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GAS TIGHT ELECTRODE SEAL

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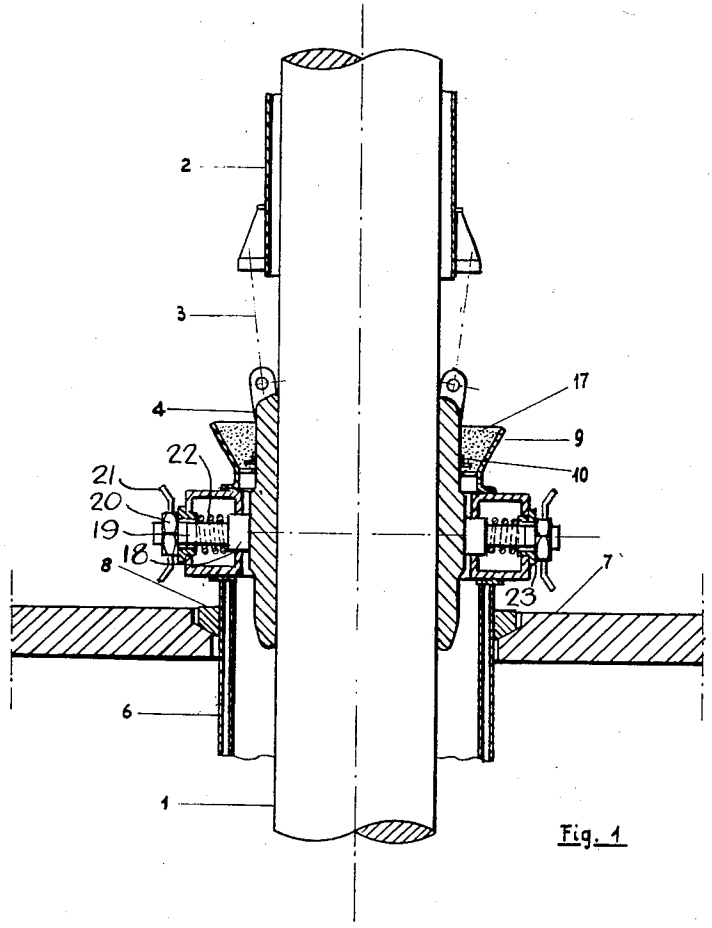


Fig. 1

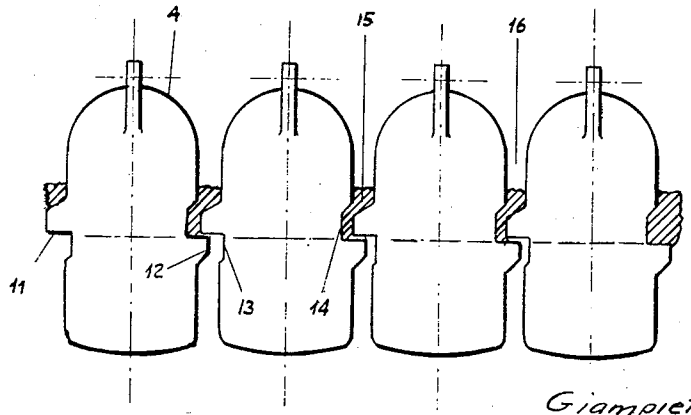


Fig. 2

Giampietro Conti
Inv.
by Scrivener & Parker
Atty's.

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GASTIGHT ELECTRODE SEAL

Giampietro Conti, Milan, Italy, assignor to Siemens Societa per Azioni, Milan, Italy, a corporation of Italy

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5 Claims. (Cl. 13—16)

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The present invention relates to a gas-tight sealing device for the electrodes of electric furnaces of the closed type.

Tightness round the electrodes in an electric reduction furnace of the closed type has been heretofore attained with various arrangements, none of which, however has proved to be quite satisfactory. In fact, the solutions adopted so far allowed for only partial sealing causing the known inconveniences of gas ignition and of excessive heating up of the vault and structure carrying the electrodes.

To obviate these drawbacks, it has already been proposed to apply special seals against metallic members suitably shaped, generally as cylinders, which may be constituted by the current-carrying clamps themselves and are fitted on the electrode instead of against the electrode itself, which offers an irregular surface and, therefore, little suitable for good tightness. However, there remained the unsolved problem of providing tightness between the said metallic members and the electrode. This problem has never been solved in a satisfactory manner, even if the metallic members were relatively firm with respect to the electrode during the movement of adjustment in the furnace.

Another solution proposed for a seal consist in a hydraulic closure, which in itself warrants perfects gas-tightness, but which leaves unsolved the problem of how to attain tightness between the hydraulic closure and the electrode.

There have been already proposed also closures of the semi-fixed type, that is to say, closures remaining firm during the operation of adjusting the furnace, but being movable while extending the electrode; these however proved to be little satisfactory.

It is an object of the present invention to provide a gas tight sealing device for the electrodes of an electric reduction furnace of the closed type, eliminating the inconveniences mentioned of the known devices.

The sealing device according to the invention essentially comprises a cup shaped member surrounding the current-carry clamps and being practically arranged close to them, and a finely subdivided material, preferably sand, contained in the cup shaped member.

According to one feature of the invention, the members constituting the current carrying clamps are shaped in such a manner as to form in interstices existing between them, labyrinths apt to withhold the finely subdivided material contained in the cup from escaping thereof, so

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that with the sealing arrangement according to the invention there is automatically obtained also a seal between the individual current carrying clamps, for which, therefore, no separate seals are required.

The invention is illustrated by one preferred embodiment hereinafter described with reference to the accompanying drawing, where Figure 1 is a vertical section along the axis of the electrode, representing a sealing arrangement according to the invention, and Figure 2 represents the development in a plane of some members constituting the current carrying clamps, between which tightness is provided according to the invention.

In Figure 1, reference numeral 1 designates the cylindrical electrode surrounded by the cylinder carrying the suspension 2, to which the current carrying clamps 4 are connected by means of suspending members 3. The said clamps are kept applied against the electrode 1 in a manner known in itself by means of pressing members 18 contained in the ring 5 surrounding the current carrying clamps and supporting the cylinder 6. Between the latter and the vault 7 of the furnace there is provided a suitable gas tight packing 8, which may be of a conventional kind. A ring-shaped member 9 is secured onto the ring 5, preferably by welding. The member 9 has a bottom wall and a side wall, and on each current carrying clamp there is fixed an angle member 10 having one wall practically parallel to the bottom wall of member 9 and cooperating with said member 9 so as to form a cup surrounding the clamps. The clamps present lateral projections 11, 12 (see Figure 2) and recesses 13, 14, which fit in one another so as to form a labyrinth 15 in register with the interstices 16 existing between the members 4. The cup 9, 10 is filled with sand 17, which penetrates into the interstices 16 and fills the labyrinths 15, thus constituting a packing between each couple of contiguous current carrying clamps. The material 17 constituting the packing may even be fibre-glass, slagwool, asbestos, shavings or other stuff mixed in any manner, reduced to a finely subdivided condition. The members 9 and 10 may be suitably cooled and magnetically insulated or made of diamagnetic material.

As shown, each pressing member 18 includes a threaded stem 19 which projects outwardly from the ring 5 for receiving an adjustable nut 20 provided with extensions 21. A spring 22 is interposed between a sleeve 23 and the member

18 for resiliently urging the latter into engagement with its associated clamping member 4.

The arrangement hereinbefore described warrants perfect tightness between the electrode and the cylinder 6 and moreover allows for moving the current carrying clamps in a vertical and in a horizontal direction as necessary for truing the furnace. It also allows for relative motion of the electrode, suspension members and vault-closure with respect to one another.

The sealing device according to the invention is very easy in maintenance and can be quickly dismantled and reassembled at any time. Moreover, it is very economical.

Although only one form of embodiment of the present invention is hereinbefore described, it is obvious that there may be many variants and modifications thereof without departing from the scope of the invention.

I claim:

1. In an electric reduction furnace of the closed type, one or more electrodes, a plurality of current-carrying clamps surrounding each of said electrodes in spaced relation to each other throughout the lengths thereof, a cup-shaped member having a substantial bottom portion surrounding said current-carrying clamps close thereto, each of said clamps being provided with side-projections fitting into recesses in contiguous clamps and establishing a continuous labyrinth in the interstices between each couple of contiguous current-carrying clamps, and a finely subdivided refractory material contained in said cup-shaped member and forming a gas-tight seal between said bottom portion and said current-carrying clamps and in said labyrinths.

2. In an electric reduction furnace of the closed type, one or more electrodes, a plurality of current-carrying clamps surrounding each of said electrodes in spaced relation to each other throughout the lengths thereof, a substantially annular member including a plurality of pressing members for said current-carrying clamps, each of said clamps being provided with side-projections fitting into recesses in contiguous clamps and establishing a continuous labyrinth in the interstices between each couple of contiguous current-carrying clamps, a cup-shaped member comprising a first ring-shaped member carried by said annular member and a second ring-shaped member carried by said current-carrying clamps, and a finely subdivided refractory material contained in said cup-shaped member and forming a gas-tight seal for said electrodes between said first and second ring-shaped member and in the labyrinths between each couple of contiguous current-carrying clamps.

3. In an electric reduction furnace of the closed type, one or more electrodes, a plurality of current-carrying clamps surrounding each of said electrodes in spaced relation to each other, a substantially annular member including a plurality of pressing members for said current-carrying clamps, a cup-shaped member comprising a plurality of sections each carried by one of said current-carrying clamps and a ring-shaped member carried by said annular member, and a finely subdivided refractory material contained in said cup-shaped member and forming a gas-tight seal for said electrodes between said plurality of sections and said ring-shaped member and in the interstices between each couple of contiguous current-carrying clamps.

4. In an electric reduction furnace of the closed type, one or more electrodes, a plurality of current-carrying clamps surrounding each of said electrodes in spaced relation to each other, a substantially annular member including a plurality of pressing members for said current-carrying clamps, a cup-shaped member comprising a first ring-shaped member carried by said annular member and a second ring-shaped member carried by said current-carrying clamps, said first ring-shaped member having a bottom-wall and a side-wall and said second ring-shaped member having a wall substantially parallel to said bottom wall of said first ring-shaped member and close thereto, and a finely subdivided refractory material contained in said cup-shaped member and forming a gas-tight seal for said electrodes between said bottom-wall of said first ring-shaped member and said substantially parallel wall of said second ring-shaped member and in the interstices between each couple of contiguous current-carrying clamps.

5. In an electric reduction furnace of the closed type, one or more electrodes, a plurality of current-carrying clamps surrounding each of said electrodes in spaced relation to each other, a substantially annular member including a plurality of pressing members for said current-carrying clamps, a cup-shaped member comprising a first ring-shaped member carried by said annular member and a second ring-shaped member carried by said current-carrying clamps, each of said clamps being provided with side-projections fitting into recesses in contiguous clamps and establishing a labyrinth in the interstices between each couple of contiguous current-carrying clamps, and a finely subdivided refractory material contained in said cup-shaped member and forming a seal between said first and said second ring-shaped member and in said labyrinth.

GIAMPIETRO CONTI.

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