disposed walls provided with integral shoulder portions, a plurality of refractory conducting blocks located in spaced-apart relation on each of said ledges and each block having two parallel-extending grooves

in its upper surface, a plurality of elongated refractory resistor members located in parallel spaced-apart relation, with their ends located in the grooves in said conducting blocks, the upper surface of said resistor members being located above the upper surface of said conducting blocks, and superposed means for maintaining said resistor members in close operative engagement with said conducting blocks.

In testimony whereof, I have hereunto subscribed my name this 20th day of February 1922.

ORA A. COLBY.