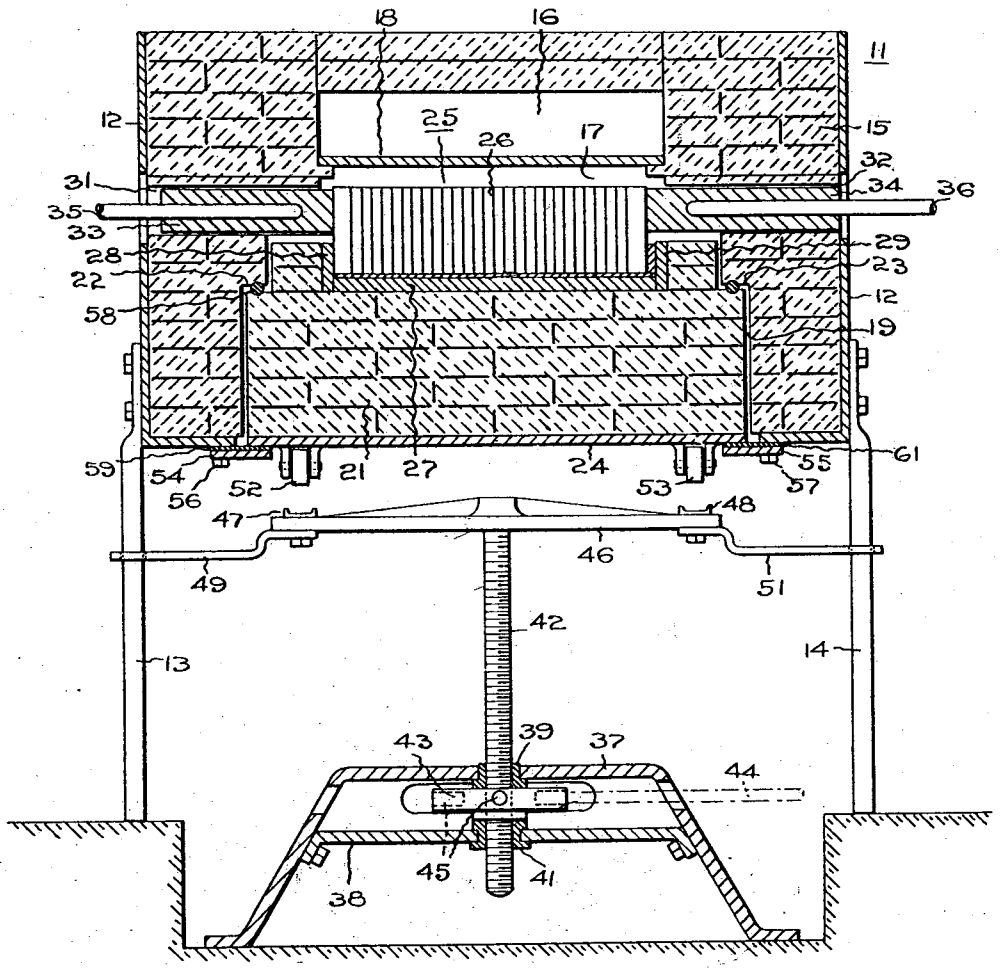
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E. J. BRANNIGAN

REMOVABLE FURNACE HEATING UNIT

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WITNESSES:

R. S. Harrison

W. M. Biebel

INVENTOR

Edward J. Brannigan

BY

Wesley G. Carr

ATTORNEY

Patented Aug. 16, 1927. 1,638,826

UNITED STATES PATENT OFFICE.

EDWARD J. BRANNIGAN, OF BUFFALO, NEW YORK, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

REMOVABLE FURNACE HEATING UNIT.

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

The object of my invention is to provide a relatively compact and complete furnace structure embodying a quickly removable closure member supporting a resistor member for the furnace.

In practicing my invention, I provide a plurality of refractory walls enclosing an open-bottom furnace chamber and having mounted therein a plurality of spaced terminal electrodes. A refractory, removable, closure member interfits with said walls and supports a resistor that is engaged by said electrodes. Means are provided to hold the closure member in its proper operative position and to effect a substantially air tight joint between the closure member and the refractory walls.

The single figure of the drawings is a view, in vertical longitudinal section, of an electric furnace embodying my invention.

An electric furnace 11 comprises a suitable outer metal frame or casing 12 that is mounted on a plurality of supporting members 13 and 14 respectively, suitably secured to the metal casing.

A relatively thick lining 15, located within the casing 12, is constituted by a plurality of bricks or blocks of a suitable high-temperature resisting refractory material that are spaced apart to provide a furnace chamber comprising a work-receiving compartment 16 and a heating compartment 17. The work-receiving compartment is provided with a door (not shown) in the usual manner. The two compartments are separated by a refractory diaphragm or plate 18 that may comprise any suitable high-temperature resisting material usually employed in the art.

The work-receiving and the heating compartments may be of any suitable or desired contour and dimensions. The bricks or blocks constituting the lining 15 are built up to comprise side walls, end walls and a roof portion and provide an open bottom structure, which opening is designated by the numeral 19 in the drawing.

A quickly removable closure member 21 interfits with the refractory walls which may be provided with a shoulder portion, as indicated by the numerals 22 and 23 in the drawings, and comprises a metal bottom plate 24 upon which is mounted a plurality of refractory bricks or blocks built up to suitably close the opening 19.

A resistor member 25 is operatively supported by the closure member 21 and comprises a plurality of relatively thin plates 26, of suitably electric-conducting material usually employed for high temperature work. The built-up resistor member 25 is supported in any suitable or desired manner within a depression in the top of the closure member 21 and when first assembled in proper operative position thereon may be spaced from the supporting surface by a piece of wood 27. End pieces 28 and 29, of wood, may be provided to properly hold the plates in position until they and the closure member supporting them have been moved into proper operative position relatively to the furnace structure, as will be hereinafter described in detail.

The furnace structure 11 is provided with two opposed, alined openings 31 and 32 respectively, within which are located elongated terminal members 33 and 34, the inner ends of which are in operative engagement with the end plates of the assembled resistor member 25, substantially as illustrated in the drawing.

Each of the elongated terminal members 33 and 34 is provided with an elongated opening extending longitudinally and axially thereof, within which are located terminal electrodes 35 and 36 respectively. Any suitable or desired resilient compressing means may be applied to the terminal electrodes 35 and 36 to press them into close operative engagement with the terminal members 33 and 34 respectively, and to press these latter members into close operative engagement with the end plates of the assembled resistor 25 and also to maintain the abutting faces of the relatively thin plates 26 in close operative engagement with each other.

As the resilient compressing means constitutes no part of my invention, I have not thought it necessary to further illustrate and describe the same, and any suitable means may be employed.

A means for removing the closure member and the resistor member, and for replacing the same, comprises a member 37 that may be of substantially inverted U-shape and be provided with a stiffening rod 38 that is suitably secured thereto at its ends. Bear-

ing members 39 and 41 are provided in the top surface of the member 37 and in the member 38 respectively, through which extends a screw-threaded rod 42 that is actuated by an internally screw-threaded hand wheel 43, that is located between the bearing members 39 and 41 respectively. A turning movement of the hand wheel 43, either directly by the hand of an operator or by the use of a turning member 44 that engages a plurality of spaced openings 45 provided in the periphery of the hand wheel, effects a vertical movement of the rod 42.

At its upper end, the rod 42 carries a plate 46 that is provided with a pair of spaced track members 47 and 48, respectively, that may be of channel form in lateral section. Means for preventing a turning movement of the supporting plate 46 and the rod 42 when the hand wheel 43 is turned, comprise extensions 49 and 51 that operatively engage the supporting members 13 and 14 respectively, and are thereby prevented from turning with the hand wheel.

The metal plate 24 is provided with a plurality of spaced wheels 52 and 53, respectively, that are adapted to fit into the track members 47 and 48 on the supporting plate 46.

Means for holding the closure member 21 in its proper interfitting operative position relatively to the lining 15 may comprise spaced plates 54 and 55 that may be of cast iron or steel, and be suitably secured against the bottom portion of the casing 12 and closely adjacent to the edge of the opening 19, by a plurality of bolts 56 and 57.

Means for effecting a substantially air-tight joint between the closure member and the refractory walls of the furnace structure comprise a gasket 58 that is located between the shoulder portions 23 of the furnace structure and the corresponding shoulder portions of the closure member.

Plates or straps 59 and 61, of copper, may be located between the plates or bars 54 and 55 and the casing 12 and the edge of the supporting plate 24 and will also assist in effecting a substantially air-tight joint between the closure member and the furnace structure.

If it is assumed that the furnace has been assembled substantially as hereinbefore described, it is only necessary to provide suitable current conducting leads (not shown) that are connected to the electrodes 35 and 36 whereby current of a suitable voltage is caused to traverse the electrodes, the elongated terminal members and the resistor member and effect heating of the resistor member itself. This heat is radiated and otherwise conveyed to the plate 18, which in turn effects heating of the work-receiving compartment 16 and of any material placed therein, while, at the same time protecting the carbonaceous resistor member 25 against the oxidizing effect of air that enters the work-receiving compartment 16 through the opened door.

As soon as the resistor member 25 reaches a sufficiently high temperature, the pieces of wood 27, 28 and 29 are converted into charcoal and will continue to act as a support for the assembled resistor member although such support is not particularly required, as the resistor member is supported by and between the opposing ends of the elongated terminal members 33 and 34 that are resiliently pressed against the ends of the resistor member.

If it becomes necessary to replace a damaged resistor, the supporting plate 46 is moved into a substantially vertical direction upwardly until the wheels of the closure member 21 are supported thereby.

The supporting members comprising the plates or bars 54 and 55 which are to be understood as continuing around the entire periphery of the closure member 21, are removed by removing the bolts 56 and 57. The hand wheel 43 is then so actuated as to lower the rod 42, the plate 46 and the closure member, it being understood that the resilient compressing means hereinbefore described, have been sufficiently released to permit disengagement of the terminal members 33 and 34 from the resistor member 25.

The member 37, together with the plate 46 supported thereby and the closure member 21 located on the plate 46, may then be removed laterally of the furnace structure in any suitable or desired manner after the closure member has been lowered a sufficient distance to permit this lateral movement of the closure member relatively to the bottom of the furnace structure.

A new closure member may have been assembled in advance and held in readiness and may be located on the plate 46 after the removal of the other closure member therefrom, after which the lifting structure 37 may be removed into position under the furnace structure and the closure member moved upwardly into the opening 19 by suitable actuation of the hand wheel 43. A new gasket 58 has been provided on the top surface of the closure member and will, in co-operation with the cover plates 59 and 61, effect substantially air tight engagement therebetween, that will prevent air from flowing between the closure member and the inner surface of the refractory walls at the opening 19 which would cause an oxidizing action on the resistor member 25.

The device embodying my invention thus provides a unitary refractory closing member and a resistor member located thereon and supported thereby, that are moved into their proper operative positions relatively to an open bottom furnace structure by a

movement in a substantially vertical direction.

It provides also, means for effecting a substantially air tight joint between such a closure member and the refractory walls, and provides also a means for holding the interfitting closure member in its proper operative position within the furnace walls.

Various modifications and changes may be made without departing from the spirit and scope of the invention, I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:

1. In an electric furnace, the combination with an open-bottom refractory furnace structure, and a plurality of terminal electrodes mounted therein, of a refractory closure member for said structure movable into its operative position in a substantially vertical direction, and a resistor member mounted on said closure member and engageable by said electrodes when said closure member is in its proper operative position.

2. In an electric furnace, the combination with a plurality of refractory walls enclosing an open bottom furnace chamber, and a plurality of spaced, and aligned terminal electrodes operatively supported by said walls, of a refractory closure member for the open bottom chamber, movable into interfitting position with said furnace walls in a substantially vertical direction, an elongated resistor member adapted to be operatively engaged by said electrodes, means on said refractory walls for holding said closure member in its proper operative position, and means for effecting a substantially air tight joint between said closure member and said refractory walls.

In testimony whereof, I have hereunto subscribed my name this 16 day of April, 1924.

EDWARD J. BRANNIGAN.