Sept. 29, 1925. 1,555,542

J. YOUNG

ELECTRIC FURNACE AND HEATING ELEMENT THEREFOR

Filed Jan. 7, 1924 2 Sheets-Sheet 1

Fig. 1.

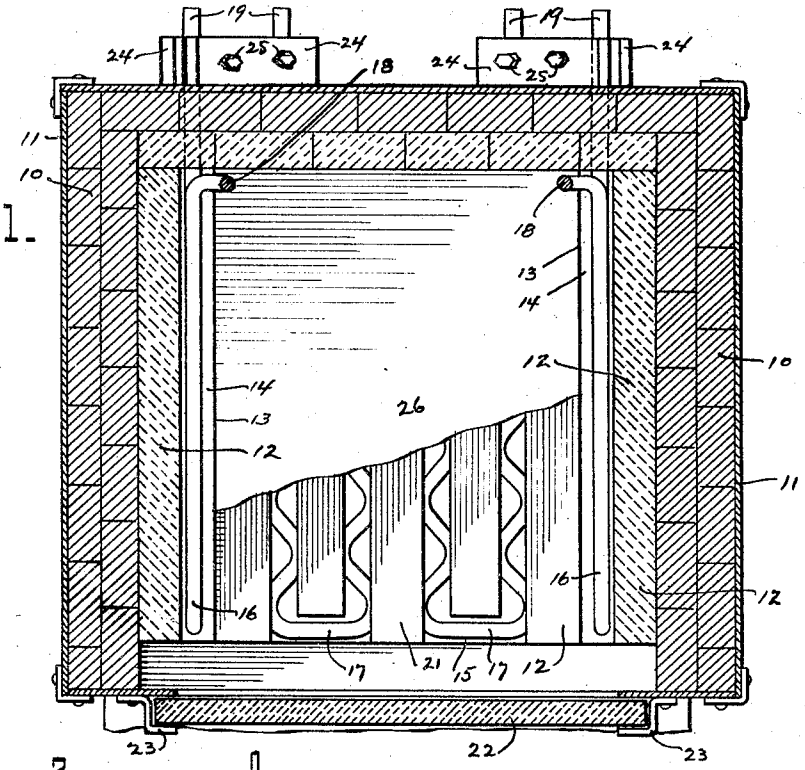


Fig. 2.

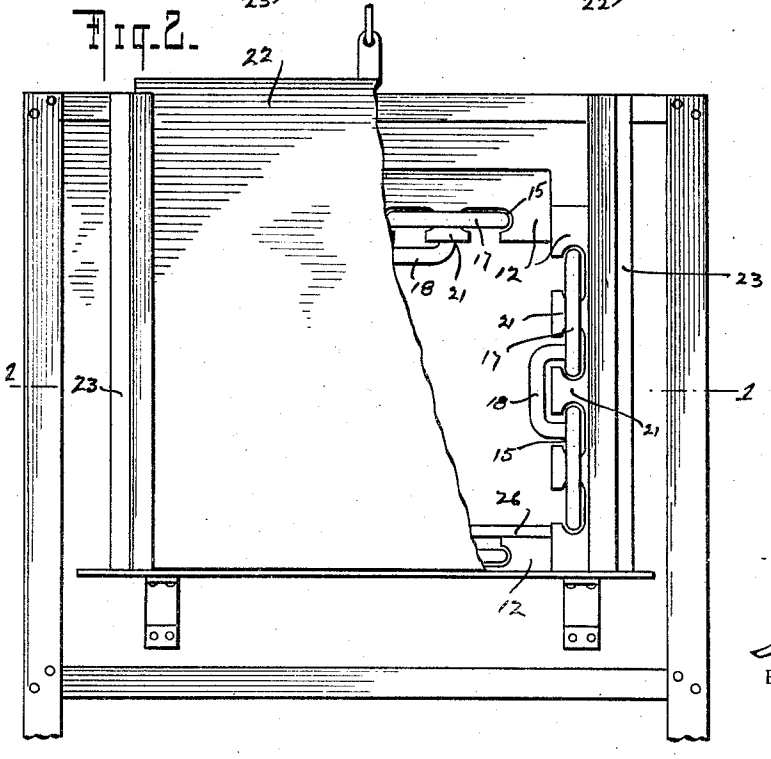
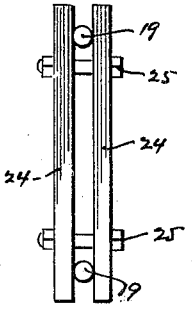


Fig. 3.



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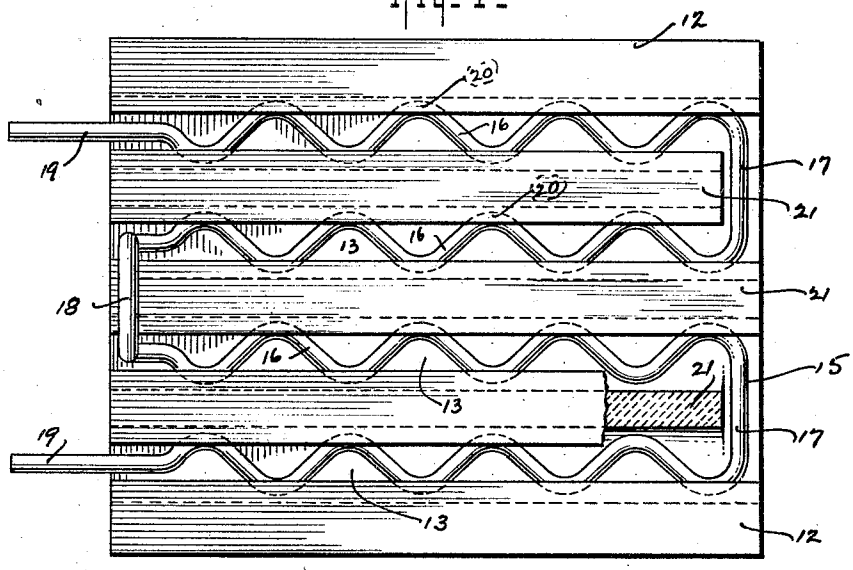
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ELECTRIC FURNACE AND HEATING ELEMENT THEREFOR

Filed Jan. 7, 1924 2 Sheets-Sheet 2

Fig. 4.



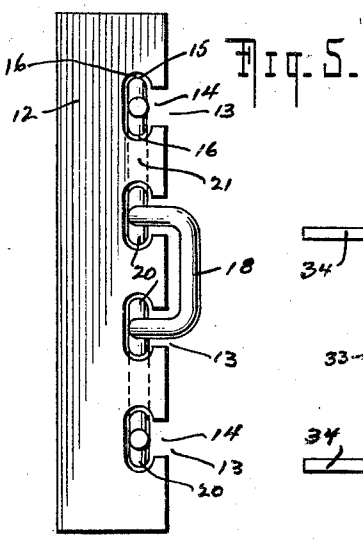
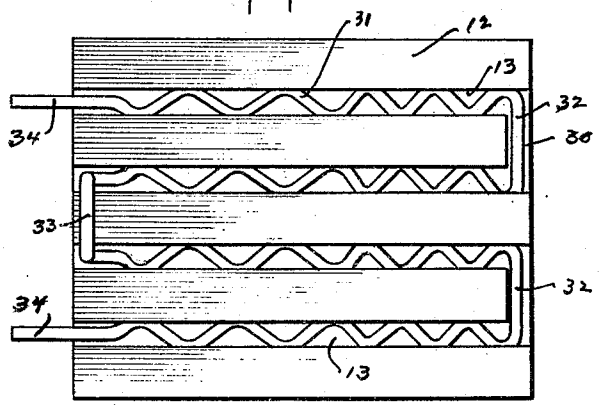


Fig. 5.

Fig. 6.



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Patented Sept. 29, 1925. 1,555,542

UNITED STATES PATENT OFFICE.

JOHN YOUNG, OF WELLAND, ONTARIO, CANADA.

ELECTRIC FURNACE AND HEATING ELEMENT THEREFOR.

Application filed January 7, 1924. Serial No. 684,742.

To all whom it may concern:

Be it known that I, JOHN YOUNG, a citizen of the Dominion of Canada, residing at Welland, in the county of Welland, Province of Ontario, Canada, have invented a certain new and useful Electric Furnace and Heating Element Therefor, of which the following is a full, clear, and exact description.

It is well known to those skilled in the art that in electric furnaces of this type, employing removable heating elements, when a defective heating element must be replaced, it is necessary to shut the furnace down and allow it to cool off, after which the defective element may be removed and replaced by a new one.

It has been the principal object of my invention to provide a furnace and heating element therefor, whereby a defective element may be quickly removed without having to disassemble the furnace or to allow it even to cool off.

Another object has been to provide a furnace provided with linings so formed as to effectively hold the heating elements, whereby they shall be exposed to the interior of the furnace, and from which the elements may be quickly and easily removed.

Another object has been to provide a heating element so formed that it may be easily assembled by a longitudinal movement.

Another object has been to provide a heating element so designed that it may be supported in such a manner that it will afford the maximum amount of radiation and prevent sagging.

Furthermore, my heating element is of such a design that it may be made to give off a greater amount of heat at the entrance of the furnace than at the rear thereof, thus compensating for door losses.

Moreover, my heating element may be provided with a large number of return bends, thus obviating any connections at the rear of the furnace and thus greatly increasing the efficiency of my furnace.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a plan view of my furnace taken on line 1—1 of Fig. 2.

Fig. 2 is a front elevation of my complete furnace, showing the door partly broken away.

Fig. 3 is an end elevation of one of the connectors used for the elements.

Fig. 4 is an enlarged face view of one of the lining slabs of the furnace, showing a heating element in position.

Fig. 5 is an end view of the lining slab and heating element, shown in Fig. 4.

Fig. 6 is a slightly reduced face view of a lining slab, showing a heating element designed to compensate for door losses.

My device comprises a body 10, preferably of heat resisting brick surrounded preferably with a metallic casing 11. The furnace is lined with the slabs 12 made of refractory and non-conductive material. These slabs are provided on both sides, as well as top and bottom of the furnace. The rear wall of the furnace is suitably protected by refractory material, while the bottom slab is preferably covered by a sheet of refractory material 26. Each of the slabs is provided on the surface which faces the interior of the furnace with a plurality of longitudinally arranged and interspaced T-shaped grooves 13. As shown in the drawings, each slab is provided with but four grooves, but obviously, in larger furnaces, the number of grooves may be increased to suit existing conditions. Each of the T-shaped grooves is provided with a mouth 14 and recessed portions 15.

Each of the heating units 15 has a number of strands and return bends, as shown in the drawings, depending upon the number of grooves in each of the slabs. In this particular case there are four strands 16, and three return bends 17 and 18. The ends 19 of the elements are extended outwardly so that they will project through the furnace rear wall where they may be connected by suitable connectors to be hereinafter described. Two of the strands extend from the ends 19 to the return bends 17, while the other two strands extend from the return bends 17 to the return bend 18. Each of the strands 16 of the heating element is corrugated as shown, or otherwise formed so as to have alternately arranged portions, the humps or peaks 20 of the portions lying in the recesses 15 of the T-shaped grooves, while the major portion of the strand is

exposed to the interior of the furnace through the mouth 14 of the T-shaped grooves. The return bends 17 preferably lie in the same plane as the corrugations of the element, so that they will be let in below the face of the lining, and, therefore, be out of the way at the entrance of the furnace. In order to provide for this, the ridges 21 between the T-shaped grooves are cut away as shown. Since the heating element is assembled by a longitudinal movement, the return bend 18 is brought up and over the top of the ridge 21, so as not to interfere therewith.

It will be evident from Figs. 1 and 2 that the T-shaped grooves 13 are exposed when the door 22 of the furnace is raised, so that the heating elements 15 may be removed from the grooves without having to disassemble the furnace. This door, as is customary in furnaces of this type, is preferably of refractory material and supported by guides 23.

As hereinbefore stated the ends 19 of each of the heating elements are sufficiently long to extend through the rear wall of the furnace and to project at the outer face thereof. Each of the elements is connected to an adjacent element by means of one of the connectors shown in Fig. 3. These connectors comprise two bars of suitable metal 24, which are held in place and clamped to the ends 19 of the elements by means of bolts 25. It is, of course, obvious that two ends of adjacent elements are not so connected together but are suitably connected to the source of heating current.

In Fig. 6, I have shown a resistance element 30 having the corrugations of the strands 31 near the entrance side of the furnace decreased in pitch, whereby a greater number of corrugations is provided and compensation for door losses is assured. This element is, of course, provided with return bends 32, and 33, and with ends 34 in a manner similar to the element hereinbefore described.

It will be evident from the foregoing that when either of the heating elements becomes defective, it is only necessary to disconnect the connectors at the rear of the furnace of the particular element, which may then be easily withdrawn through the mouth of the furnace by simply opening the door. This may be done without waiting for the furnace of the defective element to cool down, thus obviating the loss of time attending the removal or replacement of a heating element in furnaces of this type.

Some modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiment herein contained, the form shown and described being merely a preferred form thereof.

Having thus described my invention, what I claim is:

1. An electric furnace comprising a refractory body having linings made of refractory, non-conductive material extending substantially the full length of the furnace and formed with continuous T-shaped grooves, resistance elements slidably mounted within the grooves of the linings and supported therein throughout their lengths, each resistance element being formed of a single piece of material and having interspaced strands each of which is formed with bent portions lying alternately above and below the axis of the strand for engagement with the recesses of the T-shaped grooves.

2. An electric furnace comprising a refractory body having linings made of refractory, non-conductive material extending substantially the full length of the furnace and formed with continuous T-shaped grooves, resistance elements slidably mounted within the grooves of the linings and supported therein throughout their lengths, each resistance unit being formed of a single piece of material and having interspaced strands each of which is formed with alternately arranged portions lying above and below the axis of the strand for engagement with the recesses of the T-shaped grooves.

3. An electric furnace comprising a refractory body having linings made of refractory, non-conductive material extending substantially the full length of the furnace and formed with continuous T-shaped grooves, resistance elements slidably mounted within the grooves of the linings and supported therein throughout their lengths, each resistance element being formed of a single piece of material and having interspaced strands of corrugated form engaging the recesses of the T-shaped grooves, whereby the elements are supported.

4. An electric furnace comprising a refractory body having linings made of refractory, non-conductive material extending substantially the full length of the furnace and formed with continuous T-shaped grooves, resistance elements slidably mounted within the grooves of the linings and supported therein throughout their lengths, each resistance element being formed of a single piece of material and having interspaced strands of corrugated form engaging the recesses of the T-shaped grooves, and means so formed as to provide easy removal of each resistance element.

In testimony whereof, I have hereunto signed my name.

JOHN YOUNG.