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F. THORNTON, JR

RESISTOR MOUNTING FOR ELECTRIC FURNACES

Filed Aug. 18, 1923

Fig. 1.

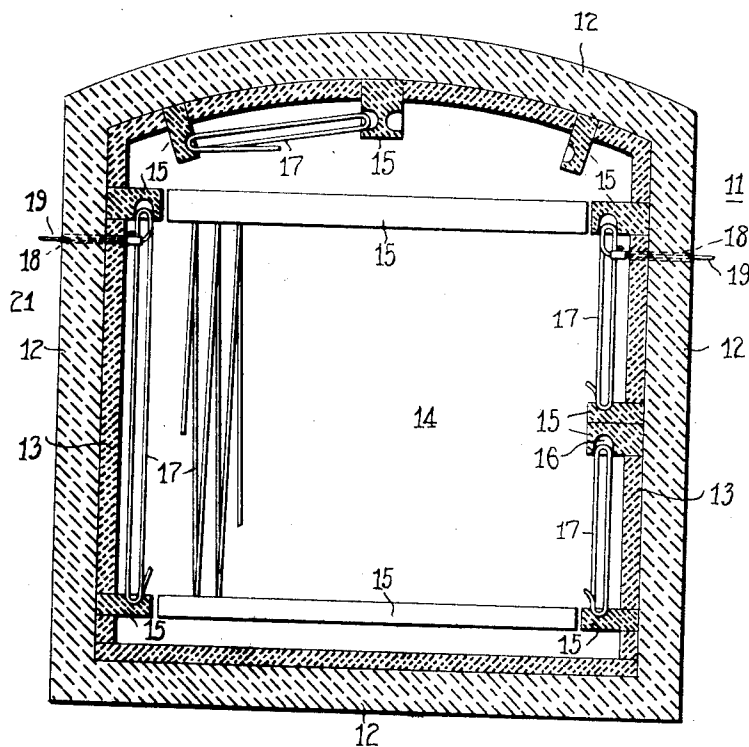


Fig. 2.

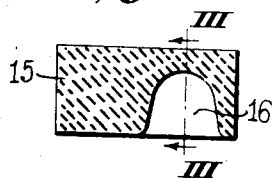
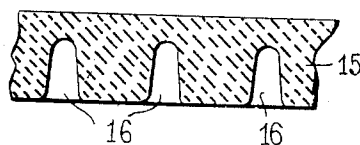


Fig. 3.



WITNESSES:

R. S. Harrison
H. M. Diebel

INVENTOR

Frank Thornton, Jr.

BY

Wesley S. Carr
ATTORNEY

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UNITED STATES PATENT OFFICE.

FRANK THORNTON, JR., OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

RESISTOR MOUNTING FOR ELECTRIC FURNACES.

Application filed August 19, 1923. Serial No. 653,004.

To all whom it may concern:

Be it known that I, FRANK THORNTON, Jr., 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 Resistor Mountings for Electric Furnaces, of which the following is a specification.

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

One object of my invention is to provide a relatively simple and compact construction for a quickly removable and replaceable heating unit for an electric resistance furnace.

Another object of my invention is to provide a relatively high capacity heating unit for an electric furnace.

Another object of my invention is to provide a heating unit for an electric furnace that shall comprise supporting means for a resistor operatively engaging a relatively small portion only of the resistor, the resistor being otherwise substantially self-supporting.

Another object of my invention is to provide a supporting means that shall permit of the free lateral expansion of the resistor member during its operation, while preventing longitudinal movement thereof.

In practicing my invention, I provide pairs of relatively narrow, elongated, refractory, supporting members, located in parallel spaced relation relatively to each other in the walls of a furnace, and having one end projecting into the furnace chamber. A plurality of spaced pockets are provided in the adjacent faces of the refractory members, the pockets in one of the supporting members being deeper than those in the other member.

A heating unit comprises a helically wound coil having flattened, substantially parallel sides and integral rounded edge portions, which latter are located in the respective pockets in the supporting members.

In the single sheet of drawings,

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

Fig. 2 is a view, in lateral section of a refractory resistor supporting member and,

Fig. 3 is a partial view, in longitudinal section therethrough, taken on the line III—III of Fig. 2.

An electric furnace 11 comprises a plurality of side, top and bottom walls 12 that are respectively built up of a plurality of bricks or blocks of a suitable heat-insulating material usually employed in the art. If desired, an inner lining 13 may be provided for each of the walls 12, and it may comprise a suitable refractory high-temperature resisting material usually employed in the art. A furnace chamber 14 is provided by the outer walls 12 and the inner lining 13 therefor, which chamber may be of any suitable or desired shape and dimensions.

A pair of relatively narrow, elongated, refractory supporting members 15 are located in one of the walls of the furnace, and they may be supported by the inner lining substantially as illustrated in the left hand wall 12 of Fig. 1 of the drawing. Each of the members 15 is provided in one of its faces and adjacent to the outer edge that projects into the furnace chamber 14, with a plurality of spaced pockets 16. The members 15 are so placed that the pockets in the respective members are located in the opposing faces. The pockets 16 in one of the members 15 are deeper than those in the other member for a purpose to be hereinafter set forth in detail.

A heating element for the furnace comprises a helically wound coil 17 of a suitable resistance material, the coil having flattened, substantially parallel sides, and integral rounded edge portions. The rounded edge portions of each turn of the coil 17 are adapted to fit into the pockets 16 in the pairs of supporting members 15. The width of the opening 16 laterally of the supporting members 15 is of substantially the same dimension as the lateral width of the coil 17. The width of the slots 16 longitudinally of the members 15 is substantially the same as the thickness of the resistor wire or bar constituting the heating coil or coil 17.

When it is desired to assemble a heating unit 17 in its proper operative position rela-

tively to the two supporting members 15, one edge of the coil 17 is first placed in operative engagement with that refractory supporting member having the deeper pockets 16 therein, the edge portions of the respective adjacent turns of the coil being caused to enter the respective adjacent openings 16, the coil being held angularly disposed relatively to its final position, after which the coil is so moved laterally as to cause the outer edge portion to touch the bottom of the respective pockets.

The dimensions of a coil and the distance between the two refractory supporting members 15 is such that the coil may now be moved laterally thereof in a direction to cause the lower edge portion to approach the wall of the furnace and clear the other refractory supporting member. When the lower edge portion is located above the pockets in the lower refractory member 15, the coil may be dropped so that the lower edge portion operatively engages and fits into the pockets 16 whereby the weight of the coil is supported by the lower refractory member 15 in the case of a heating unit that is located closely adjacent to a side wall of the furnace.

The ends of the resistor member constituting the heating unit 17 may be brought out through suitable insulating bushings 18 located in the walls of the furnace near one or both of the refractory supporting members 15. If desired, a short rod 19 of a suitable electric conducting material may be located within the bushing 18, and be connected to the end of the resistor wire by a suitable connector 21.

I have illustrated in Fig. 1 of the drawing a flattened helical coil of relatively large lateral dimensions, but I may also employ flattened helical coils of relatively smaller dimensions as illustrated in the right hand side of Fig. 1. The refractory supporting members 15 are of the same constructions as hereinbefore described, and the operation of installing the heating unit is substantially the same as hereinbefore described. The heating element hereinbefore described may also be employed in the bottom or at the top of the furnace, in which case the weight of the coil is supported by the two ends instead of only by the lower end thereof. The operation of installation of the coil is, however, the same as hereinbefore described.

When it is necessary or desirable to remove a coil, it is first so moved as to cause the one edge thereof to be disengaged from that refractory resistor member 15 having shallower pockets therein, which end is then so moved as to cause this edge of the coil to be free of the outer edge of the supporting member, after which the coil is given a lateral tilting and then a lateral movement, causing the other edge portion to be disen-

gaged from the supporting member having the deeper pockets therein.

The device embodying my invention provides a double-layer coil of resistor material, substantially all of the length of the resistor member being in heat-radiating relation to the furnace chamber, that is, only a relatively small portion of its length is covered by any other portion thereof. The double-layer helical coil permits of producing a greater amount of heat in a given area of wall surface of the furnace chamber than would be possible if only a single-layer winding were provided.

The spaced pockets in each of the supporting members provide means for holding each of the turns of the helical coil 17 by their edge portions, whereby any longitudinal movement of the individual turns and of the entire coil is prevented.

The clearance between one edge portion of the coil and the bottom of the pockets permits also of the free expansion of the straight portions of each turn whereby any injurious effect of such expansion upon the supporting members is prevented.

Any coil may be easily and quickly installed and removed without disturbing any of the other coils whenever such removal becomes necessary.

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 comprising a plurality of refractory walls enclosing a furnace chamber, in combination, a pair of spaced, elongated, refractory, supporting members supported by one of said walls and projecting into said chamber, said members having a plurality of pockets in the opposing faces adjacent the outer edge, and a flattened helix of resistor wire having its rounded edge portions located in said pockets and supported by said refractory supporting members.

2. In an electric furnace comprising a plurality of refractory walls enclosing a furnace chamber, in combination, an elongated, relatively narrow, refractory member supported by and projecting from one of said walls and having a plurality of relatively shallow pockets in one face thereof adjacent to the outer edge, a second elongated, relatively narrow, refractory member, supported by and projecting from said wall in parallel-spaced relation to said first member and having a plurality of pockets in one face thereof adjacent to the outer edge, the pockets in said second member being shallower than the pockets in said first member and

a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions, the rounded edge portions only being located in said pockets to support the resistor coil.

3. In an electric furnace, in combination, a pair of relatively narrow, elongated, refractory supporting members located in parallel-spaced relation relatively to each other and having a plurality of spaced pockets in their opposing faces located adjacent to one edge thereof, and double-layer coil of resistor wire having relatively small portions of each turn located in said pockets and supported by said refractory supporting members.

4. In an electric furnace comprising a plurality of walls enclosing a furnace chamber, in combination, a pair of relatively narrow, elongated, refractory supporting members located in parallel-spaced relation relatively to each other in one of said walls and projecting into said chamber, said members having a plurality of spaced pockets in their opposing faces adjacent the outer edges thereof, and a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions supported by said pair of refractory members, said coil being placed in its proper operative position relatively to said supporting members by a lateral and tilting movement thereof.

5. In an electric furnace comprising a plurality of walls enclosing a furnace chamber, in combination, a pair of relatively narrow, elongated, refractory supporting members located in parallel-spaced relation relatively to each other in one of said walls and projecting into said chamber, said members having a plurality of spaced pockets in their opposing faces adjacent the outer edges thereof, and a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions supported by said pair of refractory members, said coil being placed in its proper operative position relatively to said supporting members by first placing one edge portion in operative engagement with one of said refractory supporting members and then placing the other edge portion in operative engagement with the other supporting member.

6. In an electric furnace comprising a plurality of refractory walls enclosing a furnace chamber, in combination an elongated, relatively narrow, refractory member supported by and projecting from one of said walls and having a plurality of relatively shallow pockets in one face thereof adjacent to the outer edge, a second elongated, relatively narrow, refractory member, supported by and projecting from said wall in parallel-spaced relation to said first member and having a plurality of pockets in one

face thereof adjacent to the outer edge, the pockets in said second member being shallower than the pockets in said first member, and a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions supported by said pair of refractory members, said coil being placeable in its proper operative position by first placing one edge portion in the deeper pockets of the first supporting member and then placing the other edge portion in the shallower pockets of the second member by a lateral and tilting movement of the coil.

7. In an electric furnace, in combination, a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions, and a pair of relatively narrow, elongated, refractory, supporting members located in parallel-spaced relation relatively to each other operatively engaging the outer surface of the rounded edge portions only of said coil to support the same and embodying means for positively locating the adjacent turns of said coil in spaced relation to each other.

8. In an electric furnace, in combination, a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions, and a pair of relatively narrow, elongated, refractory, supporting members located in parallel-spaced relation relatively to each other operatively engaging the outer surface of the rounded edge portions only of said coil to support the same and having embodying means comprising pockets of different depth in the members of said pair for positively locating the adjacent turns of said coil in spaced relation to each other, and for permitting the free expansion of said side portions of the coil during the operation thereof.

9. In an electric furnace, in combination, a helically wound coil of resistor wire having flat, substantially parallel sides and rounded edge portions, and a pair of relatively narrow, elongated, refractory, supporting members located in parallel-spaced relation relatively to each other operatively engaging the rounded edge portions of said coil to support the same and having embodying means for positively locating the adjacent turns of said coil in spaced relation to each other, and for permitting the free expansion of said side portions of the coil during the operation thereof, the coil being placeable in its proper operative position relatively to the supporting members by a lateral and tilting movement thereof.

10. In an electric furnace, in combination, a helically wound flattened coil of resistor wire, and a pair of refractory supporting members therefor operatively engaging the outer surface of a small edge portion only of said coil and having embodying means comprising receiving pockets for permitting

free lateral expansion of said coils and for preventing longitudinal movement of the individual turns of said coil.

11. In an electric furnace, in combination, a helically wound coil of resistor wire, and a pair of refractory supporting members therefor operatively engaging the outer surface of a small edge portion only of said coil and having embodying means, compris-

ing pockets of different depth in the two members for permitting free lateral expansion of said coils while preventing longitudinal movement thereof.

In testimony whereof, I have hereunto subscribed my name this 13th day of August, 1923.

FRANK THORNTON, JR.