Aug. 6, 1946. S. CHRONIS 2,405,403

CARBON ARC ELECTRODE HOLDER

Filed Oct. 19, 1944

Fig. 1.

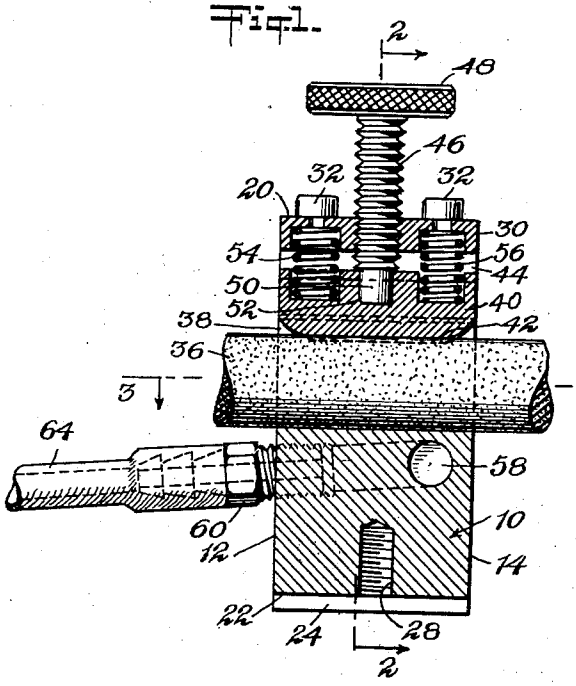


Fig. 2.

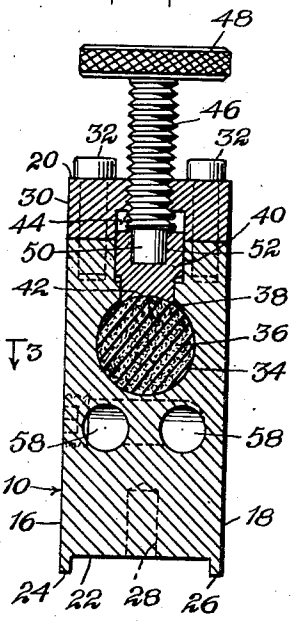
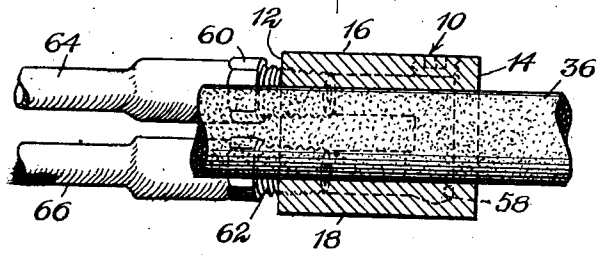


Fig. 3.



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CARBON ARC ELECTRODE HOLDER

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4 Claims. (Cl. 13—16)

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This invention relates to a carbon arc electrode holder, and more particularly to an electrode holder for a carbon arc apparatus such as is embodied in an electric furnace.

Carbon rod electrodes in an arc furnace are mounted in metallic holders included in the operating electric circuit. The carbon rod electrode is locked to the holder by a securing element which is manually releasable when it is desired to remove a spent or used electrode and replace it with a fresh carbon rod. In known structure of electrode holders, the release of the securing element loosens the connection between the electrode and the securing element as well as the metallic holder, thus freeing the electrode for withdrawal from the holder and permitting a new electrode to be freely replaced. This loose connection produces or results in a gap between electrode and the holder parts.

It is the customary or usual practice for the operator to maintain or keep on the current when an electrode is removed from and a new electrode inserted into the holder. When this is done with known structures of the type described, arcing invariably takes place at the gap in the loosened connection both when an old electrode is removed and a new one inserted. This arcing attacks and corrodes or eats away the metal of the securing element or the holder or both, and this necessitates frequent replacement of such securing elements and holders.

The prime object of my present invention relates to the provision of a carbon arc electrode holder in which the carbon electrode may be removed or replaced while the current to the machine is maintained, without the liability of such deleterious arcing taking place. In the electrode holder of the present invention, gaps are prevented from occurring by constant electrical contact being maintained between the electrode and all parts of the holder when the securing element is released or unlocked to permit free egress or withdrawal of a spent electrode and free ingress or insertion of a fresh electrode.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, my invention relates to the carbon arc electrode holder as sought to be defined in the appended claims and described in the following specification, taken together with the accompanying drawing in which:

Fig. 1 is a vertical elevational view in medial longitudinal cross-section of an electrode holder embodying the principles of construction of my present invention,

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Fig. 2 is a front elevational view thereof taken in cross-section in the plane of the line 2—2 of Fig. 1, and

Fig. 3 is a view thereof taken in transverse section in the plane of the line 3—3 of Fig. 1.

Referring now more in detail to the drawing, the electrode holder comprises a block-shaped casing, generally designated as 10, defined by the front and rear walls 12 and 14, the side walls 16 and 18 and the top and bottom walls 20 and 22, the said block casing being adapted to be mounted in the apparatus of which it forms a part, such as in an electric furnace, and connected in the electrical circuit therefor. For mounting the same, the bottom wall 22 may be grooved, providing the two marginal lips or flanges 24 and 26, and the block may be centrally threaded as at 28 for receiving a mounting securing element. Although the block casing 10 may be made as an integral or unitary piece, it is preferred in the present invention to form the top thereof as a separate cap piece 30 which is detachably mountable, and which is secured in position by means of the headed bolts (four in number) 32—32.

To carry out the object of the invention the holder 10 is formed with a channel 34 extending through the depth of the holder between the front and rear walls 12 and 14 thereof, the said channel being shaped to receive a carbon rod electrode 36, the channel being, however, open at its top over a portion of the circumference of the receiving electrode as at 38 (see particularly Fig. 2). The holder is further provided with a contact shoe 40 mounted at the top thereof, and mounted in the top for limited vertical movement in the holder. This contact shoe 40 preferably extends through the holder over its entire depth, from the front wall 12 to the rear wall 14 thereof. The contact shoe 40 is formed with a contact face 42 at its bottom, positioned at the open top 38 of the channel 34 and complementing the face of the channel to form or define therewith a seat for the carbon electrode 36, as is more clearly shown in Figs. 1 and 2 of the drawing.

The contact shoe 40 is so mounted and is so operable in the holder 10 that arcing gaps are prevented or obviated from occurring because of the constant electrical contact which is caused to be maintained between the carbon electrode 36 and the seating parts of the holder when the electrode is released or unlocked to permit free egress or withdrawal of a spent or used electrode, and free ingress or insertion of a fresh or new electrode.

To carry out this object and accomplish these results, resilient means are provided in the holder for yieldably urging the contact shoe to its electrode seating position for constant contact with a carbon electrode being removed from or replaced in said holder, and means are provided for positively moving the contact shoe to and holding the same in its seating position to lock the carbon electrode in the holder.

The contact shoe 40 is movable vertically within limits in a recess 44 formed in the holder, complemental portions of which are formed in the main block 10 and the cap 30, as clearly shown in Figs. 1 and 2 of the drawing. Centrally of the holder there is mounted an adjusting screw 46 provided conveniently at its operating end with a knurled finger wheel 48, the said adjusting screw being threadedly mounted centrally in the holder cap 30. The lower or free end of this adjusting screw is stud-shaped as at 50, and said stud is seated in an opening or recess 52 formed centrally in the shoe 40. On opposite sides of said adjusting screw are mounted a pair of springs 54 and 56 active on the opposite ends of the contact shoe for yieldingly urging the same to its electrode seating position. These springs are conveniently seated in aligned recesses formed respectively in the shoe 40 and in the holder cap 30, as best shown in Fig. 1 of the drawing.

By means of this construction, the adjusting screw 46 is used for positively moving the contact shoe to and for locking the same in its seating position to lock the carbon electrode in the holder, as depicted in Figs. 1 and 2 of the drawing, and when this adjusting screw is moved to unlock the contact shoe and loosen the carbon electrode for removal and replacement, the springs 54 and 56 exert a constant pressure on the shoe urging the same to its electrode seating position in constant contact with the electrode being withdrawn or inserted. Thus, when the adjusting screw 46 is rotated in one direction to unlock the contact shoe, the shoe is released for free upward movement in the recess 44 under the resilient or spring pressure, however, of the springs 54 and 56. When the carbon electrode 36 is now withdrawn, or a new one inserted, constant electrical contact therewith is maintained, thus obviating the formation of any arcing gaps. After a fresh electrode is inserted the adjusting screw 46 is rotated in the opposite or reverse direction to positively move the contact shoe and hold the same in its seating and locking position.

Preferably, the connection between the free stud end 50 of the adjusting screw 46 and the central recess 52 in the shoe is such that the shoe, in addition to its vertical movement in the holder, is capable of a rocking movement about the adjusting screw stud. Also, the construction is such that when the adjusting screw is moved to releasing position the stud thereof is not completely withdrawn from its mating shoe recess, and thus the shoe is held against longitudinal or through displacement in the holder. To permit of the rocking action of the shoe, the diameter of the stud is slightly less than the diameter of its mating recess. By means of this construction, a new electrode may be more readily or quickly slid or threaded into position in the holder, and the shoe, while capable of a limited vertical movement and a rocking movement, is prevented from longitudinal displacement in the holder.

In electrode holders of this type, it is the practice to circulate a cooling fluid therethrough to absorb heat developed in its use. This is accomplished by chambering the lower part of the holder by providing the communicating ducts 58 therein, and by connecting to the ingress duct a nipple 60 and to the egress duct a nipple 62, both of which may be connected by means of the pipes 64 and 66 to a supply of circulating cooling fluid.

The manner of making and using the electrode holder of my present invention, and the several advantages thereof, will in the main be fully apparent from the above detailed description thereof. In addition to accomplishing the main object of preventing arcing from taking place when a carbon rod electrode is removed from and another replaced in the holder while the current to the machine is maintained and thus preventing the holder parts from being attacked or corroded and thereby increasing the useful life of the holder, other objects are desirably achieved, such as the provision of a holder in which changing an electrode may be accomplished with facility and rapidity and in which the parts of the electrode are of comparatively simple design and may be assembled and disassembled with considerable ease and convenience.

While I have shown and described an electrode holder of the present invention in its preferred form, it is apparent that many changes may be made in the construction thereof without departing from the spirit of the invention defined in the following claims.

I claim:

1. A carbon arc electrode holder comprising a holder having a channel therethrough, said channel being open at its top, a contact shoe extending through said holder at its top and mounted in said holder for limited vertical movement therein, said contact shoe having a contact face at its bottom positioned at the open top of said channel and complementing the face of the channel to form therewith a seat for the carbon electrode, spring means in said holder active on the contact shoe for yieldably urging the same to its electrode seating position for constant contact with a carbon electrode being removed from or replaced in said holder, and a hand screw threadedly mounted in said holder and having its free end free from but engageable with the contact shoe for positively moving the same to and holding the same in its seating position to lock the carbon electrode in the holder, the said contact shoe being also rockably mounted in said holder about its region of engagement with the free end of said screw.

2. A carbon arc electrode holder comprising a holder having a channel therethrough, said channel being open at its top, a contact shoe extending through said holder at its top and mounted in said holder for limited vertical movement therein, said contact shoe having a contact face at its bottom positioned at the open top of said channel and complementing the face of the channel to form therewith a seat for the carbon electrode, spring means in said holder active on the contact shoe for yieldably urging the same to its electrode seating position for constant contact with a carbon electrode being removed from or replaced in said holder, and an adjusting screw threadedly mounted at the top of the holder and having its inner free end seated in a recess of said shoe, said adjusting screw when rotated in one direction acting to unlock said

shoe for vertical resilient motion and when rotated in the reverse direction acting to positively move the contact shoe to and hold the same in its seating position to lock the carbon electrode in the holder.

3. A carbon arc electrode holder comprising a holder having a channel therethrough, said channel being open at its top, a contact shoe extending through said holder at its top and mounted in said holder for limited vertical movement therein, said contact shoe having a contact face at its bottom positioned at the open top of said channel and complementing the face of the channel to form therewith a seat for the carbon electrode, an adjusting screw threadedly mounted centrally at the top of the holder and having its inner free end seated in a recess in said shoe, a pair of springs mounted in said holder and arranged on opposite sides of said adjusting screw active on the opposite ends of the contact shoe for yieldably urging the same to its electrode seating position for constant contact with a carbon electrode being removed from or replaced in said holder, said adjusting screw when rotated in one direction acting to unlock said shoe for vertical resilient motion but engaging said shoe to prevent endwise motion of said shoe, said adjusting screw when rotated in the reverse direction acting to engage and positively move the contact shoe to and hold the same in its seating position to lock the carbon electrode in the holder.

4. A carbon arc electrode holder comprising a holder having a channel therethrough, said channel being open at its top, a contact shoe extending through said holder at its top and mounted in said holder for limited vertical movement therein, said contact shoe having a contact face at its bottom positioned at the open top of said channel and complementing the face of the channel to form therewith a seat for the carbon electrode, an adjusting screw threadedly mounted centrally at the top of the holder and having an inner free stud end seated in a recess in said shoe, the contact shoe having a rockable movement in said holder about said stud, a pair of springs mounted in said holder and arranged on opposite sides of said adjusting screw active on the opposite ends of the contact shoe for yieldingly urging the same to its electrode seating position for constant contact with a carbon electrode being removed from or replaced in said holder, said adjusting screw when rotated in one direction acting to unlock said shoe for vertical resilient motion but the stud thereof engaging said shoe to prevent endwise motion in said shoe, said adjusting screw when rotated in the reverse direction acting to engage and positively move the contact shoe to and hold the same in its seating position to lock the carbon electrode in the holder.

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