April 14, 1925. 1,533,264

T. A. REID

ELECTRIC FURNACE RESISTOR

Filed Dec. 17, 1921

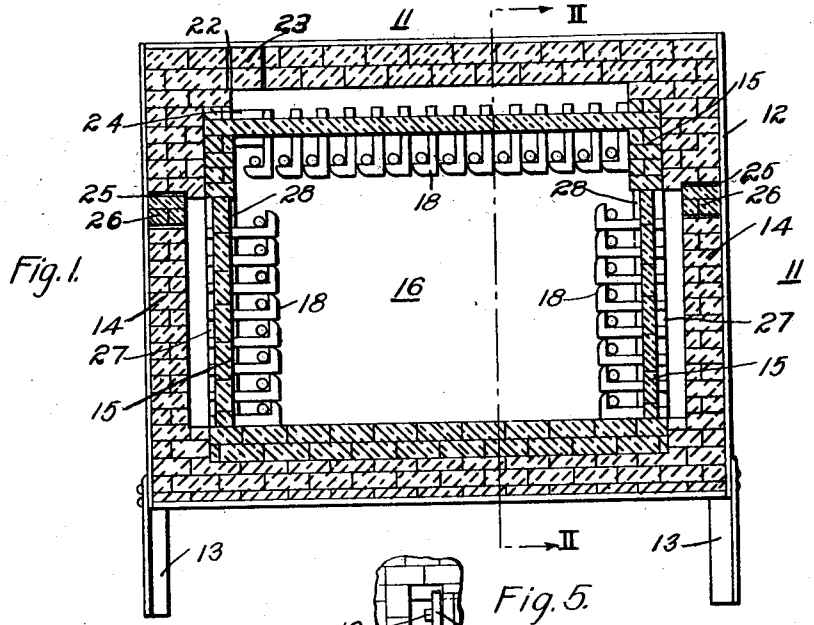


Fig. 1.

Fig. 5.

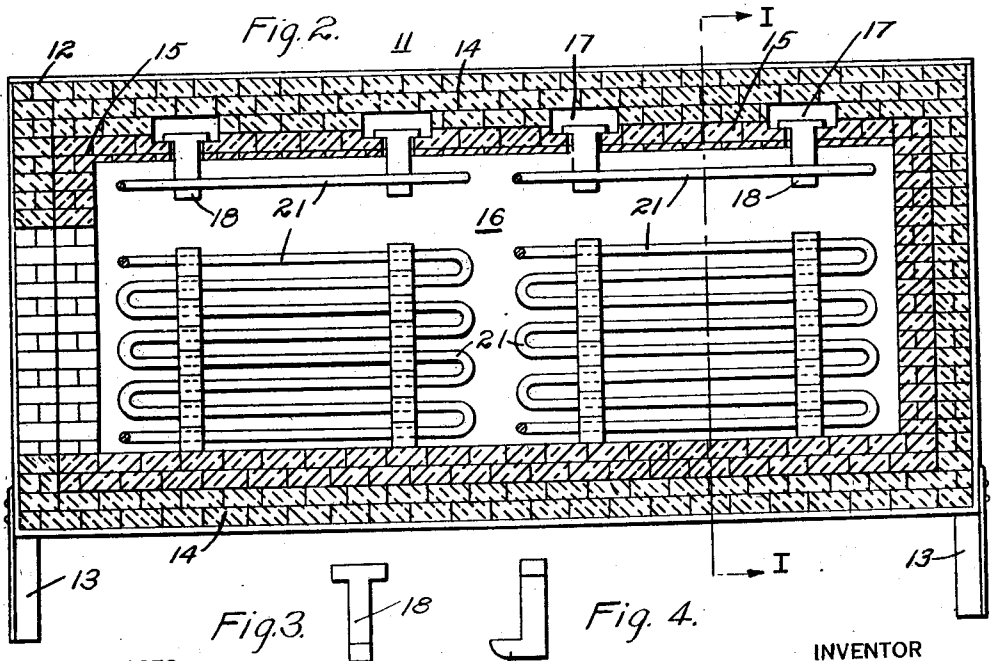


Fig. 2.

Fig. 3.

Fig. 4.

WITNESSES:

A. L. Jeffrey

W. M. Bickel

INVENTOR

Thomas A. Reid

BY

Wesley G. Carr

ATTORNEY.

Patented Apr. 14, 1925. 1,533,264

UNITED STATES PATENT OFFICE.

THOMAS A. REID, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ELECTRIC-FURNACE RESISTOR.

Application filed December 17, 1921. Serial No. 522,996.

To all whom it may concern:

Be it known that I, THOMAS A. REID, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric-Furnace Resistors, of which the following is a specification.

My invention relates to electrically heated apparatus and particularly to electric furnaces, and it has for its object to provide a relatively simple and inexpensive refractory-resistor mounting for an electric-resistance furnace which shall permit of supporting a closely spaced resistor member in the furnace chamber.

In practising my invention, I provide a plurality of relatively narrow members, of T-shape at their outer ends and of L-shape at their inner ends, and means for loosely supporting spaced-apart sets of these members by the walls of the furnace. I provide a relatively heavy preformed resistor member supported by the inner ends of L-shape of the refractory members and a single means for locking all of the refractory members of a set in proper operative position after the resistor member has been properly mounted therein.

In the single sheet of drawings,

Figure 1 is a view, in vertical lateral cross-section, of an electric furnace comprising a device embodying my invention, taken on the line I—I of Fig. 2;

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

Figs. 3 and 4 are views, in front and in side elevation, respectively, of a refractory resistor-supporting member and

Fig. 5 is a top plan view of a portion of the means supporting the resistor-supporting members.

An electric-resistance furnace 11 comprises an outer metallic framework 12 having a plurality of suitable supporting members 13. An outer lining 14 of suitable bricks or blocks of a refractory heat-insulating material is located inside of the framework 12. An inner lining 15 comprises a plurality of bricks or blocks of a suitable high-temperature-resisting refractory material so assembled and united as to form a furnace chamber 16 of any suitable or desired contour and dimensions.

The bricks or blocks constituting the inner layer 15 are spaced apart at suitable intervals to provide openings 17 therebetween, the bricks immediately adjacent the openings 17 being provided with shoulder portions for a purpose to be hereinafter set forth.

A plurality of relatively narrow refractory supporting members 18 are provided, each having an outer end of T-shape and an inner end of L-shape. A portion 19, extending at right angles to the main body of the member 18, is provided with an arcuate lower edge portion for a purpose to be hereinafter set forth. The width of the body portion of each of the members 18 is slightly narrower than the distance between the overhanging shoulder portions of the bricks in the inner lining 15 adjacent the openings 17 to permit of loosely mounting the supporting members 18 substantially in the positions illustrated in Fig. 2. The lateral width of the portion 19 is slightly greater than the thickness of the resistor member which it is to operatively support.

A resistor member 21 comprises a relatively heavy preformed rod or bar having a plurality of substantially parallel-extending and end-connected convolutions, the distance between the individual and adjacent convolutions being substantially the same as the distance between the adjacent refractory supporting members 18.

The method of mounting the refractory supporting members and of the resistor member thereon will be described more particularly with reference to the mounting thereof in the roof of the furnace chamber. An opening 22 is provided in the outer lining 14 in the roof of the furnace to permit of placing the members 18 in the proper operative positions in the respective openings 17, a plurality of suitably dimensioned bricks 23 being provided to close the opening 22 during the operation of the furnace. If desired, the members 18 may be placed in their proper operative positions from the inside of the furnace, the shoulder portions hereinbefore described in connection with those bricks of the inner lining 15 adjacent the openings 17 being cut away at one end of the furnace, as illustrated more particularly in Fig. 5 of the drawings, to permit of the outer ends of the members 18 being moved therethrough and then laterally of

the furnace to their proper operative positions.

If it is assumed that the proper number of refractory supporting members 18 has been placed in position, substantially as illustrated in Fig. 1, the preformed resistor member 21 may be brought into operative engagement with the lower or outer faces of the inner ends of the members 18 and moved upwardly, thereby raising the members 18 or moving them longitudinally of their own lengths, the depth of the openings 17 being sufficient to permit of this longitudinal movement. The right-hand convolutions of the resistor member engages the lower arcuate surface of the portion 19 of the refractory member located immediately adjacent the wall of the furnace and, by slightly moving this convolution to the left, all of the refractory resistor-supporting members are momentarily moved to the left, permitting the movement of the first convolution past the portion 19 and its location thereon to be supported thereby. The inherent resiliency of the convolutions of the resistor member 21 permits of the successive movement of each convolution away from the preceding convolution to permit of its moving along the arcuate surface of the portion 19 of the refractory supporting member with which it is to be operatively associated, until all of the convolutions are supported substantially as illustrated in the top heating element of Fig. 1 of the drawings. The dimensions between the walls, and the number of refractory supporting members 18 must be such that the distance between the end of the portion 19 of the last refractory member and the adjacent wall is at least equal to, if not slightly greater than, the thickness of the rod or bar constituting the resistor member 21. A key member 24 of substantially T-shape and made of any suitable refractory material may then be dropped into place through the opening 22, the key member being effective to maintain substantially all of the refractory members 18 in proper operative positions relatively to each other and in the supporting means.

Substantially the same method of assembly may be followed in mounting the resistor in the walls of the furnace, suitable openings 25 being provided adjacent the upper portions of the furnace, which openings are normally closed by suitable bricks or blocks 26 during the operation of the furnace. In order to space apart the outer ends of the refractory members when they are located in the walls of the furnace, I may provide a plurality of refractory members 27 which are located between the outer ends of the adjacent members, the dimensions being substantially the same as the length of the overhanging portion 19. A key member 28 may be provided to lock the members 18 in the walls in proper operative positions relatively to each other.

The device embodying my invention permits of employing a refractory resistor support of a width only slightly greater than the thickness of the bar or rod constituting the resistor member and, as the width of the body portion of the member 18 may be made sufficiently large to provide the necessary strength, the thickness thereof may be made relatively small and it is, therefore, possible to so preform the resistor member 21 that the distance between the successive and adjacent convolutions shall be relatively very small, which permits of locating a relatively large amount of resistance in a given surface area of the furnace chamber, thus permitting of raising the temperature of the furnace chamber to a relatively high value. The small distance between the adjacent convolutions of the resistor member also insures even distribution of heat over any given area of the furnace chamber, which is a highly desirable qualification in certain kinds of work. The spaced-apart sets of refractory resistor-supporting members engage a relatively small portion only of the length of each of the convolutions of the resistor member which is made sufficiently heavy in cross-section to be substantially self-supporting therebetween.

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 furnace, in combination, a plurality of walls spaced apart to form a furnace chamber, a resistor member of relatively large area of lateral cross-section in said chamber, said resistor comprising a plurality of parallel-extending end-connected convolutions and a plurality of spaced apart sets of loosely mounted refractory resistor-supporting members and means for locking each of said sets in operative position in said chamber.

2. In an electric furnace, in combination, a plurality of walls spaced apart to form a furnace chamber, a resistor member of relatively large area of lateral cross-section in said chamber, said resistor comprising a plurality of parallel-extending and end-connected convolutions and a plurality of spaced refractory members having an outer end of L-shape for supporting said resistor member, an inner end of T-shape to engage one of said walls and be supported thereby, and a single means for locking said refractory members in their operative positions.

3. In an electric furnace, in combination, a plurality of walls spaced apart to form a

furnace chamber, a resistor in said chamber comprising a plurality of parallel-extending end-connected convolutions, and a plurality of sets of refractory supporting members, each having an outer end of substantially L-shape, said members being successively movable in the direction of their length to operatively engage and support the resistor members.

4. In an electric furnace, in combination, a resistor member comprising a plurality of parallel-extending end-connected convolutions and a plurality of elongated refractory members, each having an outer end of L-shape, said members being first movable simultaneously in one direction longitudinally of their length and then movable successively in the opposite direction to operatively engage and support the resistor member.

5. In an electric furnace, in combination, a resistor member comprising a plurality of parallel-extending end-connected convolutions and a plurality of elongated refractory members, each having an outer end of L-shape, said members being first movable simultaneously in one direction longitudinally of their length and then movable successively in the opposite direction to operatively engage and support the resistor member, and means for locking all of said refractory supporting members in their operative positions.

6. In an electric furnace, in combination, a resistor member comprising a plurality of parallel-extending end-connected convolutions of relatively large area in lateral cross-section, a plurality of relatively narrow elongated refractory resistor-supporting members, the outer end of each being substantially of L-shape, said refractory members being first movable simultaneously longitudinally away from their normal operative positions and then movable individually and successively back to their normal operative positions to engage and support the resistor member over only short portions of its length, the said resistor member being self-supporting between said supporting members.

7. A resistor-supporting means comprising a plurality of contiguous refractory members, each having one end of L-shape for engaging and supporting a resistor member and means for loosely supporting said refractory members.

8. A resistor-supporting means comprising a plurality of contiguous refractory members, each having one end of L-shape for engaging and supporting a resistor member, and having the other end of T-shape, and means for so supporting said refractory members as to permit of limited movement thereof in a direction longitudinally of their length.

In testimony whereof, I have hereunto subscribed my name this 29th day of November, 1921.

THOMAS A. REID.