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ELECTRODE HOLDER FOR ARC FURNACES

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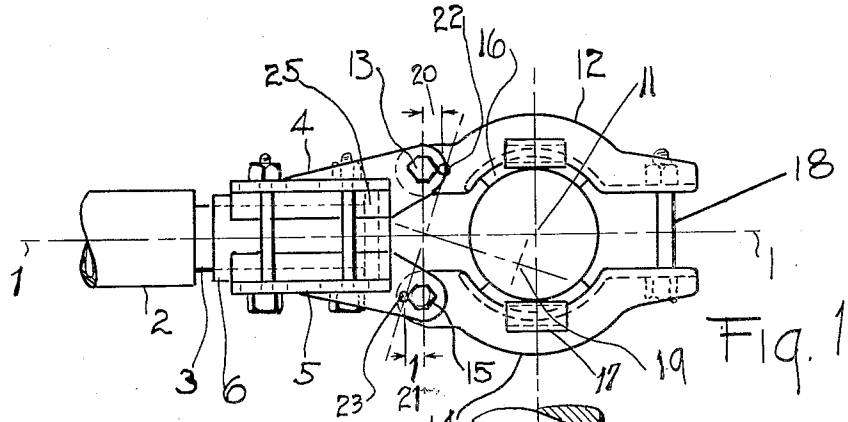


Fig. 1.

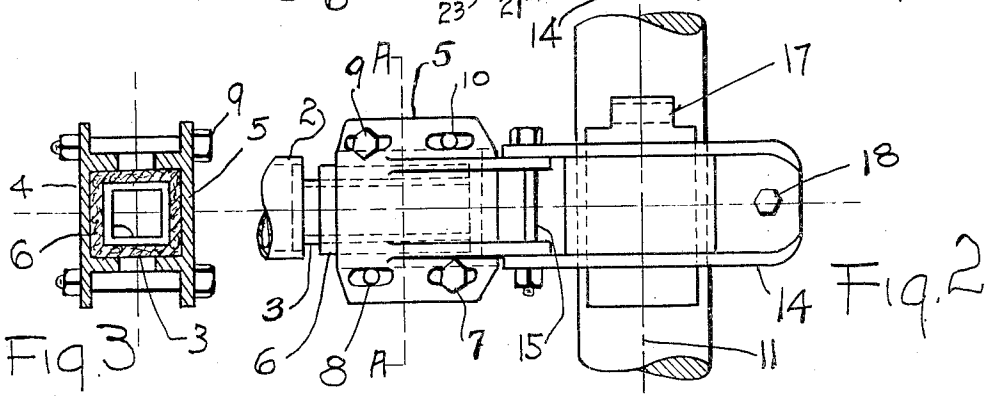


Fig. 3

Fig. 2

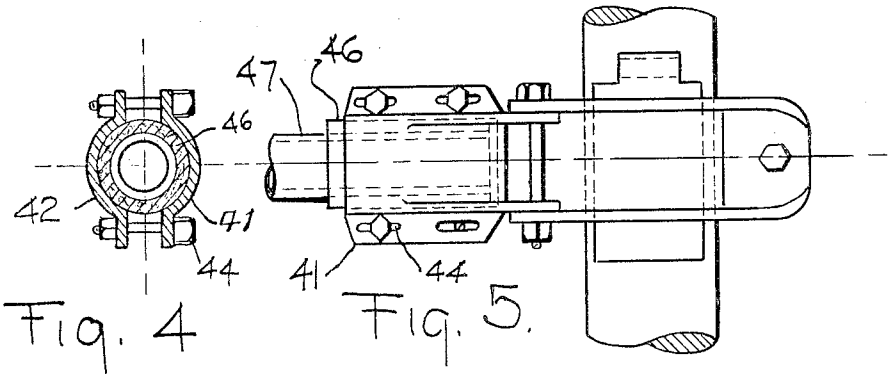


Fig. 4

Fig. 5.

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UNITED STATES PATENT OFFICE

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ELECTRODE HOLDER FOR ARC FURNACES

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My present invention relates to electrode holders for electric furnaces and more particularly to apparatus embodying improved means for lateral adjustment of the electrode axis and for insulating the holder from the arm.

In my previous application for patent, particularly United States Patent No. 1,616,797, I disclosed a universally adjustable electrode holder in which the electrode axis could be shifted horizontally about a vertical pin.

It is important to be able to move the electrode laterally. For example, to meet the changed location of the electrode hole in a new roof.

I have discovered a simple means of holding an electrode in horizontally adjusted position and of insulating the electrode clamp from the crosshead or holder arm. My improved holder comprises two adjustable hinge brackets, each having a vertical pin on which a hinge clamp is mounted. The hinge brackets are designed to fit against insulation, which in turn fits against the arm end or end part of the electrode arm. Movement of one pin and bracket ahead of the other will move the electrode axis to one side of the axis of the arm. I provide means such as slots and bolts in the hinge brackets for this purpose and for tightening the brackets in adjusted position.

These and other details of my invention will be better understood by reference to the annexed drawings.

Fig. 1 is a plan view of one embodiment of my invention. Fig. 2 is an elevation view of the apparatus of Fig. 1. Fig. 3 is a sectional elavation through the insulation along the line AA of Fig. 2. Fig. 4 is a sectional elevation through the hinge brackets of an embodiment of my invention in which the arm consists of a pipe. Fig. 5 shows an elevation view of the type of holder illustrated in Fig. 4.

Referring now to these figures, particularly Figs. 1, 2 and 3, I will describe my invention in further detail. The electrode arm in this figure is a pipe with its axis along the line 1—1. The pipe has a rectangular end portion 3, which extends inside the brackets 4 and 5, which in turn carry the hinge clamp members 12 and 14. The brackets 4 and 5 are insulated from the square or rectangular end part of the arm by means of electrical insulation, such as transite asbestos wood, known as transite 6. The transite extends inside the brackets 4 and 5 and insulates them from the metal of the arm proper and may be seen at 6 in the sectional elevation in Fig. 3, and it surrounds the rectangular end 3 of the arm and is inside the brackets 4 and 5.

In Fig. 2 may be seen the side elevation of this assembled electrode holder, including the arm 2, the insulation 6 surrounding the rectangular end of the arm, the bracket 5, the clamping member 14, the pin 15 which holds the clamping member 14, the contact 17 which contacts with the electrode 11 and is held against the electrode by the hinge clamp 14. The bolts 7, 8, 9 and 10 extending through the slotted holes in the bracket 5 serve to clamp the two hinge brackets 4 and 5 together against the insulation and in turn against the rectangular end of the arm. The holes through which these bolts extend are slotted so that one of the brackets may be moved with respect to the arm end or with respect to the other bracket. This means of adjustment constitutes a special feature of my invention. The center of the electrode in Fig. 1 is shown at 11. By moving the bracket 4 toward the electrode and the bracket 5 away from the electrode and then tightening the bolts so as to hold the hinge bracket members 4 and 5 in adjusted position, the center of the electrode will then be at one side of the arm axis of line 1—1 in Fig. 1. By this means I am able to adjust the position of the electrode axis horizontally to one side or the other of the arm axis. The amount of the adjustment is determined by the length of the slots. In Fig. 1 the electrode is shown with its axis 11 passing through the arm axis line 1—1; that is the hinge 12, which is mounted on pin 13, and the hinge 14 which is mounted on pin 15, clamp the electrode contacts 16 and 17 against the electrode so that the electrode axis is held in the position indicated by the point 11. A bolt 18 serves to hold the two ends of the clamp members

tight against the electrode, and the bolt also serves to loosen the clamp in order to move the electrode up or down in the clamp.

Now suppose it is desired to move the electrode horizontally to conform to a position where its axis would be at the point 19. By moving bracket 4 forward a distance indicated at 20, and by moving bracket 5 back approximately the same distance backward indicated at 21, then the new position of the electrode axis will be at 19. That is, the pins will have moved to the positions 22 and 23 and the electrode axis will be on a line at right angles to the line joining the centers of the pins in the positions 22 and 23, half way between them. The new adjustment is made by loosening the nuts on the four bolts, shifting the brackets and then tightening the nuts so as to clamp the brackets in the changed position. These bolts are not insulated from the brackets and this is an advantage over the previous construction which required mica insulation around the bolts. The insulation of my present invention extends outside of the brackets so that there is no danger of the current jumping from the hinge brackets which are in electrical contact with the electrodes to the arm end which may be grounded. The thickness of the transite or other insulation is determined primarily by the strength of it and by the weight of the brackets and contact mechanism carried on the end of the arm. Usually transite of about $\frac{3}{8}''$ or $\frac{1}{2}''$ thick is sufficient.

Fig. 4 shows a modified bracket in which the insulation is cylindrical and fits against the outside of the pipe arm and inside the two clamping members 41 and 42. This arrangement provides adjustment around the pipe arm and also provides adjustment of either or both of the hinge brackets 41 and 42 in the same manner as described with reference to the embodiment of my invention shown in Fig. 1. That is, the brackets like that at 41 have slotted holes 43 and bolts 44 which serve for tightening the hinge brackets in the adjusted position desired. These brackets may be tightened so as to remain in the desired position with respect to the pipe arm 45, and the insulation is shown at 46, surrounding the pipe arm and extending inside the hinge brackets. The insulation may be mica or transite or other suitable material.

Insulation, such as transite, may be provided at the end of the arm end in either of the constructions illustrated, and I have shown a piece of transite at 25 in Fig. 1 in this position. It serves to prevent the hinge bracket members from touching or making electrical contact with the arm end, and is held inside the hinge bracket members so that it cannot get out.

My improved electrode holder construction has a number of advantages. It is not necessary to depend on bolts insulated by mica or other insulating tubes which may become worn and break down and cause a short circuit, as may happen from loosening and tightening the bolts and nuts with resultant wear of insulating tubes around the bolts. Insulation which withstands both heat and wear may be used, such as transite, and since the pressure is applied over a considerable surface the rigidity of the holder parts is great. A further advantage is in the means for quick adjustment of the electrode position, and taken in combination with the universal adjustment means of my earlier United States Patent No. 1,616,797, my present invention provides a greatly simplified and improved electrode holder construction.

It is understood that the detailed construction which I have shown is not the only way in which my invention may be embodied in practice. Thus, instead of slotted holes, I may provide clamps outside of the hinge brackets, whereby the brackets may be moved independently of each other forward or backward, and thus provide for the horizontal adjustment of the electrode position in accordance with my invention, and such means is understood to be within the scope of my invention.

It is further understood that I may use contact members between the electrode and the hinge-clamping members and that these contacts may be fitted with water cooling means or without; and that I may combine the contact and hinge clamp member in a single member without getting away from the improvements of my present invention.

It is also understood that my invention is not limited to having the insulation between the arm and the hinge brackets but that the insulation may be placed elsewhere if desired; and my invention may also be applied to adjustment of the position of electrodes with other than vertical axis.

What I claim is:

1. In an electric furnace, an electrode holder comprising a horizontal arm for supporting an electrode at one end thereof, two hingeably mounted electrode clamping members, a hinge bracket for holding each clamping member, means for holding said brackets against the arm in longitudinally adjusted position and means for insulating the clamping members from the furnace proper.

2. In an electric furnace, an electrode holder having means for horizontal adjustment of a vertically movable electrode, said holder comprising a horizontal arm for holding an electrode at its outer end, two clamping members hingeably mounted each to an adjustable side bracket member, insulation between said bracket members and said arm, and means for tightening said bracket members against the arm in adjusted longitudinal position along

said arm, and means for clamping an electrode between said clamping members.

3. In an electric furnace, an electrode holder comprising a horizontal arm, insulation on said arm, bracket members held against the side of said arm in adjusted position along said arm with insulation between them and the arm and hinge clamp members mounted one on each bracket member and means for clamping an electrode between said hinge clamp members.

4. In an electric furnace, an electrode holder comprising a horizontal electrode supporting arm having horizontal and vertical end surfaces, insulation against said surfaces and hinge supporting brackets against said insulation in adjusted position longitudinally of the arm, means for clamping an electrode carried by said brackets, and means for changing the adjustment longitudinally of the arm to adjust the position of the electrode horizontally.

5. In an electric furnace an electrode carrier comprising an arm member having a flat surface at one part thereof, two hingeably mounted clamping members for clamping an electrode between, a slide bracket for each hinge, means for adjusting the position of each slide bracket independently of the other toward or away from the electrode axis and for holding them in adjusted position, and means for insulating them from the furnace proper and for clamping the electrode in said clamps.

6. In an electric furnace an electrode holding mechanism comprising a pipe arm for holding an electrode at its outer end, a hingeably mounted clamping member on each side of said arm, a hinge supporting bracket mounted on said arm for each clamp, and means for adjusting the position of said brackets along said arm and for holding them in adjusted position against said arm and means for insulating the electrode holding members from the furnace proper.

In testimony whereof I affix my signature.

ALBERT E. GREENE.