Sept. 15, 1959 G. SCHJELDERUP ET AL 2,904,609

ELECTRODE INSTALLATION FOR ELECTRIC FURNACES

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FIG. 1.

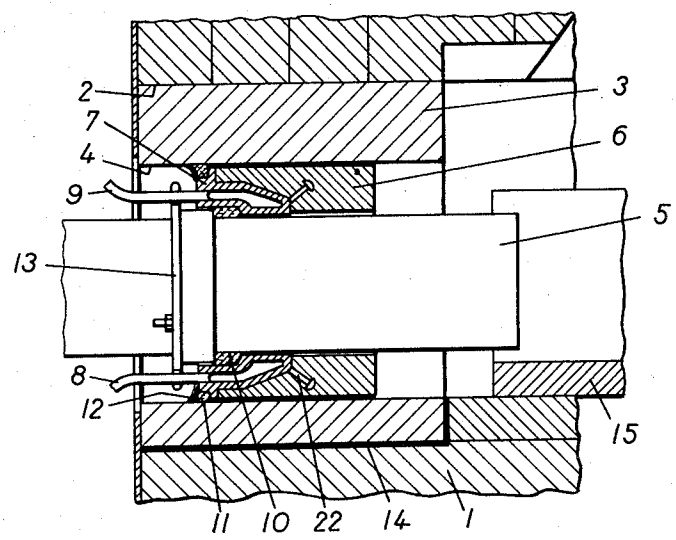
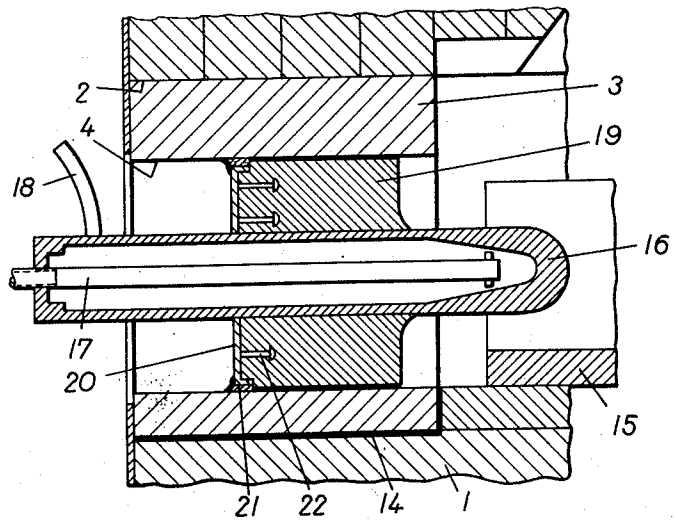


FIG. 2.



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FIG. 3.

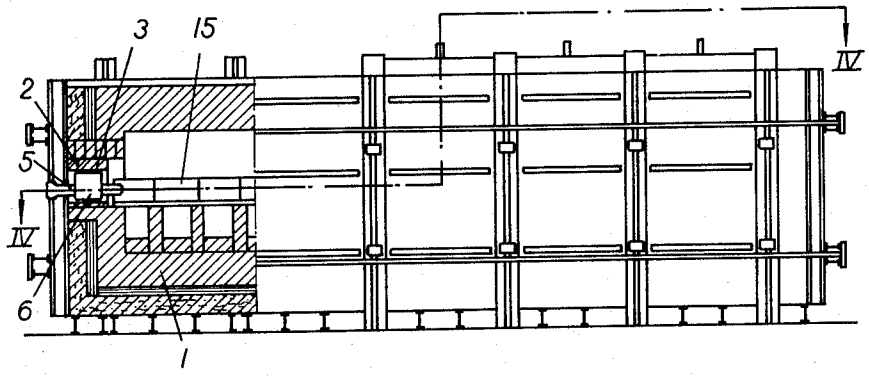
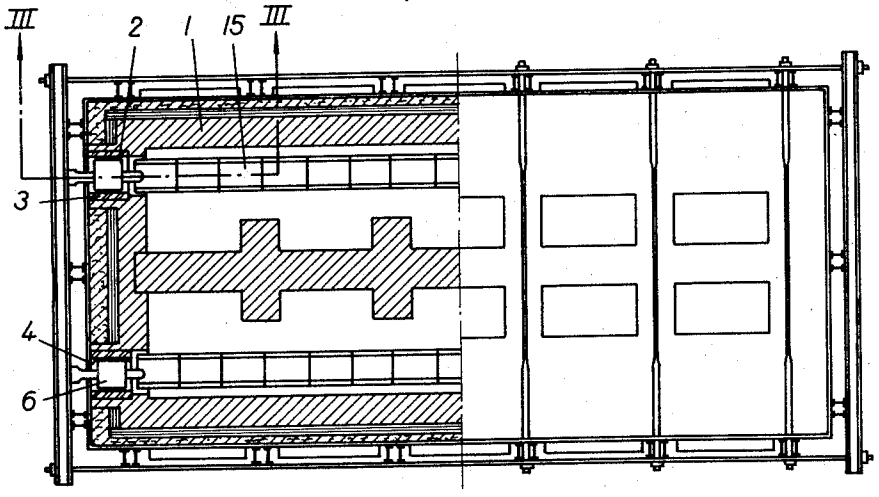


FIG. 4.



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ELECTRODE INSTALLATION FOR ELECTRIC FURNACES

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Claims priority, application Norway January 8, 1953

6 Claims. (Cl. 13—17)

The present invention relates to such electrical furnaces where the electrodes are inserted through the furnace wall or shell. More specifically the invention relates to such furnaces for which it is of much importance to prevent the entrance of air into the furnace. It is particularly difficult to prevent air from entering at such places where the electrodes are led through the wall or shell.

A main purpose of the invention is to provide for an air tight sealing around the electrode insertion. Another purpose is to provide an arrangement which permits easy adjustment and replacement of the electrodes.

Still another purpose is to prolong the life of the electrode.

The present invention is herein described as being used in connection with a furnace through which runs a trough of refractory material, said trough being filled with electrical resistor material, for instance coke. At each end of the furnace, electrodes are inserted through the wall, and the ends of the electrodes that are inside the furnace, provide the contact with said resistor material.

Should air seep into such a furnace, along the electrode, a rapid combustion of the electrode will result.

It is easily recognized that the present invention can also be used in other types of furnaces, where it is of importance to prevent entrance of air.

According to a main feature of the invention each electrode extends through a block of refractory material mounted in an opening in one of the furnace walls. Preferably the height and width of said opening are considerably greater than those of the electrode, the block may preferably consist of a ramming or of a casting mix.

According to a further feature of the invention an air-tight body is provided on the outer side of said block. The said body covers substantially the whole area between the electrode and the walls of the opening.

According to one embodiment of the invention the said body consists of a water cooled stuffing box which preferably is moulded into the said block. Between the circumference of the body and the surrounding walls of the opening is preferably placed a gasket. A second gasket may be placed between the electrode and the inner circumference of the said body.

According to a further embodiment of the invention the electrode is a metallic, water cooled, hollow electrode, for instance of iron or steel. In this case the said body, which may be in the shape of an iron plate, is preferably welded on to the electrode.

A further feature of the invention is that in the furnace wall is placed a refractory frame through which is made the opening for the block surrounding the electrode. By this method an absolute air-tightness is easily attainable around the electrode and the block.

Other features of the invention will appear from the following description in reference to the diagrammatical drawing in which—

Fig. 1 shows a diagrammatical, longitudinal section through an electrode mounted according to one embodiment of the invention, and

Fig. 2 shows a corresponding section of another embodiment of the invention.

Fig. 3 is a diagrammatic side view on a reduced scale of a furnace according to the invention, partly in section according to the line III—III in Fig. 4, and

Fig. 4 is a corresponding top view, partly in section along the line IV—IV in Fig. 3.

In Fig. 1 the furnace wall is designated as **1**, and **2** is an opening in said wall. **3** is a refractory frame built into the opening **2**. Said refractory frame **3** has an opening **4** with considerably greater height and width than those of the electrode **5**. **6** is a block of refractory material which block may be made by casting of an air-setting casting mix. The block **6** fits into the opening for and surrounds the electrode **5** with a little clearance. **7** is a water cooled stuffing box with water inlet **8** and outlet **9**, the said stuffing box being cast into the refractory casting mix **6**. **10** and **11** are asbestos gaskets which serve the sealing between the stuffing box and the electrode, and between the stuffing box and the surrounding refractory frame **3**. In order to obtain a still better sealing, the asbestos gasket **11** has been coated with glaze-containing mortar **12**. **13** is a gland. The frame **3** has conveniently been placed in a cast **14** made of best quality air-setting refractory mortar or casting mix with a high content of glaze. **15** is a trough of refractory material and made to contain electrical resistor material, for instance coke, with which the electrode **5** makes contact.

The cooling water keeps the gasket **10** cold and intact and cools the electrode surface as well. The block **6** serves as a guide for the electrode, and protects the stuffing box against dust or grains of resistor coke. The effective sealing around the electrode is primarily achieved by means of the stuffing box and the asbestos gaskets.

1, **2**, **3**, **4**, **14** and **15** in Fig. 2 denote the corresponding parts which have been described in Fig. 1. **16** is a hollow electrode made of cast iron or steel. **17** is a pipe inlet for cooling water into the electrode, and **18** is correspondingly, an outlet pipe. **19** is a block made of air-setting refractory casting mix, moulded on to and around the electrode. An iron plate **20** is placed against the outer surface of the casting mix **19**, and said plate is welded on to the electrode, and it is sealed by means of an asbestos packing **21**, to fit air-tight into the opening **4** of the refractory frame **3**. **22** are anchors.

In both arrangements described above, it has been proposed to use a one-piece refractory frame **3**, specially shaped, to form the electrode port. Although the use of such frame is preferable in order to obtain best possible sealing, it should not be considered as being an absolute necessity.

Figures 3 and 4 illustrate a complete furnace in which the invention is used. In these figures and in the Figures 1 and 2 same reference numerals designate corresponding parts, and a further description of Figures 3 and 4 will not be required, as the construction of the furnace walls and reinforcements is no part of the invention.

We claim.

1. An electric furnace having walls of refractory material and having an opening therein, said opening being of uniform cross-section along at least a part of its length, and an electrode unit adapted to fit within said opening comprising a block of refractory material adjustably positioned in the longitudinal direction of said opening and adapted to fill substantially the whole cross section of said opening with the outer end face of said block situated within the outer end of said opening, an electrode centrally positioned in said block of material in air tight relationship therewith, and an air impervious member over one end face of said block in air tight relationship

with said electrode, said block being fitted in said opening with said air impervious member in air tight relationship with the interior surface of said opening.

2. An electric furnace as claimed in claim 1 in which said air impervious member comprises a water cooled packing box cast in said block of material.

3. An electric furnace as claimed in claim 1 in which said electrode is a hollow water cooled electrode.

4. An electric furnace as claimed in claim 1 in which said air impervious member comprises an iron sheet welded in air tight relationship to said electrode.

5. An electric furnace having walls of refractory material and having an opening therein, said opening being of uniform cross-section along at least a part of its length, an electrode unit adapted to fit within said opening comprising a block of refractory material adjustably positioned in the longitudinal direction of said opening and adapted to fill substantially the whole cross section of said opening with the outer end face of said block situated within the outer end of said opening, an electrode centrally positioned in said block of material in air tight

relationship therewith, and an air impervious member over one end face of said block in air tight relationship with said electrode, and a soft refractory gasket between said air impervious member and the interior surface of said opening.

6. An electric furnace as claimed in claim 5 in which said gasket is coated with a glaze containing mortar between said block and the interior surface of said opening.

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