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ELECTRODE HOLDER WITH FLUID CONTROL

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Fig. 1

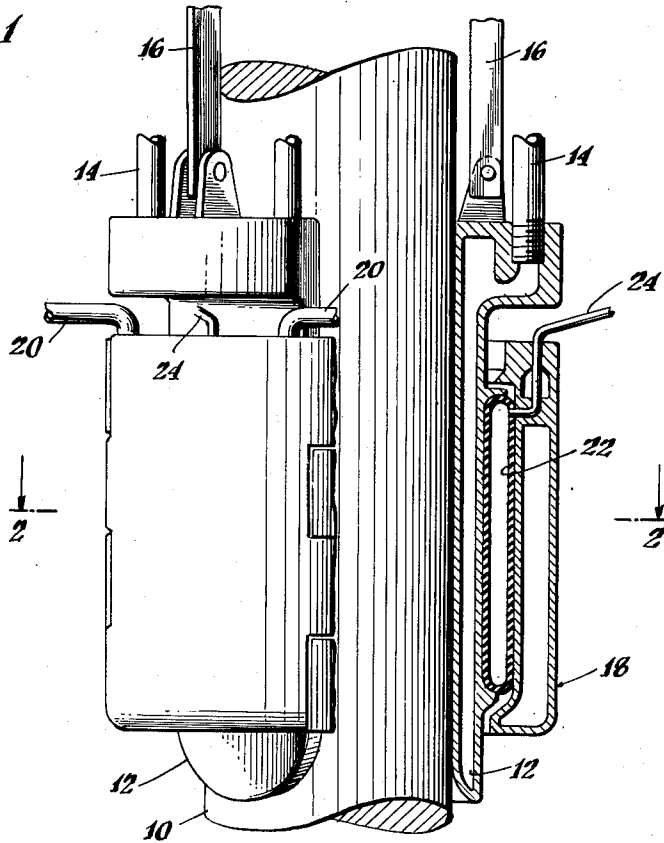
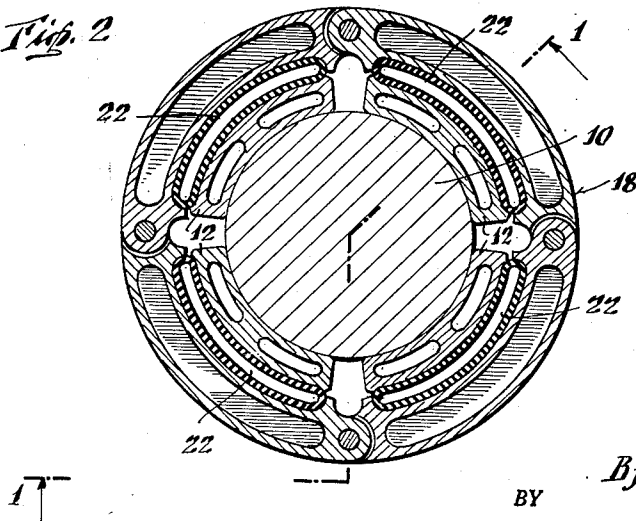


Fig. 2



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ELECTRODE HOLDER WITH FLUID CONTROL

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5 Claims. (Cl. 13—16)

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This invention relates to electrode holders for electrodes of the type used in electric smelting furnaces. Ordinarily these electrodes are fed continuously into the furnace by lowering the electrode holder, but periodically a point is reached where the holder must be raised and the electrode is fed or allowed to slip downwardly through the holder. In the usual type of construction this is carried out by having contact clamps around the electrode which are water-cooled and through which the electric current is transmitted to the electrode. These clamps are held in place by a pressure ring which surrounds them that is provided with screws which force the clamps against the electrode. In order to feed the electrode downwardly through the holder, the pressure against the clamps must be released in some fashion (as by loosening the pressure screws) but braking mechanism should be supplied so that the electrode will not move too rapidly. This also tends to lead to uneven pressure on the electrode and the working conditions are bad owing to the furnace heat.

By the present invention I make a particularly efficient type of holder. I do this by supplying water-cooled contact clamps which are surrounded by a ring of fixed diameter and between this outside ring and the pressure clamps I supply one or more expansible pressure bags. By maintaining fluid pressure within the bags the clamps can be caused to grip the electrode tightly or their grip can be relaxed sufficiently so that the electrode may slide slowly through them. Water is the best medium for developing the pressure within the bags but other fluid such as air may be used.

Ordinarily a number of clamps are employed which, as stated, are water-cooled. The external ring also should be water-cooled and this permits me to make the pressure bags of rubber (either natural or synthetic) or other similar material; or if desired the pressure bags may be made of any appropriate metal, provided expansion between the walls is permitted. It is within the spirit of my invention that a single pressure bag may be employed for a number of clamps but preferably a separate bag is employed for each clamp.

This construction may be employed with electrodes of almost any cross-sectional shape; and my construction, by having no external screws or projections and by permitting the pressure ring to be made with smooth side walls and a substantially uniform external cross section, lends itself to use with closed furnaces in which the electrode

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holder passes at least in part through a close-fitting furnace roof.

This invention may be readily understood by reference to the accompanying drawing in which Fig. 1 shows on the left-hand side a side view of the device and on the right-hand side shows a section on line 1—1 of Fig. 2; Fig. 2 is a section on line 2—2 of Fig. 1.

In these drawings 10 is the electrode which is here shown of circular cross section; numeral 12 represents the contact clamps, four of which are indicated in Fig. 2. The clamps 12 are hollow to allow space for water cooling and water is conducted to them by the pipes 14 which are made of copper and also serve to transmit the electric current to the electrodes. Each clamp 12 has attached to it a bar 16 for suspension of the electrode.

The outside ring 18 is here shown as made of four sections which are hinged together. Each of these sections is hollow and is supplied with cooling water by the pipes 20. Between the ring members 18 and the clamps 12 are positioned the pressure bags 22 and these are supplied with fluid under pressure by the pipes 24.

An important advantage of this construction is the fact that the area of pressure on the pressure clamps is so large that good electrical contact and a safe pressure for suspension can be had without employing high pressures in the pressure bags. For example, a water pressure of from 5 to 6 kilograms per square centimeter ordinarily will be sufficient. Such a pressure usually can be supplied from the water main and it is unnecessary to use a compressor or high pressure pump. Also due to the large area of pressure, the degree of pressure may be regulated very precisely so that it can be released gradually to permit the electrode to slip slowly through the holder without moving too rapidly. This of course is done only periodically after the electrode has been consumed sufficiently so that it can no longer be lowered by lowering the suspension bars 16. In such case the entire holder is raised and the electrode allowed to slide down into its new operative position and then clamped in place. The fact that this device can be operated at a distance from the furnace is an added advantage of importance.

It is understood that the example shown is given only by way of illustration and is not intended in any way to limit my invention.

What I claim is:

1. In a holder for electrodes of the type described, the combination of a plurality of hollow

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water-cooled clamps adapted to contact the sides of an electrode with relatively small spaces between them so that they will form an approximate band around the electrode, means connected with such clamps for transmitting electric current to them and for supporting the electrode in a vertical position, a second band of hollow water-cooled interconnected members surrounding said clamps and flexible pressure mechanism comprising a series of thin, flexible pressure bags adapted to conform to the shape of the electrode positioned between said clamps and said outer band so that they are protected from the heat of the furnace by said outer band and means for transmitting fluid pressure to said pressure bags whereby substantially the entire area of the clamps around the electrode will be pressed towards the electrode by pressure substantially perpendicular to the face of the electrode.

2. A structure as specified in claim 1 in which the means for transmitting fluid pressure to the flexible mechanism is a water pipe.

3. A structure as specified in claim 1 in which the flexible pressure mechanism comprises a pressure bag for each clamp.

4. A structure as specified in claim 1 in which

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the flexible pressure mechanism comprises a plurality of rubber bags.

5. A structure as specified in claim 1 in which the said water-cooled clamps form an approximate band around the electrode which has substantially smooth side walls and a uniform external cross section forming a substantially cylinder so that the holder may be lowered down through a close-fitting furnace roof.

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