July 6, 1937. J. YOUNG 2,086,148

ELECTRODE HOLDER OR CLAMP

Filed Oct. 22, 1935

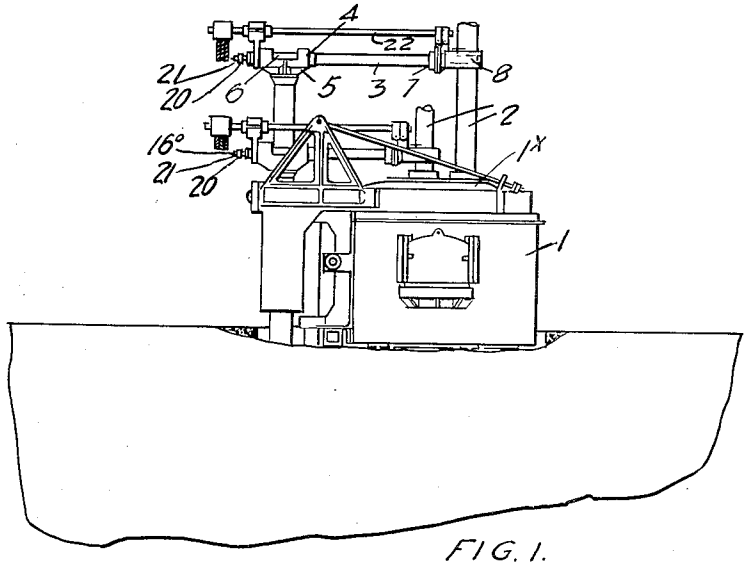

FIG. 1.

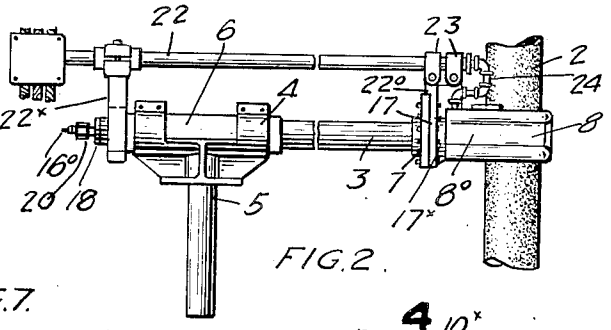

FIG. 2.

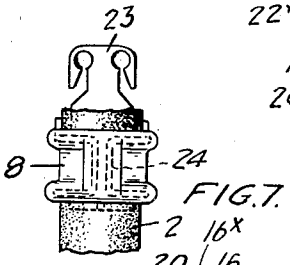

FIG. 7.

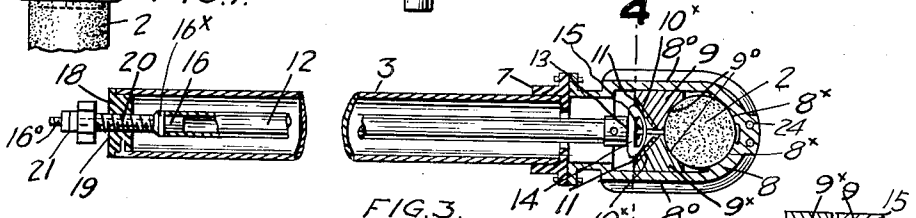

FIG. 3.

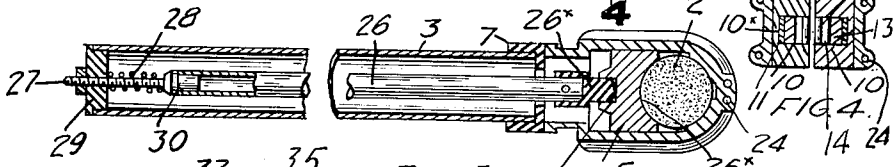

FIG. 5.

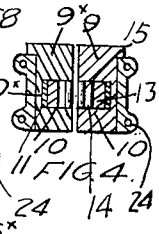

FIG. 4.

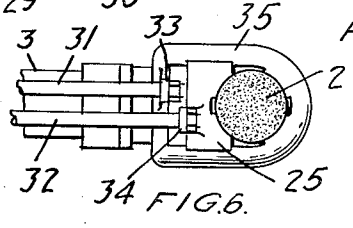

FIG. 6.

INVENTOR
J. YOUNG.
BY

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ELECTRODE HOLDER OR CLAMP

John Young, Welland, Ontario, Canada

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4 Claims. (Cl. 13—15)

My invention relates to improvements in electrode holders or clamps, particularly adaptable for use in electric melting or refining furnaces, and the object of the invention is first to provide a holder or clamp which will ensure of a good electric contact between the clamping members and the electrode, second to provide means for tightening the clamp on the electrode operated from a point remote from the electrode and the heat generated therefrom and from the furnace roof, and third to avoid the necessity of the operator climbing on the hot furnace roof to tighten or loosen the clamp, and it consists essentially of the arrangement and construction of parts as hereinafter more particularly explained.

Fig. 1 is a side elevation of an electric furnace showing my holders or clamps applied thereto.

Fig. 2 is an enlarged detail of a gib and my holder or clamp applied thereto.

Fig. 3 is a further enlarged plan sectional view through my holder and clamp intermediately broken away of its length.

Fig. 4 is a cross sectional view on line 4—4 Fig. 3.

Fig. 5 is a sectional plan view of a modified construction of clamp.

Fig. 6 is a plan view of the alternative construction shown in Fig. 5.

Fig. 7 is an end view of my clamp as shown in Fig. 2.

In the drawing like characters of reference indicate corresponding parts in the different views.

1 indicates an electric melting or refining furnace, 1^x being the roof. 2 are the electrodes carried in holders or clamps, hereinafter described, secured to tubular gib arms 3 secured on the bracket portions 4 of the gibs 5 which are raised and lowered in the usual manner. The arm 3 is provided with an insulating sleeve 6 inserted between such tube and the bracket 4. The arm 3 is provided with a flanged collar 7 at its outer end.

8 is the body of the clamp which is U or stirrup shaped in form so as to extend around one side of the electrode and formed with interior bearing seats 8^x contacting with the electrode periphery. The arms 8^o of the U body 8 form a guideway between which the movable members 9 and 9^x of the clamp slide, such members having arc shaped inner surfaces 9^o bearing against the side of the electrode opposite to the bearing faces 8^x. The inner sides of the members 9 and 9^x are recessed at 10 to form inclined faces 10^x, 10^x which together form a V shaped recess. 11 are bearing plates of hardened metal fitting against the inclined faces 10^x. The body 8 and members 9 and 9^x are preferably of copper or other suitable conducting material.

12 is a tubular thrust member provided at one end with a head 13 which is preferably arced transversely to bear against the plates 11 and is also provided with a transverse slot 14 through which pins 15, extending between the upper and lower walls of the recess, freely extend.

16 is a plug driven into the opposite end of the thrust member 12, the head 16^x of which is provided with a threaded stem 16^o. The gib arm collar 7 is secured by bolts to the flange 17 connected by the tubular portion 17^x so as to be integral with the body 3 of the clamp. The opposite end of the gib arm is provided with a closure 18 secured therein and provided with a central internally threaded orifice 19. 20 is a thrust screw meshing with the thread of the orifice 19 and through which freely extends the stem 16^o provided with nuts 21.

After the electrode 2 is inserted in the holder between the bearing faces 8^x of the body 8 and the bearing faces 9^o of the clamp members 9, the thrust screw 20 is then screwed against the head of the plug 16 forcing the tubular thrust tube 12 longitudinally and forcing the arc shaped head 13 against the plates 11 tending to spread the members 9 and 9^x apart and against the inner surface of the arms 8^o to form good contact and at the same time forcing the surfaces 9^o against the electrode and the electrode against the surfaces 8^x to form a tight grip. When it is desired to loosen the electrode, the thrust screw 20 is unscrewed, the head thereof bearing against the nuts 21 so as to withdraw the thrust member 12 and relieve the pressure of the members 9 and 9^x against the electrode 2.

It will be noted on referring to Fig. 1 that the head of the thrust screw 20 is located at considerable distance from the electrode and laterally of the furnace so that it can be readily reached without subjecting the operator to the intense heat of the furnace or electrode or requiring him to climb on the hot roof of the furnace to reach the adjusting screw.

22 are conducting tubes through which the current passes mounted on suitable brackets 22^x and 22^o, the current passing from the terminals 23 to and through the holder to the electrode. Water cooling may also be provided in the body of the holder as indicated at 24.

In Figs. 5 and 6 I show a modified construction in which I employ a single clamping member 25 surrounding the inner peripheral portion of the

electrode as indicated at 25x, the opposite face of the member being provided with a recess 25o. The adjacent end of the thrust member 26 is provided with a hardened thrust pin 26x turnably fitting the recess 25o. The opposite end of the thrust member is provided with a stem 27 corresponding to the stem 16o of Fig. 3 but in place of the thrust screw 20 I use a compression spring 28 extending between the end closure 29 and the plug 30 and serves to force the thrust member 26 longitudinally and the clamping member into contact with the electrode 2. In this form the conducting rods 31 and 32 are connected to the brackets 33 and 34 forming part respectively of the clamp body 35 and clamp member 25.

From this description it will be seen that I have devised a holder which will form a good contact between the parts thereof to convey the current to the electrode and which will enable the operator to adjust the clamp without approaching closely either to the intense heat of the electrode or the furnace roof.

What I claim as my invention is:

1. In an electrode holder, the combination with a tubular supporting arm suitably mounted at one end, an electrode holder secured to the opposite end of the arm, means within the holder for clamping the electrode, a thrust member within the tubular arm and engaging the clamping means at one end to force the same into contact with the electrode, a closure for the opposite end of the tubular arm, and having an internally threaded orifice, a tubular screw threaded in the orifice, a stem extending from the thrust member through the screw and having a nut screwed on its outer end against which the head of the tubular screw bears.

2. In an electrode holder, the combination with a tubular supporting arm suitably mounted at one end, an electrode holder secured to the opposite end of the arm and comprising a U-shaped body through which the electrode extends to fit against the base of the U, a divided clamping device bearing against the opposite side of the electrode, a thrust rod extending through the tubular arm, and means at the inner end of the thrust arm for simultaneously forcing the divided members into engagement with the electrode and for spreading them apart into tight contact with the sides of the U-shaped holder.

3. In an electrode holder, the combination with a suitably mounted supporting arm, an electrode holding device carried by the supporting arm and bearing against one side of the electrode, a divided clamping device bearing against the opposite side of the electrode and held between opposing portions of the holding device, a thrust member carried by the supporting arm, and means operated by the thrust member for simultaneously carrying the members of the clamping device into tight contact with the electrode and with the opposing portions of the holding device.

4. In an electrode holder, the combination with a suitably mounted support, an electrode holding device carried by the support and bearing against the electrode at each side of its diameter, a divided clamping device bearing against the opposite side of the electrode diagonally opposite the bearing points of the holding device and held between opposing side portions of the holding device, and means for simultaneously carrying the members of the clamping device into tight contact with the electrode and with the said opposing side portions of the holding device.

JOHN YOUNG.