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2,763,704

ELECTRIC FURNACE

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FIG. 1

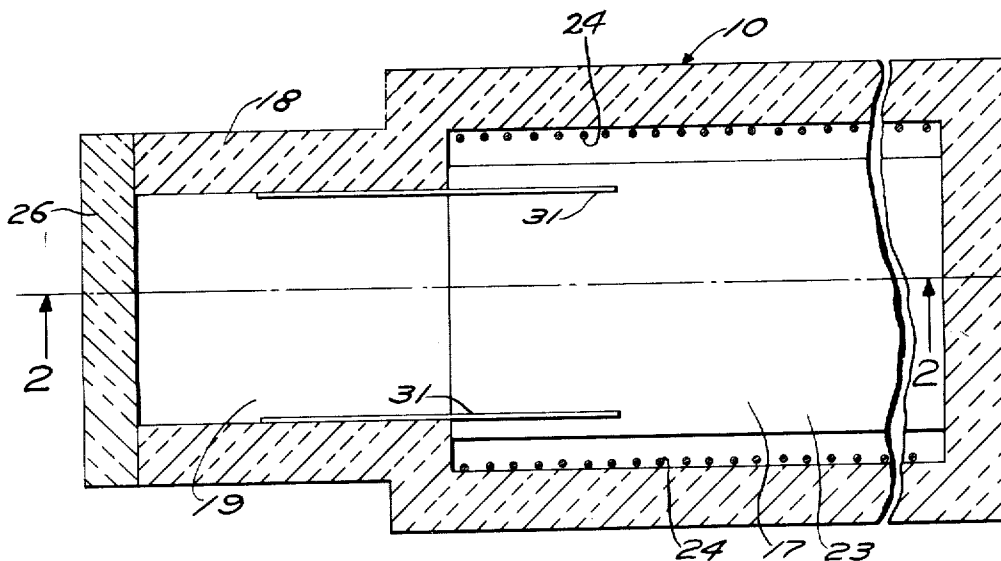
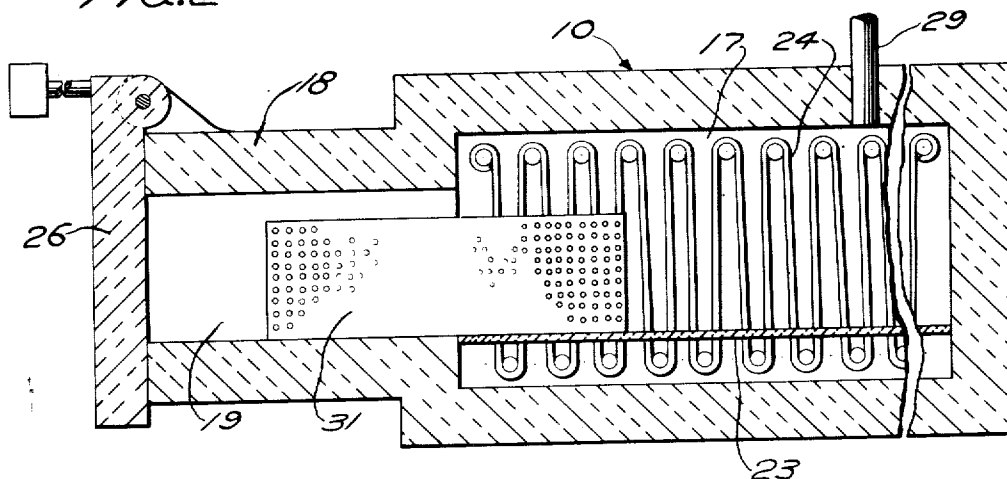


FIG. 2



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ELECTRIC FURNACE

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6 Claims. (Cl. 13—20)

This invention relates to electric furnaces and more particularly to means for protecting the heating elements of an electric furnace.

An object of the invention is to provide an electric furnace having means for protecting the heating elements from oxidation.

Another object of the invention is to provide an electric furnace having readily replaceable metal shields for intercepting air infiltrating into the furnace and for combining with the oxygen therein to prevent the oxygen from reaching and oxidizing the heating elements.

A furnace illustrating certain features of the invention may include a furnace body or housing forming a heating chamber having heating elements along the side walls thereof and a hearth for supporting parts which are to be heated in a non-oxidizing atmosphere obtained by flowing a suitable gas into the heating chamber through a pipe communicating therewith. A throat at one end of the furnace forms a restricted passageway into the heating chamber, which passageway is closed by a movable door, and a pair of perforated metal plates are secured to the side walls of the throat and extend a predetermined distance into the heating chamber in parallel and spaced relation to end portions of the heating elements to intercept air which may infiltrate through the throat and to combine with the oxygen in the infiltrating air to prevent the oxygen from impinging on and oxidizing the heating elements.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment thereof, in which:

Fig. 1 is a plan sectional view of an electrical furnace showing the protecting structure of one embodiment of the invention in position therein; and

Fig. 2 is a vertical longitudinal sectional view of this furnace and protecting structure taken along line 2—2 of Fig. 1.

The invention is shown herein as applied to a single charge type of electrical furnace 10 comprising flat bottom, top, and side walls, and front and rear end walls of suitable heat insulating material forming a heating chamber 17 of rectangular cross section. Extending from the front end wall of the furnace is a throat 18 having flat bottom, top, and side walls forming a passageway 19 into the heating chamber through which articles to be heated may be inserted into the chamber and removed therefrom. A hearth 23 is suitably supported in the chamber 17 flush with the bottom wall of the throat 18. Electrical heating elements 24 are supported on the side walls of the furnace for heating the chamber 17. As shown herein the heating elements are made from a rod or wire of molybdenum or other suitable material and are arranged up and down in pleated or accordion fashion throughout the length of the side walls of the chamber. A pivoted counterweighted door 26 is provided for closing the throat 18 and the chamber 17, and is movable from an open position to permit the

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parts to be moved into the heating chamber to a closed position to retain the heat in the chamber. The articles are heated in the furnace in a hydrogen or non-oxidizing atmosphere obtained by flowing the desired gas into the chamber through a pipe 29 from a suitable supply of the gas. Some of the gas will leak out from the heating chamber through the cracks around the door 26 and the throat 18. Ordinarily, during the operation of the furnace when the door 28 is open to insert articles into the heating chamber or to remove them therefrom, air infiltrates through the throat of the furnace into one end of the chamber and contacts the heating elements, whereby the oxygen in the air combines with the hot heating elements, causing them to oxidize and thereby shorten their life and reduce their usefulness. To prevent infiltrating air from oxidizing the heating elements, means are provided to intercept the air and combine with the oxygen therein. A pair of plates 31 of molybdenum or other suitable material which will combine with oxygen are removably secured, as by cementing, to the side walls of the throat and with the lower edges of the plates in engagement with the lower wall of the throat 18 and with the hearth 23. The end portions of the plates 31 extend a predetermined distance into the heating chamber 17 in spaced and parallel relation to the end portions of the heating elements 24 and form shields for intercepting the infiltrating air. The plates 31 are perforated to permit free circulation of the heat and atmosphere within the chamber and to provide a greater surface area of metal for the oxygen in the infiltrating air to combine with. The end portions of the plates projecting into the heating chamber are heated to the operating temperature of the furnace which may rise to about 2350° F., and the oxygen in any air which infiltrates the furnace moves along the throat and will engage and combine with the metal plates 31 before it can reach and combine with the heating elements 24. When the plates 31 have become oxidized, they are readily removed and replaced with new unoxidized plates resulting in a great savings in time and money as compared with that necessary to replace the heating elements 24. It will be understood that heating elements 24 and the protective plates 31 may be made of various suitable materials, and that the plates 31 need not be made of the same material as that of the heating elements but should have the same, or preferably a greater, capacity of combining with the infiltrated oxygen as that of the heating elements. Also, the invention may be applied to electric furnaces of types differing from that disclosed herein, as for example, a tunnel-type of electric furnace having an entrance through one end thereof and an exit through the other end thereof. In such a furnace the perforated protective plates 31 would be provided at each end to intercept and combine with the oxygen infiltrating into the furnace.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In an electric furnace having a heating chamber and a restricted passageway communicating therewith through which articles to be heated may be inserted or removed, the combination therewith of electric heating elements in said heating chamber, and means extending from said passageway into said heating chamber for intercepting and reacting with oxygen infiltrating through said passageway to protect the heating elements from said oxygen.

2. In an electric furnace having a heating chamber and a restricted passageway communicating therewith through

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which articles to be heated may be inserted or removed, the combination therewith of electric heating elements in said heating chamber, and members of oxidizable material lining a portion of said passageway and extending into said heating chamber for intercepting and reacting with oxygen infiltrating through said passageway to protect the heating elements from said oxygen.

3. In an electric furnace having a heating chamber and a restricted passageway communicating therewith through which articles to be heated may be inserted or removed, the combination therewith of electric heating elements in said heating chamber, and metal plates lining a portion of said passageway and extending partially into said heating chamber in front of said heating elements for intercepting and reacting with oxygen infiltrating through said passageway to protect the heating elements from said oxygen by absorbing it.

4. In an electric furnace having a heating chamber and a restricted passageway communicating therewith through which parts to be heated may be inserted or removed, the combination therewith of electric heating elements in said heating chamber along the sides thereof, and perforated metal plates lining a portion of opposite sides of said passageway and extending a predetermined distance into said heating chamber in spaced and overlapping relation to end portions of said heating elements for intercepting and reacting with oxygen infiltrating through said passageway to protect the heating elements from said oxygen.

5. The combination of an electric furnace having a heating chamber and a restricted passageway communicating with said heating chamber through which articles

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to be heated may be inserted or removed, said passageway having a bottom and side walls, electrical heating elements in said heating chamber, a hearth having an upper surface substantially flush with the bottom of said passageway, and plates of oxidizable material disposed along the side walls of said passageway and extending a predetermined distance into said heating chamber for intercepting and reacting with oxygen infiltrating through said passageway to protect the heating elements from said oxygen, said plates of oxidizable material having lower edges engaging the bottom of said passageway and the upper surface of said hearth.

6. The combination of an electric furnace having a heating chamber with said walls and a restricted passageway communicating with said heating chamber through which articles to be heated may be inserted or removed, said passageway having a bottom and side walls, molybdenum electrical heating elements in said heating chamber disposed along the side walls thereof, a hearth having an upper surface substantially flush with the bottom of said passageway, and perforated molybdenum plates of oxidizable material secured to the side walls of said passageway and extending a predetermined distance into said heating chamber in laterally spaced relation to the end portions of said heating elements for intercepting and reacting with oxygen infiltrating through said passageway to protect the heating elements from said oxygen, said perforated plates having lower edges engaging the bottom of said passageway and the upper surface of said hearth.

No references cited.